West County South SROS
Gate 1 Submission
Annex 3 – Environmental Assessment

Prepared for:
South West Water, Southern Water and Wessex Water

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The content of the document is draft and relates to material or data which is still in the course of completion in travel to Gate 2, and should not be relied upon at this early stage of development. We continue to develop our thinking and our approach to the issues raised in the document in preparation for Gate 2.

Stantec

West County South SROS

Gate 1 Submission

Annex 3 - Environmental Assessment

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Contents

1 Introduction

1.1 BACKGROUND

1.1.1 This Annex presents a summary of the environmental assessments carried out to support the initial appraisal of the West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer Strategic Resource Options (SROs). In doing so, the report presents an initial analysis of likely environmental impacts from the two schemes being progressed through the WCS SROs at Gate 1, drawing upon the findings of proportionate Strategic Environmental Assessment (SEA), Habitats Regulation Assessment (HRA), Water Framework Directive (WFD) Compliance Assessment, Invasive Non-Native Species (INNS) Risk Assessment, Carbon Assessment, and Natural Capital (including Biodiversity Net Gain (BNG)) Assessment workstreams. Full details of the findings of all technical environmental assessments undertaken at Gate 1 are provided within **Technical Appendices 3.1 – 3.6** which support this Annex.

1.1.2 Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) these projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally separate schemes which will be appraised concurrently by RAPID. This report therefore provides a single environmental assessment which considers both schemes.

1.1.3 This report has been reviewed by the water companies involved in the WCS SROs and subject to independent third-party assurance in line with RAPID's requirements prior to submission. The assurance process confirmed that the environmental analysis undertaken to support the WCS SROs Gate 1 Submission is robust.

1.2 CONTEXT

1.2.1 Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

1.2.2 PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

1.2.3 Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

- Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
- Potential water source - Roadford pumped storage scheme (WCS2)
- Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

1.2.4 The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within **Annex 2 – Options Appraisal Report** (including WCS1-3 Environmental Review reports) and **3 – Concept Design Report** respectively. These directly support the environmental assessment of selected options and initial concept designs for the two schemes being progressed through the WCS SROs as detailed in this report.

1.3 PURPOSE AND OBJECTIVES

1.3.1 This Annex (and associated supporting and technical appendices) provides pertinent assessment information to support Section 5 - Environmental and Water Quality Considerations of the WCS SROs Gate 1 Submission Reports in accordance with appraisal criteria specified by RAPID. In doing so, the report presents a high-level analysis of the feasibility of the two schemes (and constituent components) being progressed through the WCS SROs in environmental terms. In line with best practice this includes the development and application of technical assessment methodologies to inform the initial concept design of each scheme, identify key environmental risks and develop mitigation and monitoring proposals for consideration through refined concept designs at Gate 2.

1.3.2 The specific purpose and objectives of each technical environmental assessment summarised in this report is detailed within **Appendices 3.1 – 3.6**. This includes (N.B. not an exhaustive list):

- **Appendix 3.1 SEA** – discharge of 'reasonable alternatives' caselaw requirements, initial assessment of likely significant environmental effects (at component and scheme levels), initial development of mitigation and monitoring measures;
- **Appendix 3.2 HRA** – initial screening (at component and scheme levels) to establish the potential for Likely Significant Effects (in HRA terms) on relevant European Sites, identification of key interactions between each scheme and European Sites for further consideration at Gate 2;
- **Appendix 3.3 WFD Compliance Assessment** - initial analysis of WFD compliance risks at component and scheme levels;
- **Appendix 3.4 Natural Capital and Biodiversity Net Gain Assessment** – initial analysis of likely Natural Capital impacts (e.g. changes to ecosystem services) and BNG opportunities arising at scheme level;
- **Appendix 3.5 Carbon Assessment** – initial analysis of likely embodied and operational carbon impacts at scheme level; and,
- **Appendix 3.6 INNS Risk Assessment** – initial assessment at component and scheme levels of the risks of spreading INNS or creating pathways which themselves could increase the risk of spreading INNS.

1.4 REPORT STRUCTURE

1.4.1 The remainder of this report is structured as follows:

- **Section 2 – WCS Overview**: provides an outline of the components and associated options which together comprise the West Country South Strategic Resource Options (WCS SROs);
- **Section 3 – Methodology**: section outlines the approach adopted to undertake a proportionate Integrated Environmental Assessment (IEA) of the two schemes being progressed through the WCS SROs. At Gate 1 the aims of the IEA are to support initial concept design work and identify likely significant effects and key environmental risks;
- **Section 4 – Assessment Results**: provides a summary of the results of the IEA carried out for the two schemes being progressed through the WCS SROs. Full details of the results of constituent technical environmental assessments are provided in **Technical Appendices 3.1 – 3.6**;
- **Section 5 - Environmental Mitigation and Monitoring**: outlines initial mitigation options and monitoring proposals to address predicted likely significant adverse environmental effects and key risks.
- **Section 6 - Net Environmental Gain**: reviews the compatibility of the WCS SROs with Environmental Ambition recommendations for the emerging West Country Water Resources (WCWR) Regional Plan, considers the conceptualisation of net environmental gain as applied to the schemes being progressed through the WCS SROs and outlines proposals to develop Environmental Offsetting Areas as part of the schemes; and,
- **Section 7 – Next Steps**: outlines the next steps for progressing the IEA at Gate 2 to support decision making and refined concept designs for each scheme.

1.4.2 The main body of the report supported by the following appendices included within this document:

- Appendix A – Mitigation Plan;
- Appendix B – Monitoring & Stakeholder Engagement Plan; and,

- Appendix C: Environmental Risk Register.

1.4.3 The report is also supported by **Technical Appendices 3.1 – 3.6** which function as standalone technical environmental assessment reports.

2 WCS Overview

2.1 SUMMARY

2.1.1 As noted in **Section 1**, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

- Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
- Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
- Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO CONCEPT DESIGN COMPONENTS AND SCHEMES

2.2.1 Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

- Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 ML/D effluent[1] from Poole Sewage Treatment Works (STW) via River Stour:
  a) Poole STW infrastructure (pumps and tanks)
  b) Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at new WRC plant)
  c) River Stour section (in-river)
  d) River Stour abstraction (including eel screen)[2]
  e) River Stour bankside storage
  f) River Stour Pre Treatment Works (for onwards transmission)
- Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 ML/D for onwards transmission:
  a) Abstraction from River Tamar at Gatherley intake (125 ML/D winter months only)
  b) Gatherley to Roadford Lake including outlet (Lifton North route)
  c) Roadford Lake (no major changes to existing reservoir proposed)
  d) Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)
  e) Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)
- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)
  a) Northcombe to Prewley
  b) Prewley to Parsonage
  c) Parsonage to Pynes WTW
  d) River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)
  e) River Exe Abstraction (new) at Bolham Weir

[1] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). As per **Appendix B – Monitoring Plan**, technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.

[2] Section 3.2.3 of **Annex 2 – Concept Design Report** provides a schematic diagram and outline layout showing the approximate area of Components 1d – f.

    f) River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)
    g) Allers to Woodgate
    h) Woodgate to Kingston St Mary
    i) Kingston St Mary to Summerslade
- Component 4: Transmission Systems to SRN (components 4a - 4b)
    a) Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)
    b) River Stour Pre Treatment (Component 1f) to Testwood
        - Sub-component 4b.1: River Stour to Redlynch WBS/Storage
        - Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)
- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)
    a) Testwood WTW
    b) Testwood Lakes (small)
    c) Testwood potable storage tanks

2.2.2 Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer
    - River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
    - River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
- Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

2.2.3 Further details regarding each scheme are provided in **Annex 2 – Concept Design Reports**.

2.2.4 Adopting a ‘bottom up’ approach in line with standard SEA and HRA practice, proportionate environmental assessments have been undertaken at component and scheme levels for each of the proposed WCS schemes, except in relation to macro-environmental impacts including effects on climate change and aggregate changes in natural capital stocks which can only be assessed at scheme level.

3 Methodology

3.1 OVERVIEW

3.1.1 This section outlines the approach adopted to undertake a proportionate Integrated Environmental Assessment (IEA) of the two schemes being progressed through the WCS SROs. At Gate 1 the aims of the IEA are to support initial concept design work and identify likely significant effects and key environmental risks.

3.2 GATE 1 ENVIRONMENTAL ASSESSMENT REQUIREMENTS AND EXPECTATIONS

Statutory & Policy Requirements

PR19 Final Determination

3.2.1 PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) confirms that the requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme or SRO as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4. *PR19 final determinations: Strategic regional water resource solutions* (Ofwat, 2019) does not however specify environmental assessment requirements and was itself exempt from statutory SEA requirements owing to being a financial plan (i.e. a funding determination from Ofwat[3]).

3.2.2 SROs therefore do not constitute relevant and qualifying plans or programmes under the Environmental Assessment of Plans and Programmes Regulations 2004 (‘the SEA Regulations’) and in relation to the Conservation of Habitats and Species Regulations 2017 (‘the Habitats Regulations) no authorisation or development consent is presently being sought. Rather, SROs at RAPID Gate 1 constitute concept level project options. This means SROs are not themselves subject to statutory environmental assessment requirements and there is currently no statutory requirement to consult (whether with statutory bodies or more widely) within any environmental assessment processes adopted to support SRO development.

Established Principles from SEA, HRA and WFD

3.2.3 Notwithstanding the non-statutory context of SROs, from the outset of the gated development process RAPID has recognised the need to engage with stakeholders and to identify key environmental risks through proportionate environmental assessment processes. Identification of key environmental risks across 17 different SROs on a consistent basis requires a common set of principles for assessment to be followed, and as detailed in **Table 3.1** below this includes the application of established principles from SEA, HRA and Water Framework Directive (WFD) Compliance Assessment processes to provide methodological rigour and generate comparable assessment results.

3.2.4 Case law has established that SEA also functions as an important evidence base to justify a plan or strategy as prepared, and the non-inclusion of possible other contents. Within the context of the WCS SROs, this means:

- Demonstrating that proposed components and options within the scope of the WCS SROs are themselves ‘reasonable’ (i.e. evidence based and contributing effectively to the implementation of higher-level objectives); and,
- Determining whether there are any other ‘reasonable alternatives’ to the proposed components of WCS which could achieve the same objectives. In the event that reasonable alternatives can be identified these should be subject to an equal level of assessment (to identify likely significant effects). This process should demonstrate that the selected WCS components and options perform better in overall terms than any other identified reasonable alternatives.

[3] In December 2020 RAPID confirmed that the development of SROs constitutes ‘joint solution development’ by water companies working in partnership, rather than the implementation of a formal programme.

3.2.5 The approach adopted to appraise initially identified (i.e. unconstrained) options, select components for inclusion in the initial concept design of each scheme and discharge SEA reasonable alternatives requirements is therefore detailed within **Annex 1 – Options Appraisal** and **Appendix 3.1 – SEA**.

ENVIRONMENT AGENCY & NATURAL ENGLAND SRO GATE 1 EXPECTATIONS

3.2.6 In June 2020 the EA and NE published an initial set of information and assessment expectations for Accelerated Gate 1 submissions, focused around identifying key environmental risks and developing and assessment work programme for Gate 2. These Gate 1 expectations were refined following review of Accelerated Gate 1 submissions. In Spring 2021 the EA also provided further guidance regarding general data requirements for the gated appraisal process, requirements for INNS assessments and requirements for water quality assessments for re-use schemes.

3.2.7 **Table 3.1** below outlines the stated expectations of the EA and NE for SROs at Gate 1 and explains how these have been addressed through environmental assessment work undertaken for the WCS SROs. This demonstrates that proportionate reporting has been prepared to address all of the EA & NE's stated expectations at Gate 1 and no relevant work needed to inform Gate 1 decision making has been deferred to Gate 2.

Table 3.1: Environment Agency & Natural England Expectations for Gate 1 Submissions

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
Solution Design	Is the solution, and all sub options under consideration well described to allow the assessment to proceed?	Have site locations and pipeline corridors for all sub options been identified?	Yes • Component level options identified and subject to screening through WCS1-3 • WCS1-3 Environmental Reviews and Preliminary European Site Interactions Technical Notes provided as Appendix A of Annex 1 – Options Appraisal.
	What evidence is there of solution development and is this sufficient for the development to progress?	Have any unattainable environmental constraints that prevent the scheme/ sub scheme progressing to the next gate been identified?	No – all showstopper constraints addressed through options screening • WCS1-3 Environmental Reviews and Preliminary European Site Interactions Technical Notes generated an initial evidence base to establish potentially feasible component-level options and exclude other options with showstopper constraints. • Approach to the identification of reasonable alternative options outlined in Appendix 3.1 – SEA. Full screening results provided in Annex 1 – Options Appraisal.
		How well have the company identified and used readily available environmental information in particular with regards to designated sites and Water Framework Directive (SACOs, FCTs, conservation objectives MCZ conservation objectives, information from their own WFD investigations, Natural Capital atlas information SSSI, etc).	Readily available information underpins WCS SROs Gate 1 IEA • Technical Appendices 3.1 – 3.6 present discipline-specific assessments using available environmental datasets, including from WRMP19 outputs and publicly available sources. To remain proportionate no environmental surveys have been commissioned specifically for the WCS SROs at Gate 1. • River Tamar Resource Availability Assessment (SWW, 2021) used to inform assessment of Component 2a – River Tamar abstraction (Gatherley Intake) as well as to implement SWW WRMP19 proposals and support SWW Grid Enhancement Enablement Project. • WCS1-3 Environmental Reviews included collation of relevant datasets to inform options screening as detailed in Annex 1 - Options Appraisal.
	Are the benefits the project will bring in terms of water resources clearly articulated and defined?	Has the scheme benefits in terms of water resources been clearly articulated and defined? This should include public water supply benefits as well as conjunctive use and wider resilience benefits, including other sector benefits (where appropriate).	Yes • WCS1 Environmental Review and Options Appraisal • Resource benefits (inc. increased resilience at Roadford Lake) from enhancing Roadford Pumped Storage through the WCS SROs outlined in River Tamar Resource Availability Assessment. • Network resilience and integration benefits outlined in Appendix D of Appendix 3.1 – SEA.
Evaluation of cost and benefits	**To what extent do the costs for the project delivery and operation represent evidenced, efficient costs?**		
	Are all the non-water resource benefits, societal and	How well have non-water resource benefits, societal and environmental been evaluated?	Non-water resource benefits from initial concept design of each scheme have been identified

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
	environmental, costed and/or evaluated as appropriate?		• Network resilience and integration benefits outlined in Appendix D of Appendix 3.1 – SEA. • Application of WCS SROs SEA Framework including detailed assessment criteria • Opportunities to delivery biodiversity net gain and wider net environmental gain discussed in Appendix 3.4 – Natural Capital and BNG Assessment and Section 6 respectively.
		Have the following 5 metrics been considered appropriately as part of a natural capital approach? Biodiversity and habitat Climate Regulation (carbon storage) Natural hazard (flood and drought) regulation Water Purification Water Regulation	Yes • Additional metrics also included to provide coverage of all likely effects on ecosystem services and natural capital changes. Refer to Appendix 3.4 – Natural Capital and BNG Assessment.
		How well have amenity benefits been considered in its non-monetised assessment?	Amenity benefits have been considered in non-monetised assessment • Recreation included as additional metric in Appendix 3.4 – Natural Capital and BNG Assessment. • Network resilience and integration benefits outlined in Appendix D of Appendix 3.1 – SEA. • SEA tabular & summary reporting (component & scheme levels) against all Core SEA Objectives, including Population & Health and Material Assets.
		Does the scheme contribute to environmental and biodiversity net gain? And if so how? In particular does the scheme contribute to the 25 Year Environment Plan commitments and targets; and also other statutory environmental duties for biodiversity (which apply to EA, Water companies, OFWAT and DWI) of: - Conserving and enhancing SSSIs (Wildlife and countryside Act as amended) - Furthering the purposing of the habitats directive (and regulations) Conservation of Habitats and	Yes – statutory environmental duties complied with, contributions to BNG and wider net environmental gain identified • Marine Protected Areas and SSSIs considered as receptors within WCS1-3 Environmental Reviews and scheme level SEA (Appendix 3.1). Environmental inputs to initial concept design excluded route corridors due to environmental showstopper constraints and minimised interactions with statutory designations (all remaining interactions needed to avoid unacceptable impacts on other receptors will be reviewed at Gate 2). • Appendix 3.2 – HRA provides an initial HRA Screening to identify potential Likely Significant Effects on relevant European Sites. RAG based interaction scoring methodology adopted to identify specific impact pathways. This builds upon WCS1-3 Preliminary European Site Interactions Technical Notes (provided in Appendix A of Annex 1 – Options Appraisal).

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
		Species Regulations 2017 as amended. - Achieving the conservation objectives for marine protected areas (Marine and Coastal Access Act) - Biodiversity net gain for habitats and species of principle importance for the conservation of biodiversity – (Natural Environment and Rural Communities Act).	• Appendix 3.4 - Natural Capital and BNG Assessment considers options to deliver BNG at scheme level. This contributes to proposals for wider net environmental gain outlined in Section 6. • Consolidated Environmental Mitigation and Monitoring Plans provided in Appendices A and B. These include specific measures to protect statutorily designated sites. • Impacts on statutory designations included in Appendix C - Environmental Risk Register.
		How well does the scheme take into account the carbon challenge/ commitment?	Carbon impacts considered throughout options development, initial concept design (of each scheme) and Gate 1 environmental assessments. • WCS1-3 Carbon Assessment Technical Notes generated an initial evidence base to take account of embodied and operational carbon emissions in options development and screening. Refer to Appendix A of Annex 1 – Options Appraisal. • Component and scheme-level assessments of carbon impacts from the two schemes being progressed through the WCS SROs prepared – refer to Appendix 3.5 – Carbon Assessment. Assessment findings taken account of in scheme-level SEA and Natural Capital assessments presented in Appendices 3.1 and 3.4 respectively. • Appendix 3.5 – Carbon Assessment includes initial consideration of the development of a scheme-level Net Zero Strategy. • Impacts on the delivery of net zero emissions (at water company level) included in Appendix C - Environmental Risk Register.
Risk and programme management	Does the submission clearly demonstrate that the delivery of the solution is on track? Does the programme plan set out key milestones; clear identification of any changes, delays and mitigation measures?	Has a programme plan been shared that sets out key milestones; clear identification of any changes, delays and mitigation measures. The programme plan should be designed to ensure timely delivery of the solution.	Yes • Gate 1 Environmental Engagement Schedule provided as Table 3.2 (draft previously shared with EA & NE). • Appendices 3.1 – 3.6 outline Gate 2+ assessment, mitigation and monitoring proposals (consolidated in Appendices A and B). • Environmental and consenting requirements underpin overall WCS SROs Delivery Plan.
	To what extent are water quality and environmental risks assessed and evaluated? Are assessments carried using monitoring and methods agreed with regulators?	Does the scheme have an environmental monitoring plan that has been agreed with EA/NE (if required)?.The plan should be designed to support assessment and evaluation of water quality and environmental risks including flood risks.	Yes • Appendix B - Environmental Monitoring Plan outlines a collated suite of proposed environmental monitoring to address likely significant effects and key risks as identified through Appendices 3.1 – 3.6. This includes measures to address water quality, flood and wider environmental risks.

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
	What evidence is there that regulatory barriers have been considered?	Have regulatory barriers been considered appropriately?	Yes • Abstraction, discharge and environmental water quality regulatory requirements considered within Appendix 3.3 – WFD Compliance assessment • Development authorisation requirements and consenting route options analysed within Annex 6 – Initial Consenting Strategy • Abstraction, discharge, environmental water quality and development consenting regulatory requirements underpin proposed Gate 2+ activities and programme set out in overall WCS SROs Delivery Plan.
	Initial option-level environmental assessments, meeting local requirements as well as complying with SEA and HRA legislation, including consideration of in-combination effects and identification of environmental risks that need mitigating through the solution design and costing.	Has an initial high level environmental assessment been completed for the scheme that meets local environmental requirements? Any environmental assessment should take into account SEA requirements where appropriate such that it can be used to support SEA at a later date if or when required. These should be discussed and agreed with EA and NE. *Please note, it is recommended that the water company takes legal advice on the requirement for a scheme level SEA in addition to the Regional Plan SEA. The Regional plan SEA would have to fully assess the environmental impacts of each relevant SRO. There are likely to be EIA requirements in the future for those schemes that are not NSIPS*	Yes, all relevant initial high level environmental assessments (including SEA) carried out • Initial analysis carried out through WCS1-3 identified potential environmental effect types and risks associated with component options. Findings from WCS1-3 Environmental Reviews and from Preliminary European Site Interactions Technical Notes directly informed two-stage options screening, with outcomes subsequently discussed with the EA and NE and agreed with the water companies. Refer to Annex 1 – Options Appraisal. • Proportionate scheme level environmental assessments (including SEA) prepared for WCS SROs at Gate 1 in a way which supports WCWR Regional Plan development. • Application of WCS SROs SEA Framework including detailed assessment criteria and impact pathway analysis. Refer to Appendix 3.1 – SEA. • EIA Screening and HRA Prior Approval requirements (for non-DCO schemes) addressed within Annex 6 – Consenting Strategy.
		Has the scheme considered in-combination effects and identification of environmental risks and potential mitigation?	Yes • In-combination effects assessed within scheme-level assessments presented in Technical Appendices 3.1 – 3.6. • Appropriate mitigation measures devised through scheme-level assessments presented in Technical Appendices 3.1 – 3.6 to address predicted likely significant adverse effects and key risks. • Collated environmental mitigation schedule and risk register provided in Appendices A and C. • Identified environmental risks summarised within higher-level project risk register.

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
		Does the scheme, at this stage, comply with HRA and other relevant environmental legislation?	Yes, HRA requirements and other environmental legislation addressed. • WCS2 & 3 Preliminary European Site Interactions Technical Notes prepared to provide initial HRA input to component-level optioneering. • Initial HRA screening carried out at component and scheme levels to consider all potential impact pathways which could generate Likely Significant Effects on relevant European Sites. Refer to Appendix 3.2 – HRA. • Two-stage assessment of risks to net-deterioration and impediments to achievement of 'good status' completed for impacted waterbodies in line with ACWG guidance. Refer to Appendix 3.3 – WFD Compliance Assessment. • SEA 'reasonable alternatives' caselaw and Scoping requirements addressed within Appendix 3.1 – SEA.
		Has the scheme presented conclusions and issues arising from environmental work to date and what future work is planned?	Yes • All key findings from environmental assessments completed to date (WCS1-3 Environmental Reviews and Technical Appendices 3.1 – 3.6) summarised in Annex 3 – Environmental Assessment (this document). • Technical Appendices 3.1 – 3.6 have identified discipline-specific environmental assessment requirements at Gate 2+, as summarised in Section 7.3. • Appendices A – C present consolidated environmental mitigation and monitoring plans and an environmental risk register to address likely significant effects and key environmental risks identified at Gate 1.
		Does the scheme have reasonable prospects of meeting the following legislative, planning or policy requirements of projects: (Note that if the scheme does not meet all of these tests it may also undermine ability to achieve 25 YEP targets for designated sites or priority habitats)	Yes • Annex 6 – Initial Consenting Strategy presents an initial analysis of consenting regime/route options and planning requirements to implement the two schemes being progressed through the WCS SROs. The Initial Consenting Strategy identifies scheme components which constitute 'development' and reviews relevant statutory and national policy provisions.
		HRA tests for European sites	Addressed through: • WCS2 & 3 Preliminary European Site Interactions Technical Notes • Appendix 3.2 - HRA
		Least Hinders test from MCZs MCAA No serious harm (Wildlife & Countryside Act for SSSIs and EA guidance)	Addressed through: • WCS1-3 Environmental Reviews • Appendices 3.1 – SEA and 3.6 – INNS Risk Assessment

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
		Major development tests (National Planning Policy Framework NPPF for AONBs and National Parks)	Addressed through: • WCS1-3 Environmental Reviews • Appendix 3.1 – SEA • Annex 6 – Initial Consenting Strategy
		No loss of irreplaceable habitat test (NPPF – e.g. limestone pavement, chalk reef, chalk heath, ancient woodland etc…).	
	Are areas of uncertainty identified and how well developed are there proposals to manage the uncertainty?	Has the scheme identified areas of uncertainty and how these can be managed appropriately? The environmental assessment should be used to inform this work.	Yes • Uncertainties initially identified at component-level through WCS1-3 Environmental Reviews • WCS1-3 gap analysis carried out to inform scope of scheme-level environmental assessments presented in Technical Appendices 3.1 – 3.6. • Uncertainties arising from Gate 1 environmental assessments addressed through Gate 2+ environmental mitigation and monitoring plans (Appendices B and C). • Environmental risk register provided in Appendix C, which informed higher-level project risk register.
	How well have the parties evidenced that expenditure to date has been efficient?		Proportionate IEA methodology developed and applied to ensure efficient expenditure. • Care taken to avoid duplication of assessments for emerging WCWR Regional Plan. • WCS SROs SEA Framework developed for WCS SROs but capable of application to West Country North SRO at Gate 2 and emerging WCWR Regional Plan to enable consistent assessments.
Consistency and context	How well has the solution been placed in context of company/regional/national plans?	Is the scheme in the company's WRMP19 ?	No, except Roadford Pumped Storage feasibility assessment (completed through WCS2 and River Tamar Resource Availability Assessment (SWW, 2021)
		What was the public and regulatory response to the scheme in WRMP19 to the scheme?	N/A
		Are the scheme owners engaged in regional groups and plans?	Yes, WCS SROs are being developed in tandem with and will be included within the emerging WCWR Regional Plan
		Does the scheme take into account the National planning framework?	Yes • National Planning Framework requirements (e.g. regarding natural capital assessment and Environmental Ambition) taken account of in development of scheme-level IEA methodology and preparation of Technical Appendices 3.1 – 3.6 and this Annex.

RAPID Gate 1 Assessment Criteria	RAPID Assessment Challenges	EA, NE Assessment Expectations	WCS SROs Response at Gate 1
		How well have the impacts of the scheme on the relevant water companies supply demand balance been identified?	In progress • WCS SROs Gate 1 evidence presently being inputted to WCWRG supply-demand balance review (Summer 2021) • River Tamar – Testwood transfer scheme informed by River Tamar Resource Availability Assessment (SWW, 2021)
	To what extent are data and methods of analysis consistent with those recommended / agreed / used in regional plans and other solutions?	Are the data and methods of analysis (where appropriate) consistent with the relevant regional plans and other solutions? E.g 1 in 500?	Yes • WCS SROs IEA Scoping Study informed by review of other Regional Plans, WCWRG Method Statements, WRMP19s and other relevant plans (e.g. emerging SWW Drought Plan). • ACWG methodologies reviewed to inform IEA methodology and confirm reporting requirements.
	How well are dependencies identified and issues managed?	How well are dependencies of options / sub options identified and how are these issues managed?	Dependencies identified within: • Annexes 1 – Options Appraisal and 2 – Concept Design Report. • Project level risk register • 'Approach to Reasonable Alternatives' section of Appendix 3.1 – SEA.
	What evidence is there of engagement with stakeholders and to what extent is the engagement robust and representative?	Has there been appropriate stakeholder engagement and does the scheme stakeholders engagement plan include timely consultation with relevant environmental stakeholders including NGOs, NE as well as the EA. (RAPID will be responsible for reviewing full engagement plan)? Are there appropriate plans in place for future engagement? (Additional stakeholder engagement may be required for schemes outside of WRMP19.)	Yes • Gate 1 Environmental Engagement Schedule provided as Table 3.2 (draft previously shared with EA & NE). • Proportionate engagement with the EA, NE and relevant Local Planning Authorities from January – May 2021.
	Is a clear recommendation made for the scheme to proceed/stop and what evidence is this recommendation based on?		Yes • WCS SROs Gate 1 Summary Reports include clear recommendations, evidenced by conclusions of all Annexes and associated appendices. • Gate 2+ IEA proposals outlined in Section 7 – Next Steps based on discipline-specific assessment plans prepared for Gate 2+. Refer to Technical Appendices 3.1 – 3.6.

3.3 APPROACH TO INTEGRATED ENVIRONMENTAL ASSESSMENT

WCS1-3 Environmental Reviews

3.3.1 Work packages WCS1-3 generated an initial evidence base to establish a set of potentially feasible component-level options, comprising water sources and transmission routes, to be further developed through concept design and included in WCS SROs at Gate 1. As detailed in Appendix A of **Annex 1 – Options Appraisal**, this included identifying relevant environmental (inc. planning) constraints within specified distance thresholds (in line with ACWG guidance) which could interact with component-level options. To underpin environmental assessments at Gate 1, WCS1-3 Environmental Reviews first considered potential interactions between each unconstrained (i.e. initially identified) component-level option and relevant biodiversity, flood risk & water environment, landscape, heritage, and planning & infrastructure constraints as identified through GIS analysis. However, to remain proportionate detailed environmental reporting was not prepared at screening stage for all component options or at scheme level, as it was recognised that some would quickly be discounted due to showstopper constraints (refer to **Annex 1 – Options Appraisal** for details).

3.3.2 The initial analysis carried out through WCS1-3 informed the identification of potential generic environmental effect types and risks associated with each component option. Findings from the WCS1-3 Environmental Reviews were used to inform a two-stage tabular screening process (pass/fail and RAG based), with screening outcomes subsequently discussed and agreed with the WCWRG and constituent water companies through workshops held in February 2021. A workshop regarding key risks identified through WCS1-3 Environmental Reviews was also held with the Environment Agency and Natural England in March 2021. Component option level screening resulted in only a limited set of component options now being identified as 'potentially reasonable alternative' components (subject to the outcome of Gate 1) for inclusion within the WCS SROs, as detailed in **Section 2**. These retained components now form part of two schemes being progressed through the WCS SROs at Gate 1, each of which has been subject to a proportionate IEA (including SEA, HRA, etc) and initial concept design development.

3.3.3 Owing to their focus on identifying key risks and establishing the feasibility of options at component level, WCS1-3 Environmental Reviews afforded only limited consideration to scheme level options for environmental mitigation and net environmental gain, non-resource related socio-economic benefits and environmental monitoring. It was also not possible at that early stage to identify likely significant effects at scheme level (i.e. impacts across the full extent of each proposed long distance transfer), examine the alignment of the WCS SROs with the emerging regional Environmental Ambition or to consider how environmental issues should be addressed through the WCS SROs beyond Gate 1. Each of matters issues therefore required further consideration through an IEA of the two schemes being progressed through the WCS SROs.

IEA Scoping

3.3.4 Stantec UK Ltd (Stantec) and Ricardo Energy & Environment (Ricardo) were jointly commissioned to undertake an IEA Scoping Study to define a proportionate and effective approach for undertaking twin-track environmental assessments of the WCS SROs (at scheme level) and the emerging West Country Water Resources Regional Plan. Prepared in early 2021, this IEA Scoping Study took account of all environmental feasibility work completed up to that point for the WCS SROs and ongoing work by WCWRG to define the scope of the Regional Plan, including in terms of defining an appropriate regional Environmental Destination and setting Environmental Ambitions at catchment level.

3.3.5 The objectives of the Scoping Study were to develop a proportionate and robust IEA methodology to underpin parallel SRO and Regional Plan development which:

- Demonstrates compliance with relevant legislation and regulatory requirements including the Environment Agency's National Framework for Water Resources (March 2020) and WRMP24 Water Resources Planning Guidance (WRPG);
- Support's decision-making, including how IEA will contribute to delivering net environmental gain from SROs, interface with the emerging regional Environmental Ambition and align with the application of decision-making metrics to both develop SROs and prepare the Regional Plan in tandem;
- Remains proportionate in both assessment and reporting, with opportunities to deliver efficiencies and mitigate inconsistency through the integration of assessment processes for SROs and the Regional Plan where appropriate (e.g. ensuring the avoidance of assessment duplication);

- Aligns with WRMP requirements to allow SRO and Regional Plan options and associated IEA findings to subsequently be adopted by water companies in WRMP24 assessments with minimal additional assessment requirements; and,
- Supports SWW, WSX and SW as WCS SRO promoters and WCWRG to engage effectively and timely with key stakeholders throughout SRO and Regional Plan development.

3.3.6 The IEA Scoping Study defined an evidence-based suite of technical methodologies to complete all relevant environmental assessment of the WCS SROs at Gate 1 in a way which firstly satisfies SRO requirements and expectations at Gate 1 (refer to **Section 3.2** above) but can then also be carried forward for inclusion within the future environmental assessment of the Initial Draft WCWR Regional Plan (August 2021). This approach will result in the undertaking of robust multi-stage IEA to inform SRO and Regional Plan development whilst avoiding duplication, thereby demonstrating efficient expenditure.

3.3.7 The scope of this IEA covers Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) Compliance Assessment, Invasive Non-Native Species (INNS) Risk Assessment, Natural Capital & Biodiversity Net Gain (BNG) Assessment and Carbon Assessment. At Gate 1 the IEA has focused on establishing scheme feasibility, defining key environmental risks insofar as can be identified at concept design stage, exploring potential mitigation options and further developing the scope of detailed environmental assessments to be undertaken at Gate 2. Underpinning these objectives, the IEA has reviewed the implications of (WCS1-3) environmental feasibility assessments carried out to support early SRO development, both in terms of confirming initial scheme feasibility and evidencing a proportionate set of feasible options which should be subject to further environmental assessment.

ACWG GUIDANCE

3.3.8 The group of water companies involved in developing SROs (known as the All Company Working Group - ACWG) have been working together to increase consistency in approaches to SRO development across the country. Mott MacDonald were commissioned by the ACWG to develop a common environmental assessment method for SROs to increase the consistency of environmental assessment and the evaluation of impacts on environmental water quality. This work generated three outputs, each of which sets out guidance to inform the approach adopted to undertake proportionate environmental assessments for SROs. As outlined below, the IEA methodology adopted for the WCS SROs at Gate 1 aligns with relevant ACWG guidance:

Strategic Environmental Assessment: Core Objective Identification (September 2020)

3.3.9 This guidance provides a proposed set of ‘Core’ SEA objectives for application in assessing SROs in order to drive consistency between SEA of different SROs. However, the proposed Core SEA objectives were developed based on a review of WRMP19 SEA Frameworks and are designed to align with WRPG expectations and other current environmental policy requirements. This framing means the objectives are conditioned by the nature of WRMP19 options considered and the key environmental issues identified at Scoping stage which WRMP19 SEAs were designed to respond to proportionately. Furthermore, only six water companies participated in interviews to inform the refinement of the Core SEA Objectives. This did not include Wessex Water, which covers the area where the majority of environmental impacts from WCS (sources and transmission sections) are likely to occur.

3.3.10 As WRMP19 SEA processes pre-date both PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) and the Environment Agency’s National Framework for Water Resources (March 2020), this limits the ability of the selected Core SEA objectives to assess transboundary and spatially disparate environmental impacts from individual SROs. The guidance also does not acknowledge that the approach adopted to undertake proportionate SEAs of emerging Regional Plans and WRMP24s still needs to be set through statutory SEA Scoping processes.

3.3.11 Notwithstanding these concerns and the statutory requirement still to undertake SEA Scoping for relevant plans including the emerging WCWR Regional Plan, the guidance confirms that core SEA objectives can be supplemented by additional bespoke objectives as required to address key environmental/sustainability issues applicable to each region and the options being assessed. A key role of both WCS Gate 1 environmental assessments (i.e. identification of key environmental risks) and subsequent SEA Scoping in respect of the WCWR Regional Plan is therefore to determine the adequacy of the core SEA Objectives to cover relevant environmental issues in each context and to develop additional criteria to ensure the consistent application of the Core SEA Objectives. As detailed in **Appendix 3.1 – SEA** a bespoke SEA Framework has therefore been developed and applied to the WCS SROs at Gate 1.

Application of Draft WRPG Guidance to SROs (October 2020)

3.3.12 This guidance provides a framework for SRO environmental assessments aligned with Draft WRPG and WRSE Regional Plan Environmental Assessment Methodology Guidance. The guidance indicates that high level environmental assessments should be carried out to inform robust SRO Gate 1 submissions and subsequently refined at future gates to account for the environmental implications of detailed design and planning considerations. Of relevance to the WCS SROs, the guidance:

- Lists environmental GIS based datasets to be included in SRO environmental assessments. As detailed in sub-appendices A – Component Level SEA Matrices and C – GIS Data Tables of **Appendix 3.1 – SEA** these datasets have been applied to the WCS SROs;
- Identifies five key natural capital metrics (ecosystem services) to underpin natural capital assessments and explains their application to SROs: biodiversity and habitat, climate regulation (carbon storage), natural hazard (flood and drought) regulation, water purification and water regulation. These metrics have been applied within the initial Natural Capital & BNG Assessment presented in **Appendix 3.4**.
- Endorses use of the ENCA guidance (Defra, March 2020) and methodology to undertake natural capital assessments whilst recognising that application of Natural England's Biodiversity tool 'The Biodiversity Metric 2.0' to undertake a full BNG is not likely to be possible for an SRO at Gate 1 or at Regional Plan level. Instead, the guidance suggests utilising relatively coarse habitat and land use change mapping at Gate 1. This approach has been adopted in the initial Natural Capital & BNG Assessment presented in **Appendix 3.4**.
- Promotes alignment between SRO and Regional Plan environmental assessments to avoid duplication whilst recognising that the requirements of each do not fully align. The WCS IEA Scoping Study has developed a methodology to complete all relevant environmental assessment of the WCS SROs at Gate 1 in a way which firstly satisfies SRO requirements and expectations at Gate 1 but can then also be carried forward for inclusion within the environmental assessment of the emerging WCWR Regional Plan.
- Sets out the relationship between SRO and Regional Plan environmental assessments from the perspective of WRSE, as of all emerging Regional Plans the WRSE Regional Plan is at the most advanced stage of development. However, this approach is not directly applicable to the WCS SROs as component-level options appraisals (WCS1-3) could not be completed in time for the inclusion of specific schemes from the WCS SROs within the WRSE Regional Planning data review (December 2020). One reason was the need to complete the River Tamar Resource Availability Assessment (SWW, February 2021) and undertake initial engagement with the EA and NE (January – March 2021) before being able to confirm which options should be subject to initial concept design and included within the two schemes being progressed through the WCS SROs.

3.3.13 This guidance does not however provide assessment criteria or a detailed methodology to support the application of core SEA objectives in SRO and/or Regional Plan SEAs (i.e. *how* likely significant environmental effects per objective should be identified based on environmental datasets and reporting templates. No guidance is also provided regarding methodologies for INNS risk assessment or carbon accounting.

Water Framework Directive: Consistent Framework for Undertaking No Deterioration Assessments (November 2020)

3.3.14 This guidance sets out a two-stage approach and accompanying reporting spreadsheet templates to apply the 'constraint test' of the WFD Regulations[4] to emerging SROs. This test considers the extent to which emerging SROS may impact on the following WFD objectives:

- To prevent deterioration between WFD status class of any element in the waterbody as set out in WFD Regulation 13(2)(a)
- To prevent new impediments to attaining 'Good' WFD status or potential for the waterbody, or any assessed element, as set out in WFD Regulations 13(2)(b) and 13(2)(c). In some waterbodies it is

[4] Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 SI 2017 No. 407

accepted that it is currently technically infeasible or disproportionately costly to achieve Good status or potential. If this is the case, then the test is applied to current agreed objectives for the waterbody.
- To ensure that the legally binding planned programme of measures in the second cycle of River Basin Management Plans (RBMP2), to help attain the WFD objectives from the waterbody, are not compromised.

3.3.15 In accordance with the ACWG guidance the compliance of the two schemes being progressed through the WCS SROs with these WFD objectives has been tested through the initial WFD Compliance Assessment presented in **Appendix 3.3**.

3.4 TECHNICAL ASSESSMENT METHODOLOGIES

3.4.1 This scheme-level IEA of the WCS SROs is underpinned by detailed technical methodologies for each constituent area of environmental assessment, each developed and applied in accordance with relevant requirements, expectations and guidance:

IEA Co-ordination

- To add value, impact assessments should not simply be viewed as technical exercises but rather as means of improving effectiveness. This IEA was therefore focused on embedding environmental considerations and minimising risks within the two schemes being progressed through the WCS SROs. A consistent focus was also on ensuring WCS SRO environmental assessment outputs at Gate 1 can be used or easily adapted for WCWR Regional Plan purposes.
- IEA Co-ordination covered all activities required to underpin the submission of a robust WCS SRO Environmental Annex and associated appendices at Gate 1. In addition to collation of this Annex, key tasks included: facilitating information exchange, consistency reviews of all technical assessment deliverables, leading engagement with environmental and planning stakeholder, developing an environmental risk register, mitigation plan and monitoring plan, and developing Gate 2 environmental assessment proposals.
- A further task was the preparation of **Annex 6 - Initial Consenting Strategy** to provide a roadmap for achieving development consent to implement the schemes being progressed through the WCS SROs. This strategy identifies consenting route options, planning strategy issues, programme implications and supporting documentation requirements.

3.4.2 These activities were undertaken in a proportionate manner, only exceeding minimum requirements and expectations where doing so at this stage would generate efficiencies in relation to Regional Plan and/or SRO Gate 2 development.

SEA

- Development and application of WCS SROs SEA Framework, including detailed assessment criteria, to identify likely significant environmental effects on a consistent basis;
- Objectives-led approach to the identification of ‘potential’ and ‘actual’ reasonable alternative options;
- ‘Impact pathway analysis’ – cross-matching potential environmental effect types identified as being associated with WCS component options (as listed within WCS1-3 Environmental Reviews) with identified specific environmental constraints relevant to the components selected for initial concept design and inclusion within the two WCS SRO schemes. This process resulted in the identification and categorisation of a full set of likely environmental (inc. socio-economic) effects and key risks on individual receptors and receptor groupings;
- Qualitative analysis of socio-economic, resilience and integration benefits – including through engagement with asset management and strategy officers within relevant water companies; and,
- Development of initial mitigation and monitoring proposals to address identified likely significant effects and key risks (with reference to the SEA Framework).

HRA

- European Sites baseline review:
  - Desktop identification and analysis of all European Sites within 15km of initial concept design of each WCS SRO scheme, and of other potentially relevant European Sites as agreed with with NE (e.g.

  - water-dependent SACs greater than 15km downstream of Component 2a – River Tamar abstraction).
  - Collation of pertinent information regarding designations, qualifying features / criterion, threats / pressures, conservation objectives, closest associated SSSI and SSSI conditions.
- European Sites filtering: identification of relevant threats, pressures and potential impact pathways between components and European Sites;
- Initial HRA Screening: RAG based categorisation and assignment of Interaction Scores (0 – 5) for relevant European Sites in relation to each WCS component. An Interaction Score of at least 1 indicates the potential for a Likely Significant Effect;
- Aggregation and ranking of Interaction Scores:
  - For each component to indicate which have the highest potential for Likely Significant Effects.
  - At scheme level (interaction scores for all components forming part of each scheme) to indicate the range of impact pathways from each scheme which have the potential to result in Likely Significant Effects.

WFD Compliance Assessment

- Assessment of each scheme and constituent components against WFD compliance objectives (no. 3)
- Completion of Level 1 and 2 WFD screening assessment spreadsheets for relevant waterbodies in accordance with ACWG guidance (2020). The basic structure of the ACWG assessment comprises:
  - Level 1 basic screening to identify relevant impacts types:
    - Confirmation of relevant (potentially affected) waterbodies;
    - Identification of possible impacts and embedded mitigation measures; and,
    - Screening to remove waterbodies with no or only minor localised impacts.
  - Level 2 detailed screening for impact
    - Waterbody-scale detailed assessment of impacts to each WFD quality element for each activity;
    - Assessment of data confidence level and design certainty
    - Identification of further mitigation needs; and,
    - Assessment of residual impacts.
  - Cumulative and in-combination assessment of compliance risks.
- Identification of Gate 2+ mitigation and monitoring requirements to address WFD compliance risks identified at Gate 1.

Natural Capital and Biodiversity Net Gain Assessment

- Initial assessment to inform concept design and aid decision making through quantification of relative scheme benefits and disbenefits;
- Application of ACWG recommended ecosystem service metrics;
- Quantitative non-monetised and monetised assessments including initial development of summary natural capital account;
- GIS led development of natural capital and biodiversity baseline - habitat types, land use categories and spatial extent of the key ecosystem services; and,
- Mapping of key priority habitats to identify requirements for minimum 10% BNG uplift.

Carbon Assessment

- Methodological and summary reporting regarding component-level impacts identified through WCS1-3 Carbon Assessments;
- Initial concept design stage component and scheme level carbon assessments (embodied and operational emissions) using UKWIR guidance (2012), BEIS (2019) grid intensity forecasts and WRSE Cost Consistency Methodology (2020); and,
- Assessment undertaken using Stantec's in-house carbon tool based on the UKWIR methodology.

INNS Risk Assessment

- Review implications of EA's INNS Risk Position Statement for each scheme being progressed through the WCS SROs (and constituent components);

- High-level screening against relevant statutory requirements through collation and review of existing data regarding known distribution of INNS in relation to catchments associated with each scheme; and,
- Application of AMP6 INNS Risk Assessment tool (Ricardo) to complete proportionate risk assessment, including:
  - Production of INNS Risk 'heat maps' to identify highest risk areas associated with each scheme; and,
  - Tabular reporting of component and scheme level overall INNS Risk scores, risk groups and key pathways.

3.4.3 Full details of each technical assessment methodology which contributes to this IEA are provided in **Technical Appendices 3.1 – 3.6**.

3.5 STAKEHOLDER ENGAGEMENT

3.5.1 An important element of the IEA has been regular engagement with environmental and planning stakeholders, including:

- Monthly progress meetings with EA & NE to review concept design and environmental assessment work, discuss environmental issues associated with each scheme (e.g. implications of proposed abstractions and discharges on Rivers Tamar, Exe and Stour) and agree scheme-level assessment scope;
- Provision of draft WCS1-3 Environmental Reviews (final version included in Appendix A of **Annex 1 – Options Appraisal**) and draft **Technical Appendices 3.1 – 3.6** to EA & NE for review, followed by multi-disciplinary meetings to discuss key environmental risks identified at component and scheme levels;
- Tailored briefing notes issued to three Local Planning Authorities (LPA) hosting proposed major infrastructure components, with follow-up invitations to attend individual meetings with the WCS SROs project team. The purpose of this initial engagement was to explain how each scheme has developed to date, discuss how planning and environmental issues are being addressed at Gate 1 and to inform **Annex 6 – Initial Consenting Strategy**.

3.5.2 A schedule of all engagement activities undertaken as an integral part of this IEA is provided in **Table 3.2** below.

Table 3.2: Schedule of Environmental and Planning Stakeholder Engagement for WCS SROs at Gate 1

Date	Attendees	Agenda
12.01.2021	EA & NE	Project introduction, WCS1-3 feasibility assessments methodology, outline environmental approach to optioneering
09.02.2021	EA & NE	WCS1-3 optioneering, emerging assessment methodology
02.03.2021	EA & NE	Draft WCS1-3 Environmental Reviews issued for comment
09.03.2021	EA & NE	WCS1-3 findings, SROs concept design overview, final scheme level assessment methodology
17.03.2021	RAPID	Overview of environmental inputs to optioneering and assessment methodology
26.03.21	EA & NE	WCS1-3 technical consultation – detailed review of environmental screening outcomes and identified risks to inform concept design
13.04.21	EA & NE	Scheme level environmental assessment programme review
13.04.21	Relevant LPAs	Tailored stakeholder briefing notes issued
21.04.21	EA & NE	Scheme level assessments emerging findings workshop
26.04.21	Wiltshire Council	Project introduction, infrastructure components and impacts in Wiltshire

Date	Attendees	Agenda
06.05.21	EA & NE	Draft Technical Appendices issued to EA & NE for review: • Appendix 3.3 - WFD Compliance Assessment • Appendix 3.4 - Natural Capital and BNG Assessment • Appendix 3.5 - Carbon Assessment • Appendix 3.6 - INNS Risk Assessment
13.05.21	EA & NE	Draft Technical Appendices issued to EA & NE for review: • Appendix 3.2 - HRA
21.05.21	EA & NE	Draft Technical Appendices issued to EA & NE for review: • Appendix 3.1 - SEA
25.05.21	EA & NE	Draft Annex 3 – Environmental Assessment issued to EA & NE for review

3.5.3 A schedule of comments was received from the EA on 9th June, with feedback provided by NE in letter format on 21st June 2021. Owing to the intersectionality of matters raised, the assessment team needed to first review all comments together before being able to progress appropriate responses. Minor clarifications have now been incorporated into final WCS SROs Gate 1 environmental reporting and a comments log has been prepared to respond to all points raised by the EA and NE.

4 Assessment Results

4.1 OVERVIEW

4.1.1 This section provides a summary of the results of the IEA carried out for the two schemes being progressed through the WCS SROs. Full details of the results of constituent technical environmental assessments are provided in **Technical Appendices 3.1 - 3.6**.

4.1.2 Formed from combinations of concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer
  - River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
  - River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
- Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

4.1.3 As major infrastructure projects involving new river abstractions, discharge points and pipelines spanning over 100km, the construction and operation of the two schemes (and constituent components) being progressed through the WCS SROs has the potential to generate a very wide range of effects on a wide range of different environmental, social and economic receptors. Having regard to the scale, locational and (concept) design characteristics of the schemes, a high-level overview of the types of environmental, social and economic effects likely to be generated is outlined in **Table 4.1** below. Each of these effects may be experienced by individual (and potentially groups of) receptors in different ways, depending on a wide range of factors (siting, design, construction and operational processes, embedded mitigation, etc).

Table 4.1: Overview of Environmental, Social and Economic Effects from WCS SROs

Environmental Aspect ***Relevant Technical Assessments***	**Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use** **Direct (land take) and Indirect (off-site) effects**
Biodiversity *SEA Objectives 1.1 – 1.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment* *INNS Risk Assessment*	Construction and Operation • Habitat loss or fragmentation (including from abstraction, pollution risks and land-take leading to potential loss of corridors and connectivity for species), • Habitat degradation (including from pollution risks and commissioning activity), • Species disturbance, • Species loss or harm • Opportunities for biodiversity net gain including habitat establishment and improvement.
Population and Health *SEA Objectives 2.1 – 2.3* *Natural Capital & BNG Assessment*	Construction • Noise and vibration impacts, • Local reduction in air quality (construction dust), • Construction traffic impacts. • Disruption to existing economic activities (land uses, increased congestion, etc), • Construction employment from labour market. • Severance and accessibility impacts on community infrastructure, • Temporary severance and accessibility impacts on designated routes, • Increased congestion, • Changes in residential amenity. Operation • Noise, vibration and air quality impacts from operational equipment.
Water Environment and Flood Risk *SEA Objectives 3.1 – 3.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment* *Carbon Assessment*	Construction and Operation • Pollution and discharge risks to water quality (surface and groundwater) including from pipe sterilisation/maintenance and associated outfalls, • Degradation of water quality due to sedimentation and in-channel works, changes in river flows (resulting from abstractions and discharges), • Changes in of watercourse geomorphology (bed and banks), • Changes in preferential flow regimes (surface and groundwater), • Potential changes in WFD status (all aspects), • Impacts on fish, inverts and macrophyte habitats and behaviours, • Impacts on the characteristics of waterbodies designated as protected areas, • Impacts on public and private water supplies, • Water environment improvements in potential environmental offsetting areas. • Loss of or damage to geological features, • Disturbance and loss of carbon rich soils, • Ground instability and contamination, • Loss or degradation of groundwater dependent terrestrial ecosystems (GWDTE),

Environmental Aspect ***Relevant Technical Assessments***	**Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use** **Direct (land take) and Indirect (off-site) effects**
	• Pollution risks to soil and land quality, • Soil erosion and sedimentation of adjacent watercourses. • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. • Ground instability and contamination risks
Soil *SEA Objective 4.1* *Natural Capital & BNG Assessment*	Construction and Operation • Disturbance or potential remediation of contaminated land • Degradation or loss of the best quality, most versatile and locally important agricultural land • Re-use of brownfield / previously developed land • Use of greenfield land
Air *SEA Objective 5.1* *Natural Capital & BNG Assessment*	Construction • Local reduction in air quality (construction dust), • Construction traffic impacts – congestion and associated emissions, • Changes in residential amenity. Operation • Air quality impacts from operational equipment.
Climatic Factors *SEA Objectives 6.1 – 6.2* *Natural Capital & BNG Assessment* *Carbon Assessment*	Construction • Embodied carbon (materials), • Construction energy and fuel usage (carbon impact). Operation • Operational energy consumption (carbon impact), • Opportunities to deploy onsite low/zero carbon generating technologies.
Landscape *SEA Objective 7.1* *Natural Capital & BNG Assessment*	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations.

Environmental Aspect ***Relevant Technical Assessments***	**Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use** **Direct (land take) and Indirect (off-site) effects**
Cultural Heritage *SEA Objective 8.1* *Natural Capital & BNG Assessment*	Construction • Removal or disturbance of known or currently unrecorded archaeological assets, • Temporary effects on the setting of heritage assets. Operational • Permanent effects on the setting of heritage assets (from above ground infrastructure only), • Opportunities to conserve and enhance heritage assets within in potential environmental offsetting areas.
Material Assets *SEA Objective 9.1 – 9.2* *Natural Capital & BNG Assessment* *Carbon Assessment*	Construction and Operation • Land, materials and energy (resource usage). • Loss or potential restrictions on use of best quality/most versatile agricultural land (subject to potential access and maintenance requirements), • Loss or sterilisation of private land, • Disturbance to or conflicts with land use activities, • Interfaces with, disruption to or conflicts with existing and proposed infrastructure (water, waste, electricity, gas, transport), changes in infrastructure resilience. • Conflicts with major transport infrastructure, • Land sterilisation effects (potential long-term spatial growth constraints to existing settlements).

4.2 SEA

4.2.1 An important element of SEA work completed at Gate 1 has been the development of a detailed SEA Framework for the WCS SROs in accordance with relevant ACWG guidance. This SEA Framework, which includes detailed assessment criteria, has been developed initially for use in assessing the WCS SROs but is capable of applying to other SROs in the region (i.e. West Country North at Gate 2) and the wider scope of the emerging WCWR Regional Plan.

4.2.2 The WCS SROs SEA Framework has been applied to each of the schemes being progressed through the WCS SROs to identify likely significant environmental (including socio-economic) effects (beneficial and adverse) and to support initial mitigation development. Based on component and scheme level analysis, **Tables 4.2** and **4.3** below provide a summary of predicted likely significant effects and identified key environmental risks arising from each scheme.

Table 4.2: Likely Significant Effects and Key Risks from River Tamar to Testwood Transfer Scheme

SEA Topic	Likely Significant Effects and Key Risks
1. Biodiversity	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 2a. Abstraction from River Tamar at Gatherley intake − Component 2b. Gatherley to Roadford (Lifton North route) − Component 2c. Roadford Lake − Component 2d. Roadford Lake to Northcombe (Roadford Northcombe route) − Component 3a. Northcombe to Prewley (Northcombe to Prewley route) − Component 3b. Prewley to Parsonage (Prewley to Parsonage) − Component 3d. River Exe: Allers to Pynes (relevant as impacted section of watercourse) − Component 3e. River Exe Abstraction (new) at Bolham Weir − Component 3f. River Exe to Allers − Component 3g. Allers to Woodgate − Component 3h. Woodgate to Kingston St Mary − Component 3i. Kingston St Mary to Summerslade − Component 4a. Summerslade to Testwood Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective 1.1. To protect designated sites and their qualifying features. − Core SEA Objective 1.3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. − Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS). Identified Key Risks (Component and Scheme level): • Encroachment of important ecological features resulting in direct and indirect: − Habitat loss or fragmentation − Habitat degradation (including to downstream Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA from River Tamar abstraction) − Species disturbance − Species loss or harm.
2. Population and Human Health	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 3h. Woodgate to Kingston St Mary

SEA Topic	Likely Significant Effects and Key Risks
	Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective: 2.1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing Identified Key Risks (Component and Scheme level): • Temporary severance and accessibility impacts during construction Identified Benefits (Component and Scheme level): • Enhanced network resilience • Local non-resource social and economic benefits
3. Water	Component Level SEA - Likely Significant Effects: • Major Positive (++): − Component 3e. River Exe Abstraction (new) at Bolham Weir − Component 3f. River Exe to Allers − Component 3g. Allers to Woodgate − Component 3h. Woodgate to Kingston St Mary − Component 3i. Kingston St Mary to Summerslade − Component 4a. Summerslade to Testwood Scheme Level SEA - Likely Significant Effects: • Major Positive (++): − Core SEA Objective: 3.5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts. Identified Key Risks (Component and Scheme level): • Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: − Loss or reduction of flood plains (natural storage), − Increased flood risks resulting from temporary and permanent changes to ground conditions and/or drainage patterns. • Changes to river flow, water chemistry and geomorphology • Watercourse crossings, resulting in potential pollution risks during construction (HDD installation technique proposed) • Earthworks in proximity to safeguarding zones, resulting in pollution risks
4. Soil	No component or scheme level likely significant effects. Identified Key Risks (Component and Scheme level): • Encroachment of Grades 1-5 (inc. BMV) ALC, resulting in: − Temporary reduction in productive land and yields − Pollution risks with the potential to degrade soil quality

SEA Topic	Likely Significant Effects and Key Risks
5. Air	No likely significant effects.
6. Climatic Factors	No likely significant effects.
7. Landscape	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 3a. Northcombe to Prewley (Northcombe to Prewley route) − Component 3b. Prewley to Parsonage (Prewley to Parsonage) Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective: 7.1. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites. Identified Key Risks (Component and Scheme level): • Temporary reduction in local landscape character and visual amenity during construction activities. • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations.
8. Historic Environment	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 4a. Summerslade to Testwood Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective: 8.1. To conserve, protect and enhance landscape and townscape character and visual amenity Identified Key Risks (Component and Scheme level): • Effects (temporary or permanent) on the setting of heritage assets • Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	No likely significant effects.

Table 4.3: Likely Significant Effects and Key Risks from Poole to Testwood Effluent Re-Use Transfer Scheme

SEA Topic	Likely Significant Effects and Key Risks
1. Biodiversity	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 1c. River Stour section (River Stour route) − Component 1d. River Stour abstraction − Sub-component 4b.1: River Stour to Redlynch WBS/Storage − Component 5b. Testwood Lakes (small) Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective 1.1. To protect designated sites and their qualifying features − Core SEA Objective 1.3: To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. − Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS). Identified Key Risks (Component and Scheme level): • Encroachment of important ecological features resulting in direct and indirect: − Habitat loss or fragmentation − Habitat degradation − Species disturbance − Species loss or harm. • Identified Key Benefit: reduced discharge of effluent into Poole Harbour (therefore a reduction in nitrate loading into Poole Harbour designated sites). Technical environmental studies and further analysis required at Gate 2 to characterise this beneficial effect.
2. Population and Human Health	No likely significant effects.
3. Water	No likely significant effects identified at this initial stage. However, further analysis needed of potential effects on hydrology and water quality from proposed River Stour discharge (tertiary treated effluent) and abstraction required at Gate 2.
4. Soil	No likely significant effects.
5. Air	No likely significant effects.
6. Climatic Factors	No likely significant effects.
7. Landscape	No likely significant effects.

SEA Topic	Likely Significant Effects and Key Risks
8. Historic Environment	Component Level SEA - Likely Significant Effects: • Major Negative (--): − Component 1c. River Stour section (River Stour route) Scheme Level SEA - Likely Significant Effects: • Major Negative (--): − Core SEA Objective: 8.1. To conserve, protect and enhance landscape and townscape character and visual amenity Identified Key Risks (Component and Scheme level): • Effects (temporary or permanent) on the setting of heritage assets • Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	No likely significant effects.

4.3 HRA

4.3.1 The HRA Screening has been underpinned by the collation of a detailed baseline dataset, with the following information collated for every European Site within 15km of at least one Component or Sub-Component using a GIS model and freely available data obtained from Natural England and the JNCC[5]. Furthermore, comments from statutory consultees and other stakeholders have been taken into account in screening in European Sites for consideration within the HRA Screening.

4.3.2 In order for the outcome of the HRA Screening to be readily interpreted, a Red, Amber, Green (RAG) assessment has been carried out. Of the interactions identified, the following were identified to be the key issues for which further consideration and Appropriate Assessment would be required:

- **Red+ Interactions:** Direct impacts on European Sites as a result of construction phase activities either within or immediately adjacent to a European Site. The European Sites to which these interactions relate comprise: Dorset Heaths SPA, SAC and Ramsar, River Avon SAC and Avon Valley SPA and Ramsar and The New Forest SAC and relate to potential LSE as a result of components or sub-components within Complete Component 1 and 4 and therefore are a consideration for both water transfer schemes.
- **Red Interactions:** Largely indirect impacts on European Sites as a result of water abstraction, transfer or discharge in to / through / out of waterbodies which are hydrologically linked to European Sites. Such interactions are relevant to both water transfer schemes; and
- **Orange Interactions:** Largely indirect impacts on European Sites as a result of indirect effects arising from temporary construction phase activities, such as preparatory and construction works. Such interactions are relevant to both water transfer schemes.

4.3.3 Further to the above, for those European Sites that are hydrologically linked to waterbodies from which water is abstracted, through which it is transported or into which it is discharged, Likely Significant Effects arising as a result of the transfer of invasive, non-native species, cannot be ruled out. These relate to: Solent and Dorset Coast SPA and distantly connected European Sites via the River Stour; Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA via the River Tamar; Exe Estuary SPA and Ramsar via the River Exe; and Avon Valley SPA and Ramsar via the River Avon SAC.

4.3.4 The complete Component interaction scores and RAG scoring, and HRA Screening outcome is summarised as follows in **Table 4.4**:

Table 4.4: Complete Components: Summary Interaction Scores and HRA Screening Outcome

Complete Component	Summed Interaction Score and RAG rating	HRA Screening Outcome
Component 1: Poole Effluent Re-use	59	Potential for LSE identified, therefore Appropriate Assessment required
Component 2: Roadford Pumped Storage	15	Potential for LSE identified, therefore Appropriate Assessment required
Component 3: Transmission System to Wessex Water	22	Potential for LSE identified, therefore Appropriate Assessment required
Component 4: Transmission System to Southern Water	106	Potential for LSE identified, therefore Appropriate Assessment required
Component 5: Southern Water Reception Points	0	No potential for LSE identified. Appropriate Assessment not specifically required.

[5] A full reference list identifying relevant data sources is provided within **Section 7**.

4.4 WFD COMPLIANCE ASSESSMENT

4.4.1 The approach outlined within the ACWG guidelines has been applied to undertake the constraint test of the WFD Regulations in relation to each scheme being progressed through the WCS SROs and constituent components. All concept design components selected (through screening) for inclusion within the two schemes been assessed using the Level 1 basic screening to identify potentially affected WFD water bodies and possible impacts based on activities. Using relevant EA guidance[6], most construction activities have been screened out at Level 1 as these would not lead to WFD non-compliance.

4.4.2 Level 2 detailed screening has then been applied to all water bodies where level 1 screening indicated potential WFD non-compliance against any of the 3 WFD Objectives. This considered likely impacts on each status element and the RBMP2 programme of measures for each WFD water body. This has been used to assess elements included in status classification which provides the baseline for no deterioration and therefore supports the assessment of WFD Objective 1. The information also informs the assessment of WFD Objective 2 – for status elements already achieving Good status or their published RBMP3 target Objective 2 does not require testing. The spreadsheet also identifies the published Reasons for Not Achieving Good status assessments undertaken by the EA and lists the published RBMP2 programme of measures for the water body for the assessment of WFD Objective 3.

4.4.3 For each relevant water body, the ACWG template has been completed and a summary of predicted component level impacts is outlined below. These initial assessment conclusions at Gate 1 are subject to further development of operating rules and treatment solutions, together with additional potential bespoke aquatic habitat assessment, water quality monitoring and water quality modelling planned at Gate 2.

Component 1: Poole Effluent Re-Use:

4.4.4 The assessment identified that both the Stour (Middle) and Stour (Lower) are potentially non-compliant with WFD objectives. Of note, the proposed 30 ML/D effluent-reuse yield from Poole STW is based on initial analysis of historical resource availability during dry periods (up to 1:500 year events). It is acknowledged this is less than maximum current output from Poole STW and further resource may therefore be available. A suite of technical environmental studies and further analysis will be undertaken at Gate 2 to refine the effluent-reuse DO.

Component 2: Roadford Pumped Storage:

4.4.5 The assessment identified that Roadford Lake, the River Wolf, River Thrushel, Lower River Lyd, Tamar (Lyd to Inny) and Lower Tamar are potentially non-compliant with WFD objectives.

Component 3: Transmission System to Wessex:

The assessment identified that both the Exe (Culm to Creedy) and Exe (Creedy to Estuary) are potentially non-compliant with WFD objectives.

Components 4 & 5 (Transfer to Southern Water):

4.4.6 For the purposes of this WFD assessment, each component has been assessed in relation to any waterbodies likely to be impacted as part of each proposed scheme. As Component 4 consists of the transfer of water within a treatment system (and can therefore be treated as a “closed” system with no waterbody interaction), this has not been assessed under WFD. The same applies to Component 5, as this only relates to reception arrangements and storage options within the existing Testwood WTW complex.

4.5 NATURAL CAPITAL AND BIODIVERSITY NET GAIN ASSESSMENT

QUALITATIVE ASSESSMENT

4.5.1 A qualitative assessment has been carried out describing the likely changes to natural capital assets and the associated changes to ecosystem service delivery arising from the construction and operation of the high-level WCS SRO Components. A summary of the assessment results is presented in **Table 4.5** below.

[6] Environment Agency Operational Instruction OI 488_10_SD01 WFD compliance assessment for new physical modifications

Table 4.5: Qualitative assessment of natural capital impacts of the WCS SRO

Component	Temporary construction impacts	Operational impacts
Component 1: Poole Effluent Re-use	Construction will lead to loss or degradation of pasture, woodland, floodplain grazing marsh and small amounts of heathland natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence.	Disbenefits to biodiversity related to discharge of treated effluent into River Stour and associated flow and water quality changes, which may affect habitat quality. Disbenefits related to construction of water treatment infrastructure is unknown as size and location of sites are yet to be determined. Potential biodiversity, natural hazard regulation and recreation benefits related to the River Stour bankside storage component, although these will depend on component design. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
Component 2: Roadford Pumped Storage	Construction will lead to loss or degradation of pasture and arable land, and small amounts of woodland, purple moor grass, floodplain grazing marsh and water natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence, for example Higher Combe Forest and Bratton Clovelly wood.	Disbenefits to biodiversity related to increased abstraction from the River Tamar and associated flow and level changes, which may affect habitat quality. Potential disbenefits to biodiversity in the Roadford Lakes due to changes in flow regime from new discharge and abstraction. Disbenefits related to construction of water treatment infrastructure at North Combe WTW is unknown as size and location of the process stream are yet to be determined. Potential biodiversity and recreation benefits related to the discharge into Roadford Lakes if operation will support the reservoir levels in periods of low flow, however this benefit may be limited as abstraction to North Combe WTW will also be operating. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
Component 3: Transmission System to Wessex Water	Construction will lead to loss or degradation of pasture and arable land, and small amounts of floodplain grazing marsh, urban greenspace, woodland, grassland, water and orchard natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence, for example Cranbourne Chase & Wiltshire Downs, as well as several public footpaths.	Potential biodiversity and recreation benefits related to the discharge into River Exe if operation will support the river levels in periods of low flow, however changes to flow regime and water quality may also cause disbenefits to river habitats. Disbenefits related to construction of surface infrastructure is unknown infrastructure design is yet to be determined. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
Component 4: Transmission System to Southern Water	Construction will lead to loss or degradation of pasture and arable land, and small amounts of floodplain grazing marsh, woodland, grassland, lowland meadows and water natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may	Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.

Component	Temporary construction impacts	Operational impacts
	impede access to local recreation sites within the zone of influence, for example public footpaths through Gatmore Copse, Grovely Woodland and Old Sarum.	
Component 5: Southern Water Reception Points	Potential disbenefits during construction depending on infrastructure required, size and location, to be determined at Gate 2.	Potential biodiversity and recreation benefits related to the discharge into Testwood Lakes if operation will support the lake levels in periods of low flow, however this benefit may be limited as additional water will be abstracted for supply. Disbenefits related to construction of water treatment infrastructure at Testwood WTW is unknown as size and location of any required infrastructure is yet to be determined. Potential for habitat improvement if component requires BNG (dependent on size and infrastructure required).

BIODIVERSITY AND HABITAT

4.5.2 The initial Natural Capital Assessment undertaken at Gate 1 indicates that the majority of land use change associated with each of the schemes being progressed through the WCS SROs is either urban or arable land with relatively low biodiversity value. More detailed analysis of impacts on local biodiversity features will however be required at Gate 2.

4.5.3 The assessment also predicts expected changes in habitats from delivery of the schemes, including consideration of required mitigation for BNG. This indicates there is likely to be a loss of habitat extent for most habitat types, even with BNG mitigation in place, as at Gate 1 only habitat creation rather than enhancement can be quantified from a Natural Capital standpoint without undertaking disproportionate field surveys. The assessment shows some anticipated loss of significant areas of higher biodiversity value habitat, such as saltmarsh, heathland and grassland, which support a range of wider ecosystem services. These will need to be mitigated at Gate 2+ to avoid significant harm to biodiversity.

4.5.4 The only planned habitat creation is woodland. It has been assumed that all new woodland creation will be deciduous woodland, this assumption will be confirmed as scheme design evolves through later Gates.

CLIMATE REGULATION

4.5.5 **Table 4.6** summarises the baseline land use types within the 50m ZoI of each scheme and the momentary value of the climate regulation ecosystem services they provide.

Table 4.6: Summary of non-traded carbon sequestration values per component

WCS SRO Components	Change in non-traded carbon sequestration value during construction (£2019)	Change in non-traded carbon sequestration value following BNG uplift
Component 1: Poole Effluent Re-use	-£1,772.53	-£288.03
Component 2: Roadford Pumped Storage	-£9,108.84	-£4,655.05
Component 3: Transmission System to Wessex Water	-£12,980.50	-£3,479.72
Component 4: Transmission System to Southern Water	-£8,192.96	-£3,856.69

4.5.6 The Transmission System to Wessex high level component, which incorporates lower-level components which form part of both the River Tamar to Testwood and Poole Effluent Re-use to Testwood schemes, provides the greatest carbon sequestration value under baseline conditions. However, this is simply related to the large ZoI as well as the presence of a large amount of arable land within the ZoI which provides carbon sequestration services.

NATURAL HAZARD REGULATION

4.5.7 **Table 4.7** presents the baseline assessment of natural hazard regulation per component.

Table 4.7: Summary of natural hazard regulation impacts per component

Component	Change in natural hazard regulation value during construction (£2019)	Change in natural hazard regulation value following BNG uplift
Component 1: Poole Effluent Re-use	-£348.69	£237.09
Component 2: Roadford Pumped Storage	-£3,566.90	-£1,809.57
Component 3: Transmission System to Wessex Water	-£4,538.57	-£789.59
Component 4: Transmission System to Southern Water	-£3,671.98	-£2,031.80

WATER PURIFICATION

4.5.8 Baseline water purification provision has not been quantified at Gate 1 however a brief summary of the baseline and potential changes is included in **Table 4.8** below.

Table 4.8: Summary of baseline water purification service provision per component

Component	Baseline water purification ecosystem service provision
Component 1: Poole Effluent Re-use	Water purification services are currently provided by arable, pasture and grassland habitats. River Stour (Middle d/s Pimperne Brook) WFD waterbody is currently achieving Poor status. Poole STW will discharge up to 30ML/d into River Stour. This will increase the flow and dilute pollutants downstream and therefore have the potential to improve water purification. However, if the effluent is of poor quality, there is a potential of declining water purification services.
Component 2: Roadford Pumped Storage	Water purification services are currently provided by arable, pasture, woodland and grassland habitats. This option involves 125ML/d abstraction from the River Tamar (Thrushel Wolf and Lyd) WFD waterbody which is currently achieving a Moderate status. Therefore, the abstraction has potential to decline water purification services. The abstracted water will be transferred to Roadford Lake for storage. Roadford Lake WFD waterbody is currently achieving a Moderate status. Water from Roadford Lake will be treated at North Combe WTW. Hence, additional flow and abstraction will have the potential to improve water purification. However, if more water is transferred to North Combe WTW there will potentially be a decline in water purification.
Component 3: Transmission System to Wessex Water	Water purification services are currently provided by arable, pasture, woodland and grassland habitats. River Exe (Barle to Culm) WFD waterbody is currently achieving a Moderate Status. Abstraction from River Exe at Bolham Weir will potentially improve water or decline water purification with potential impacts on the hydrological regime.
Component 4: Transmission System to Southern Water	No change to water purification as the water will be transferred via a pipeline from Summerslade to Testwood WTW.

Tourism and Recreation

4.5.9 **Table 4.9** below depicts the baseline welfare value for each element, derived from the ORVal tool, as well as the estimated visitation on a given year.

Table 4.9: ORVal outputs

Component	Estimated Welfare Value (£ per year)	Estimated visits (per year)
Component 1: Poole Effluent Re-use	97,039	30,696
Component 2: Roadford Pumped Storage	51,248	15,720
Component 3: Transmission System to Wessex Water	2,627,727	933,845
Component 4: Transmission System to Southern Water	418,683	168,086

4.5.10 Predicted high-level impacts on tourism and recreation value from each component within the two schemes being progressed through the WCS SROs are as follows:

Component 1 – Poole Effluent Re-use:

4.5.11 No national parks were identified by the ORVal tool that fall within the ZoI of the pipeline route. The pipeline route crosses agricultural/greenfield areas. The loss to welfare for agricultural/greenfield areas are not included in this assessment. There are potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the ZoI. It is assumed a year of temporary closure of paths and roads as part of construction of the pipelines.

Component 2 – Roadford Pumped Storage:

4.5.12 Most of the estimated welfare value is attributed to a path that runs through Higher Combe Forest near the Roadford Lake. The vast majority of the pipeline crosses through agricultural/greenfield areas. There are potential short-term impacts to recreation and wellbeing where construction may impede access to recreation sites.

Component 3 – Transmission system to Wessex Water:

4.5.13 The majority of the tourism and recreation value is attributed to several footpaths which will impacted during the construction of the pipeline. There are paths which are within the zone of influence for local recreation sites such as Cranbourne Chase & West Wiltshire Downs. The model predicts a high footfall and therefore a high annual welfare value is estimated. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence.

Component 4 – Transmission system to Southern Water:

4.5.14 The pipeline crosses agricultural/greenfield areas along majority of the route. Most of the estimated welfare value is attributed to paths through local recreation sites such as Gatmore Copse. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence. The pipeline crosses through Testwood Lakes which has an annual value of £485,320 by the model, this is reflected in the high visitor numbers modelled by the ORVal tool.

AGRICULTURE

4.5.15 **Table 4.10** depicts the baseline agriculture value for each element. This data is derived using the adapted whole-farm income method outlined by the ONS as part of their Natural Capital Accounts Methodology Guide (2020) with data from the Farm Business Survey (England) on farms located in the South West of England. The values below represent the annual value of provisioning services that support agricultural production for the estimated area of each component.

Table 4.10: Baseline assessment of agriculture ecosystem service provision

Component	Estimated agriculture value (£2019)
Component 1: Poole Effluent Re-use	£1,105.22
Component 2: Roadford Pumped Storage	£22,165.34
Component 3: Transmission System to Wessex Water	£272,784.77
Component 4: Transmission System to Southern Water	£59,222.37

SCHEME LEVEL SUMMARY ANALYSIS

4.5.16 **Table 4.11** summarises the total change in each of the ecosystem service benefits for schemes being progressed through the WCS SROs. Only those ecosystem services which are possible to monetise have been included in this summary. The summary shows that even with habitat creation for BNG mitigation in place, a net loss of ecosystem service values is anticipated during the construction period, this is due to the temporary loss of habitat cover during construction, which is expected to return to baseline levels following habitat reinstatement, and the fact that habitat improvement measures have not been included in the quantified assessment.

Table 4.11: Scheme level assessment of natural capital values

Ecosystem Service	Total change in value during construction (£2019)	Total change in value with BNG mitigation in place (£2019)
Climate regulation	-£30,282.31	-£12,459.17
Natural hazard regulation	-£11,777.44	-£4,393.87
Recreation	-£3,194,697	Not possible to assess at this stage

4.6 CARBON ASSESSMENT

4.6.1 At Gate 1 a carbon assessment methodology has been developed and a high level carbon assessment undertaken in accordance with UKWIR guidance (2012).

EMBODIED CARBON ASSESSMENT

4.6.2 Based on the design information from the civil and mechanical engineers, embodied carbon estimates were derived. Embodied carbon from the initial construction of the assets associated with the two SROs are shown in **Table 4.12** along with the embodied carbon per megalitre produced and he minimal flow to be maintained to ensure water quality and 25% utilisation.

Table 4.12: Embodied carbon associated with SRO construction

Solution	Embodied carbon (tCO2e)	Embodied carbon per ML at full throughput (kgCO2e/ML)	Embodied carbon per ML at Water quality maintenance flow with 25% utilisation (kgCO2e/ML)
WCS Sources & Transfers	127,294	194	444
WCS Southern Water transfer	45,840	70	160

WHOLE LIFE CARBON ASSESSMENT

4.6.3 The whole life carbon assessment combines the embodied carbon, operational carbon and carbon associated with replacement of assets over the project design life. The contribution of granular activated carbon (GAC) regeneration (in operational carbon (chemicals)) and renewal (consumables) is a major predicted source of carbon emissions as this is used in existing processes at Northcombe WTW and Allers WTW and is proposed to be used within the Water Recycling Centre (tertiary treatment of effluent) at Newtown. Accordingly, significant carbon savings are possible if the design flow of the scheme could be scaled down.

4.6.4 The whole life carbon impact of the WCS Southern Water Transfer SRO has operational carbon impacts more than three times the embodied carbon if the scheme were to be operated continuously at its design capacity. At the lower bound of usage, the embodied and operational carbon impacts are similar.

BENCHMARKING

4.6.5 Typical water industry carbon intensities are 185 to 224 kg CO2e / ML water treated. The carbon intensity of the WCS Sources & Transfers SRO is 10 to 12 times (for full throughput and the water quality maintenance with 25% utilisation flow, respectively) typical water industry carbon intensities. Contributing to the intensity are the size of the GAC contact tanks and the number of energy-intensive high lift pumping stations.

4.6.6 At full throughput, the WCS Southern Water Transfer SRO is approximately 50% more energy intensive than conventional water supplies. This increases to 100% more when the scheme is only partially used. Again, this illustrates the need to carefully size the schemes and flow regimes to reduce the scale of the schemes if they are only partially utilised.

INDICATIVE RENEWABLE ENERGY TO MEET ELECTRICITY DEMAND

4.6.7 Given that many water companies are aiming to achieve Net Zero by 2030 and will aim to balance new energy demands with renewable energy sources or other measures, an indicative assessment of wind or solar requirements to meet the scheme requirements have been derived. It has been assumed that 4 MW wind turbine would be installed, each with a land take of 1.6 hectares. An average wind speed for the area would be in the order of 5.5 m/s. Indicative results for the two SROs, shown in **Table 4.13** and **Table 4.14**, illustrate the additional land required to meet the demand of these schemes.

Table 4.13: Indicative Renewable Energy Sources to meet WCS Sources & Transfers SRO Electricity Demand

Carbon contribution	Units	Flow at full design throughput	Water quality maintenance flow with 25% utilisation
Solar PV	hectares	291	134
Wind	hectares	34	16

Table 4.14: Indicative Renewable Energy Sources to meet WCS Southern Water Transfer SRO Electricity Demand

Carbon contribution	Units	Flow at full design throughput	Water quality maintenance flow with 25% utilisation
Solar PV	hectares	63	28
Wind	hectares	8	3.2

4.7 INNS RISK ASSESSMENT

4.7.1 Based on component and scheme level analysis, the high-level INNS assessment identified the following:

Poole Effluent Re-Use:

- Transfer of treated effluent from the Poole STW is considered low risk due to influence of prior treatment, whereas risk associated with use of the in-river River Stour section is considered high as increased flows could result in further distribution of INNS within already connected systems;
- Abstraction and transfer of raw water from the River Stour into a bankside storage system creates a new pathway and is therefore consider a very high risk. The bankside storage system design should consider a closed system to avoid the creation of additional (secondary) pathway for INNS distribution. The risk will remain very high until the raw water is treated (possibly at Testwood WTW);

Roadford Pumped Storage:

- Very high risk associated with the transfer of raw water from the River Tamar to Roadford Lake. This INNS “catchment” incudes the rivers Lyd and Thrushell which could introduce new INNS species to Roadford Lake where a secondary pathway (recreational users) could result in the onward distribution of INNS to other catchments. The risk will remain very high until the water is treated at the Northcombe WTW;
- To address identified very high risk of INNS transfer, refined concept design at Gate 2 should develop and apply additional mitigation measures including tailored pre-treatment of abstracted water prior to discharge into Roadford Lake and a review of the proposed abstraction location (Gatherley Intake) to reduce the extent of the INNS “catchment”;
- The risk associated with the onwards transfer of treated water from Northcombe WTW is considered low;

Transmission System:

- Abstraction and subsequent transfer of raw water from either the River Exe or the River Stour present very high risks for INNS distribution. Changes in river flow could also result in habitat changes that may favour the distribution and establishment of INNS. Risk will remain high until water is treated at Allers WTW (for potable transfer) or Testwood WTW (for effluent re-use raw transfer); and,
- Distribution pathway from River Stour would be disrupted should the reception point include either potable storage tanks or treatment processes within Testwood WTW. Where the reception point/destination includes the direct transfer of any raw water into Testwood Lakes (small lake), the pathway is considered to present a very high risk. Such a transfer could result in a distribution of INNS within a different catchment with secondary pathways at the lakes potentially resulting in the wider distribution of INNS within the Southern Water’s Hampshire zone.

4.7.2 Detailed risk assessments were carried out for identified high risk components of each scheme, namely raw water transfers into Roadford Lake and Testwood Lakes resulting in high risks of INNS distribution. This identified a total of 48 and 52 INNS species, respectively, that were selected within the tool based upon the presence of likely pathways that may facilitate the spread of species, the location of each transfer, the types of habitat at the connection source, connection mechanism and the proposed destination and the seasonality of each transfer.

5 Environmental Mitigation and Monitoring

5.1 OVERVIEW

5.1.1 Building on the scheme level IEA findings presented in **Section 4**, this section outlines initial mitigation options and monitoring proposals to address predicted likely significant adverse environmental effects and key risks.

5.2 EMBEDDED MITIGATION

5.2.1 As detailed in **Annex 3 – Concept Design Report**, at Gate 1 the following environmental mitigation and associated design assumptions have been embedded into the initial concept design of the schemes being progressed through the WCS SROs:

- No demolition of buildings proposed;
- 50m construction working width, 25m either side of linear components, with the exception of infrastructure below/along roads where working width will be limited to road carriageway and any verges. In addition to accommodating construction working areas this approach provides design flexibility to enable micro-siting through refined concept design at Gate 2 to minimise direct interactions with environmental constraints;
- New 600mm diameter pipes for most transmission components to support 30 MLD transmission. Only exceptions are:
  - Component 2b Gatherley – Roadford where 1200mm diameter pipe is required to support 125 MLD transfer;
  - Component 2d Roadford Lake - Northcombe WTW where capacity in existing pipe (900mm) will be used. This avoids the need for major infrastructure works in this area and therefore minimises potential environmental impacts.
- Adequate eel screen included within initial concept design of Component 2a – Gatherley Intake (abstraction from River Tamar) to comply with the Eels (England and Wales) Regulations 2009 (as amended).
- Crossings of A roads, motorways, railways and watercourses all by 'trenchless' Horizontal Direction Drilling (HDD) with dualled pipes to facilitate maintenance. Single pipes for all other sections including minor track/road crossings.
- Temporary severance, accessibility, public access and traffic effects during construction to be managed through Construction Environmental Management Plan (CEMP), Construction Traffic Management Plan (CTMP) and Access Management Plan (AMP). In due course these plans will detail procedures, site-specific mitigation measures and contingency arrangements to avoid unacceptable adverse environmental and amenity impacts. At Gate 2, the principles and scope of each plan will be outlined and agreed with relevant stakeholders.

5.2.2 These embedded mitigation measures have been taken account of in component and scheme level IEA at Gate 1.

5.3 FURTHER MITIGATION AND MONITORING

5.3.1 The findings of Gate 1 environmental assessments will be used at Gate 2 to identify environmentally sensitive areas where potential design refinements and additional use of HDD techniques will be considered within a refined concept design, taking account of engineering constraints and wider viability considerations. All identified direct major interactions between proposed WCS infrastructure and environmental constraints will be subject to individual review at Gate 2, with localised pipeline diversions or other design changes implemented where feasible to further reduce the potential for each scheme to result in likely significant adverse effects.

5.3.2 Further mitigation measures and environmental monitoring (i.e. surveys and modelling) to better understand and address likely significant adverse environmental effects and key risks as predicted through this IEA are outlined in **Appendix A – Mitigation Plan and Appendix B – Monitoring Plan** respectively. Where relevant and proportionate, measures detailed in these plans should be applied at Gate 2 (and subsequent gates where appropriate) to inform a refined concept design for each scheme in order to minimise adverse environmental effects and allow each scheme to generate net environmental gain.

6 Net Environmental Gain

6.1 OVERVIEW

6.1.1 In accordance with stated RAPID Gate 1 requirements and the expectations of the Environment Agency (itself a member of RAPID) and Natural England, opportunities to deliver net environmental gain have been considered from the outset of the WCS SROs. Given the requirements at Gate 1 to establish scheme feasibility and identify key risks, work to date has focused upon considering scheme alignment with emerging regional Environmental Ambitions and confirming the scope within which net environmental gain could be delivered as part of each scheme.

6.2 COMPATIBILITY WITH EMERGING REGIONAL ENVIRONMENTAL AMBITION

Context

6.2.1 In tandem with the development of the WCS SROs the West Country Water Resources Group (WCWRG) is developing a Regional (Water Resources) Plan as required by the Environment Agency's National Framework for Water Resources (March 2020). An important synergy is that all SROs within the WCWRG area need to be taken account of within the Regional Plan in terms of balancing future supply and demand needs.

6.2.2 The Environment Agency's National Framework sets out the expectation that Regional Plans (and thus SROs included within them) should seek to pro-actively enhance the environment and increase ambition in this area. This includes:

- Meeting the water requirements of sites specially protected for nature conservation.
- Restoring sustainable levels of abstraction to freshwater and wetland habitats of principal importance listed under Section 41 of the Natural Environment and Rural Communities Act (2006), particularly chalk rivers and other sites identified as priority habitats for restoration.
- Restoring river flows to support the recovery of salmonid fish populations.
- Embedding the principle that new development should result in net environmental gain - the aim is for every Regional Plan to have a net positive impact on the local and national environment.

6.2.3 The WCWRG Regional Plan Environmental Ambition Method Statement (July 2020) indicated the development of a regional Environmental Destination would be framed around achieving a positive change in natural capital across the region and localised initiatives, including sustainability reductions where possible within supply-demand balance constraints, to restore or improve environmental quality in selected river catchments.

6.2.4 In February 2021 the EA advised that targets for catchment level restoration should be driven by addressing climate change objectives, improving WFD status and achieving European Site conservation objectives, rather than being driven by supply-demand balance constraints and then considering what environmental outcomes could be achieved. This objectives-led approach is intended to strengthen regional Environmental Destination / Ambition targets but in doing so may itself necessitate the development of additional intra- or inter-regional transfer schemes to enable both a higher level of Environmental Ambition and a robust supply-demand balance to be achieved within emerging Regional Plans and subsequently delivered at local level through WRMP24s.

Initial Assessment of WCS SROs Compatibility

6.2.5 In April 2021 a suite of draft scenarios and catchment-level Environmental Ambition options (Wood for WCWRG, 2021) was shared with the WCS SROs project team to inform this IEA. This was provided for the following catchments of relevance to proposed abstractions on the River Tamar (at Gatherley) and River Exe (at Bolham Weir near Allers) to provide sources for the proposed River Tamar to Testwood transfer scheme:

- Lower River Tamar
- River Tavy
- Upper River Exe
- River Otter

6.2.6 Given that a preferred Environmental Destination has not yet been selected for the emerging WCWR Regional Plan, to remain proportionate, at Gate 1 this IEA has only considered whether each of the schemes being progressed through the WCS SROs is either potentially compatible or fundamentally incompatible with the achievement of Environmental Ambition options presented to the WCWRG for relevant catchments. These options relate to potential sustainability reductions (in relation to existing abstractions) by 2050 to avoid or reduce otherwise predicted flow deficits against both Environmental Flow Indicator (EFI) or 'enhanced' targets where appropriate to support protected areas.

6.2.7 Based on the Environment Agency's 2050 Climate Change projections, the WCWR Environmental Screening Assessment (Wood for WCWRG, 2021) indicates that:

- **River Tamar** – The Lower River Tamar is predicted to fail EFI targets under baseline and enhanced scenarios, although it is noted the Gunnislake abstraction may not be represented correctly in the screening assessment due to operating under a complex licensing agreement linked to the Roadford Pumped Storage Scheme. Taking account of predicted flows and climate projections a 10% reduction in the Gunnnislake abstraction licence is recommended, although this requires further consideration by the WCWRG. The River Tamar Resource Availability Assessment (SWW, 2021) demonstrates that in addition to supporting onwards transmission (30 MLD), the proposed 125 MLD winter-months abstraction at Gatherley would increase year-round reservoir levels at Roadford Lake whilst retaining plentiful winter flows downstream of the proposed new abstraction. As Roadford Lake acts as a strategic storage asset and already feeds the River Tamar via the River Wolf, Component 2 of the WCS SROs offers the potential to better regulate intakes and flows to achieve more a sustainable abstraction regime across all seasons at Gunnislake.
- **River Exe** – no sustainability reductions to the relevant intake, Wimbleball Reservoir, which supports downstream abstraction are recommended. The proposed change in downstream abstraction (from Pynes WTW to Bolham Weir) would not affect inputs to or flows within the Upper River Exe.

6.2.8 Initial analysis therefore indicates that the River Tamar – Testwood scheme being progressed through the WCS SROs is potentially compatible with Environmental Ambition proposals for the emerging WCWR Reginal Plan. No impacts on the achievement of catchment level Environmental Ambitions are presently predicted from the Poole Effluent Re-Use – Testwood scheme.

6.3 DELIVERY OF NET ENVIRONMENTAL GAIN

Balancing Beneficial and Adverse Impacts

6.3.1 The high-level objective for the WCS SROs set within PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) is to develop new water resources and/or utilise capacity within the southern area of the West Country (South West and Wessex Water), and then to transfer the water to the east to Southern Water's Hampshire zone. The overarching aim of this strategic water transfer is to utilise available resources to tackle water stress and enhance drought resilience.

6.3.2 Whilst this high-level objective starts to frame the WCS SROs, it does not consider anything other than functional outcomes. The following supplementary objectives were therefore defined by the project team to help guide optioneering and initial concept design development:

- Align with PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019)
- Support delivery of current and emerging WRMPs;
- Provide viable strategic water transfer to enhance network resilience;
- Optimise use of land and existing infrastructure and integrate with existing networks where possible;
- Provide cost effective regional strategic water transfer infrastructure;
- Avoid unacceptable significant adverse environmental, amenity or socio-economic effects, including by applying the environmental mitigation hierarchy; and,
- Deliver net environmental gain.

6.3.3 Planned sustainability reductions in Southern Water's Hampshire zone are intended to substantially reduce abstraction limits and drought occurrences locally in order to achieve compliance with the Habitats Directive and WFD. Confirmation in 2019 of sustainability reductions to the Rivers Itchen and Test and Candover Stream means these effectively now form part of the future baseline scenario within which Southern Water needs to plan for the long term, rather than themselves representing a beneficial environmental impact from any individual SRO or only being relevant to accelerated schemes which can deliver new sources of water in the short term (by 2027), as longer term source options for the Hampshire zone will also be needed.

6.3.4 In this context, the role of longer-term SROs including the WCS SROs is to provide additional schemes which indirectly facilitate sustainability reductions and help to alleviate environmental water stress whilst protecting public water supplies. Given this indirect relationship and as the WCS SROs are not capable of short-term delivery (by virtue of being on RAPID's Standard Gate trajectory), the achievement of specific sustainability reductions should not be assigned to either scheme or indeed any other SRO as a direct environmental benefit. This complicates the conceptualisation of delivering net environmental gain, as whilst likely significant adverse effects and key environmental risks summarised in **Section 4** and detailed in **Technical Appendices 3.1 – 3.6** indicate that the construction and operation of each scheme is likely to result in a wide range of adverse environmental effects on receptors across a wide geographical area (three water company regions), beneficial sustainability reductions within Southern Water's Hampshire zone cannot readily be balanced against this.

Cumulative Effects and Environmental Offsetting Areas

6.3.5 The IEA undertaken at Gate 1 indicates that, despite consideration of environmental constraints within component level screening (refer to **Annex 1 – Options Appraisal**) and significant environmental inputs to initial concept design work, each scheme being progressed through the WCS SROs is likely to result in adverse effects on receptors including priority habitats, woodlands, watercourses and flood risk zones where encroachment may be required. The localised nature of these likely adverse impacts means that individually most (but not all) direct and indirect interactions with environmental constraints can be considered as relatively minor, but given the scale of each scheme it is also necessary to consider likely cumulative impacts resulting from multiple encroachments into sensitive environmental areas across the full extent of each scheme.

6.3.6 To address potential cumulative effects in line with the mitigation hierarchy, opportunities to further reduce the number of direct interactions with environmentally sensitive areas through design refinements and the identification of potential areas for environmental offsetting will be considered at Gate 2 as part of the Preferred Design of each scheme being progressed through the WCS SROs.

6.3.7 Proposals for environmental offsetting will initially focus on identifying land (and potentially watercourse) availability and suitability to undergo environmental improvements (e.g. wetland creation, native woodland planting, etc) which can be properly assigned to each scheme as a beneficial impact. An important principle is that local environmental enhancement should go beyond simply compensating for predicted adverse effects elsewhere on a like for like basis to deliver net biodiversity and wider net environmental gain, as measured through changes in biodiversity metrics and natural capital (e.g. contributions to specific ecosystem services). Further consideration of options to achieve biodiversity net gain and enhance natural capital is provided in **Appendix 3.4 – Natural Capital and Biodiversity Net Gain**.

7 Next Steps

7.1 OVERVIEW

7.1.1 This Annex has presented a summary of the environmental assessments carried out to support the initial appraisal of the WCS SROs. Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) these projects have been progressed in tandem by an integrated team. This has resulted in the initial development and environmental assessment of two functionally separate schemes which will be appraised concurrently by RAPID.

7.1.2 The Annex has outlined the Integrated Environmental Assessment (IEA) methodology adopted to undertake proportionate SEA, HRA, WFD Compliance Assessment, INNS Risk Assessment, Carbon Assessment, and Natural Capital (including BNG) Assessments of the two schemes being progressed through the WCS SROs. It has been demonstrated that this IEA satisfies all relevant appraisal criteria and expectations set for Gate 1 by RAPID, the EA and NE. The IEA methodology also provides an efficient approach to 'iterative integration' between SRO and Regional Plan development, including by avoiding duplication of technical assessments and through the development and application of a common SEA Framework.

7.1.3 This Annex (and associated supporting and technical appendices) has documented pertinent assessment information to support Section 5 - Environmental and Water Quality Considerations of the WCS SROs Gate 1 Submission Reports. In doing so, a high-level analysis has been undertaken to establish the feasibility of the two schemes (and constituent components) being progressed through the WCS SROs in environmental terms, as well as to identify key environmental risks and to develop mitigation and monitoring proposals for consideration through refined concept designs at Gate 2.

7.2 GATE 2 INTEGRATED ENVIRONMENTAL ASSESSMENT

7.2.1 The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

7.2.2 An important part of the IEA work completed at Gate 1 has been the development of detailed and ACWG compliant assessment frameworks and methodologies for the WCS SROs which can also now be applied to other SROs in the region and to the emerging WCWR Regional Plan. Whilst the level of detail applied in environmental analysis and associated reporting is expected to increase as environmental monitoring data becomes available and in line with progression through RAPID's multi-gated process, the methodologies and assessment criteria developed through Gate 1 are likely to remain valid for use at Gate 2 without a need for significant further methodological development. Details of proposed technical environmental assessment at Gate 2 are provided for each constituent discipline of this IEA within **Appendices 3.1 – 3.6**.

7.2.3 At Gate 2 the main IEA tasks will therefore be to provide environmental advice to influence and then to formally assess the likely environmental effects arising from refined concept designs for each scheme. This will comprise the following phased activities, each of which is reflected within **Annex 8 – WCS SROs Project Plan**:

- **Refined Options Appraisal** - Targeted desktop and survey work to address key risks and likely significant effects identified at Gate 1, as well as to identify risks from any new options not considered through WCS SROs Gate 1. This will include:
  - Further analysis of key risks through targeted reviews of Gate 1 SEA, HRA, WFD and INNS work. The work will utilise the WCS SROs Impact Pathway Analysis database, with all environmental interactions categorised as 'major' or 'moderate' reviewed to determine whether alternative options with reduced environmental impacts are feasible and could be progressed at Gate 2, or whether this is not possible and the identified interactions are likely to be acceptable; and,
  - Suite of technical studies (including environmental monitoring) to establish the environmental acceptability of proposed abstractions (location, volume and duration) and discharges involving the Rivers Tamar, Exe and Stour. An early Gate 2 activity will be to confirm the scope of these technical studies with the EA and NE. Further details are provided in Appendix B – Monitoring Plan.

- **Refined Concept Design Development** – Following the Options Appraisal phase and the completion of technical studies for the Rivers Tamar, Exe and Stour, environmental analysis will be used to inform the selection of a Preferred Design for each functionally separate water transfer scheme. This work will need to be informed by proportionate mitigation and monitoring proposals (including further technical assessments) as detailed in **Appendices A** and **B**, with a particular focus on reviewing opportunities for:
  - Design refinements to avoid or minimise major interactions with environmental receptors and associated likely significant adverse environmental effects.
  - Environmental betterment, including options to generate wider environmental and societal benefits from the delivery of each functionally separate water transfer scheme.
- **Environmental Assessment of Refined Concept Design & Gate 2 Reporting** – Formal assessment (SEA, HRA (formal screening), WFD Compliance, Natural Capital & Biodiversity Net Gain, INNS Risk) and reporting to identify and address all key environmental risks, likely significant effects and benefits from the refined concept design of each functionally separate water transfer scheme. As with Gate 1, assessments will be carried out first at component level and then scheme level to provide sufficient granularity to consider a wide range of beneficial and adverse impacts on specific receptors. The assessment will also consider likely in-combination effects, including likely cumulative adverse impacts (e.g. multiple infrastructure projects affecting an environmental receptor) and potential positive synergies between each scheme and other strategic plans and projects delivering environmental and societal benefits (e.g. Dorset Heaths Planning Framework, Stour Valley Park, Solent Nutrient Neutral Development, etc).

Appendix A Mitigation Plan

A.1.1 The findings of this Gate 1 IEA will be used at Gate 2 to identify environmentally sensitive areas where potential design refinements and additional use of HDD techniques will be considered within a refined concept design, taking account of engineering constraints and wider viability considerations. All identified interactions between each scheme and relevant environmental receptors which at Gate 1 are predicted to result in likely significant adverse effects on SEA Objectives, likely significant effects on European Sites, net-deterioration and compliance risks to WFD waterbodies, INNS distribution risks, or potential reductions in habitat cover or connectivity will be subject to individual review at Gate 2, with localised pipeline diversions or other design changes implemented where feasible to further reduce the potential for each scheme to result in adverse environmental effects.

A.1.2 Drawing upon recommendations developed through discipline-specific assessments presented in **Technical Appendices 3.1 – 3.6**, further mitigation measures to address likely significant adverse environmental effects and key risks as predicted through this IEA are outlined in **Table A.1** below. Where relevant and proportionate, these measures should be applied at Gate 2 (and subsequent gates where appropriate) to inform a refined concept design for each scheme to minimise likely adverse environmental effects.

Table A.1: Proposed WCS SROs Environmental Mitigation for Consideration at Gate 2+

Environmental Aspect	Further Mitigation
Biodiversity *SEA Objectives 1.1 – 1.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment* *INNS Risk Assessment*	**SEA:** • Review opportunities for design refinements to avoid important ecological features (direct interactions) and reduce indirect effects • Additional use of HDD to avoid important ecological features • Iterative development of CEMP including procedures and physical measures to protect habitats and species • Consider opportunities to provide local ecological benefits directly through each scheme • Identify the potential scope of and role for environmental offsetting areas **HRA:** • Review route realignment to see if amendments can avoid direct impacts on European Sites **Natural Capital & BNG:** • Local opportunities for habitat enhancement and creation for a minimum 10% net gain in habitats and hedgerows. • Table 5-1 of Appendix 3.4 provides a summary of offsetting requirements to achieve an approximate 10% net gain for habitats and hedgerows. **INNS Risk** • Development of specific INNS control measures at abstraction, discharge and treatment locations, to be advised by INNS specialist
Population and Health *SEA Objectives 2.1 – 2.3*	**SEA:** • Review opportunities for design refinements to reduce severance, accessibility and amenity impacts during construction • Consider opportunities to provide local recreational, amenity and accessibility benefits through the delivery of each scheme • Iterative development of CTMP and AAP
Water Environment and Flood Risk *SEA Objectives 3.1 – 3.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment*	**SEA:** • Review opportunities for design refinements to reduce encroachment into flood risk areas and watercourse crossings • Further develop the Gate 1 design assumption of utilising HDD (dual pipes) for all watercourse crossings and demonstrate the application of this to major watercourse interactions Iterative development of CEMP including pollution prevention procedures and physical measures relevant to working in the water environment **HRA:** • Consideration of timing of abstraction / discharge, volume of abstraction / transfer / discharge, methods to be employed when crossing rivers and streams or other sensitive habitats, which may indirectly link to European Sites, on-going monitoring etc **WFD Compliance:** • Mitigation for the potential non-compliance with WFD objectives due to risk of increasing total phosphorus and phosphate concentrations in the affected waterbodies may be achieved due to the timing of the scheme, i.e. during periods of generally higher flows. If mitigation due to environmental conditions does not occur, appropriate engineering design solutions to achieve reductions in phosphate prior to discharge into Roadford Lake will be required • Further development of operating rules of the scheme is likely to be able to provide mitigation for elements potentially non-compliant with WFD objectives **INNS Risk:**

Environmental Aspect	Further Mitigation
	• Mitigation measures aimed at reducing the risk of INNS distribution, by adopting standard biosecurity measures, will be required during construction activities. Specifically, the scheme design should consider additional mitigation measures including pre-treatment of abstracted water prior to discharge into Roadford Lake and the possible change abstraction location to reduce the extent of the INNS catchment
Soil *SEA Objective 4.1* *Natural Capital & BNG Assessment*	**SEA:** • Review opportunities for design refinements to reduce encroachment into BMV agricultural land Iterative development of CEMP including pollution prevention procedures and physical measures relevant to protect soil quality during earthworks
Air *SEA Objective 5.1* *Natural Capital & BNG Assessment*	**SEA:** • Specification and application of construction dust suppression measures applicable to the risk level of construction working areas (multiple types) within each scheme as per relevant IAQM Guidance.
Climatic Factors *SEA Objectives 6.1 – 6.2* *Natural Capital & BNG Assessment*	**SEA:** • Development and implementation of scheme level strategies to align with statutory and water company net zero emission targets.
Landscape *SEA Objective 7.1* *Natural Capital & BNG Assessment*	**SEA:** • Review opportunities for design refinements to reduce visual impacts from above ground surface infrastructure in or otherwise adversely affecting AONB and National Parks. This includes consideration of opportunities to deploy vegetation or topographical screening to minimise impacts.
Cultural Heritage *SEA Objective 8.1* *Natural Capital & BNG Assessment*	**SEA:** • Review opportunities for design refinements to avoid physical disturbance and reduce setting effects from above ground surface infrastructure on heritage assets. This includes consideration of opportunities to deploy vegetation or topographical screening to minimise impacts. Iterative development of CEMP including procedures and physical measures to protect unrecorded archaeological assets.
Material Assets *SEA Objective 9.1 – 9.2* *Natural Capital & BNG Assessment*	**SEA:** • Review opportunities for design refinements to avoid land use conflicts and reduce traffic and amenity impacts during construction Consider opportunities to provide local access and amenity benefits through the delivery of each scheme Iterative development of CTMP and AAPAP

Appendix B Monitoring & Stakeholder Engagement Plan

B.1 Monitoring

B.1.1 All identified interactions between each scheme and relevant environmental receptors which at Gate 1 are predicted to result in likely significant adverse effects on SEA Objectives, likely significant effects on European Sites, net-deterioration and compliance risks to WFD waterbodies, INNS distribution risks, or potential reductions in habitat cover or connectivity will be subject to individual review at Gate 2.

B.1.2 Drawing upon recommendations developed through discipline-specific assessments presented in **Technical Appendices 3.1 – 3.6**, further environmental monitoring measures to better understand likely significant adverse environmental effects and key risks as predicted through this IEA are outlined in **Table B.1** below. Where relevant and proportionate, these measures should be applied at Gate 2 (and subsequent gates where appropriate) to inform a more detailed IEA for each scheme.

B.1.3 In summary, at the outset of Gate 2 a suite of technical studies and surveys to demonstrate the acceptability of proposed abstractions and discharges involving the Rivers Tamar, Exe and Stour will be required to inform the Gate 2 Refined Options Appraisal:

- Fisheries assessment
- Aquatic habitat assessment (inc. surveys) for both directly impacted reach and downstream water-dependent sensitive habitats/designations
- Geomorphological survey of impacted reach
- Water quality assessment (of impacted reach)
- INNS surveys in identified high risk locations
- Hydrological modelling

B.1.4 The outputs of these technical studies will be used to:

- Confirm the acceptability of proposed components for inclusion within a refined concept design of each scheme at Gate 2, leading to the identification of a Preferred Design which will be subject to detailed design and planning through Gates 3 – 4; and, in tandem,
- Progress abstraction and discharge licence negotiations with EA

B.1.5 Further environmental monitoring may then be required to support refined concept design development of each functionally separate water transfer scheme (e.g. River Stour flood risk analysis).

Table B.1: Proposed WCS SROs Environmental Monitoring for Gate 2+

SEA Topic	Recommended Environmental Monitoring
Biodiversity *SEA Objectives 1.1 – 1.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment* *INNS Risk Assessment*	**SEA:** • River Tamar fisheries and aquatic habitat surveys • River Exe fisheries and aquatic habitat surveys • River Stour fisheries and aquatic habitat surveys • Site walkovers and relevant habitat or species surveys. - To remain proportionate, at Gate 2 any surveys should focus on the main 'risk areas' where Gate 1 environmental assessments have predicted major interactions and/or likely significant adverse effects in order to inform potential design refinements. - Specification at Gate 2 of a wider suite of relevant ecological surveys and assessments to underpin pre-planning activities at Gate 3. **HRA:** • Ground-truthing of proposed BNG and mitigation options (informed by BNG surveys) together with stakeholder engagement (to better understand local authorities) will enable a more refined Natural Capital account to be provided at Gate 2 • Gate 2 HRA Screening will be used to shape the requirement for an Appropriate Assessment (Stage 2 of the HRA process) at Gate 3, including confirmation of existing baseline data reviews and required surveys **Natural Capital & BNG:** • The current ZoI for the assessed elements extends to 1 km from any likely construction zones. Whilst acceptable for a high-level approach as required for Gate 1, greater detail will be necessary for Gate 2. Once the options have been developed further, more in-depth analysis of likely effects on factors such as water quality, bankside habitats or groundwater flow will be possible, and may highlight a necessity to expand or reduce the ZoI. • It will be important at Gate 2 to understand indirect interactions between components and surrounding habitats in greater detail to develop the assessment, ultimately giving a more accurate predicted change in Natural Capital values. It will be important to consider how habitat condition contributes to delivery of ecosystem services and assess how habitat enhancement measures will affect natural capital values **INNS Risk Assessment** • Full INNS Pathway Risk Assessments required at Gate 2, including INNS surveys in identified high risk locations.
Population and Health *SEA Objectives 2.1 – 2.3l Capital & BNG Assessment*	**SEA:** • Land title searches to inform initial landowner engagement and confirm acquisition requirements **Natural Capital & BNG:** • Capture site specific features and less generalised figures for visitor numbers to enable an accurate valuation of recreational services Monetisation of BNG uplift proposals for habitat creation to outline recreation and tourism benefits
Water Environment and Flood Risk *SEA Objectives 3.1 – 3.5* *HRA* *WFD Compliance Assessment* *Natural Capital & BNG Assessment* *Carbon Assessment*	**SEA:** • River Tamar water quality and geomorphological surveys, hydrological modelling • River Exe water quality and geomorphological surveys, hydrological modelling, resource availability assessment • River Stour water quality and geomorphological surveys, hydrological modelling to inform refined options appraisal. Flood risk analysis subsequently required to support refined concept design development. • Site walkovers, water quality and geomorphological surveys at the location of watercourse crossings within or otherwise likely to impact nationally and internationally designated sites. **WFD Compliance:** • More detailed assessment of hydrological impacts of each scheme and potential impacts on phosphorous concentrations in affected waterbodies Bespoke aquatic habitat assessment, water quality monitoring and water quality modelling at Gate 2

SEA Topic	Recommended Environmental Monitoring
	Natural Capital & BNG: • Further investigation into drought impacts on habitats integrity resilience and natural flood resilience • Detailed aquatic and terrestrial field surveys to confirm habitat condition and extent for BNG assessment, as well as hydrological modelling and detailed WFD assessment. **INNS Risk:** • Target INNS monitoring programme to provide detailed baseline of species associated with the River Tamar, River Lyd, River Thrushel, River Exe and River Stour as well as Roadford Lake and Testwood Lakes. This data would be important to consider in further scheme design and the identification of suitable mitigation measures (including pre-treatment requirements) • Review of INNS distribution risk into the wider catchment from removal of propagules through treatment processes and sludge/waste from the WWTW is transferred to terrestrial habitats within the destination catchment
Soil *SEA Objective 4.1* *Natural Capital & BNG Assessment*	**SEA:** • Land title searches to inform initial landowner engagement, including specifically to identify easement requirements for buried pipe infrastructure on agricultural land.
Air *SEA Objective 5.1* *Natural Capital & BNG Assessment*	**SEA:** • No monitoring considered to be necessary or proportionate
Climatic Factors *SEA Objectives 6.1 – 6.2* *Natural Capital & BNG Assessment*	**Natural Capital & BNG:** • Development of habitat type and land usage future baselines to account for expected changes in the global climate, as this would create disparity between predicted changes caused by each scheme and observed changes in the future.
Landscape *SEA Objective 7.1* *Natural Capital & BNG Assessment*	**SEA:** • Site walkovers and proportionate Landscape and Visual Appraisal of the main 'risk areas' where major direct interactions with AONB and National Parks and likely significant adverse landscape effects have been predicted through this Gate 1 SEA to inform potential design refinements. • Any remaining major direct interactions or likely significant adverse landscape effects following refined concept design at Gate 2 is likely to trigger a detailed LVIA at Gate 3.
Cultural Heritage *SEA Objective 8.1* *Natural Capital & BNG Assessment*	**SEA:** • Site walkovers of the main 'risk areas' where major direct interactions (setting effects) on heritage assets have been predicted through this Gate 1 SEA to inform potential design refinements
Material Assets *SEA Objective 9.1 – 9.2* *Natural Capital & BNG Assessment*	**SEA:** • Land title searches to inform initial landowner engagement and confirm acquisition requirements **Natural Capital & BNG:** • Development of land usage future baseline to account for planned changes such as delivery of other major infrastructure projects, build out of allocated development sites and other large-scale developments.

B.2 Stakeholder engagement

B.2.1 As detailed in Section 3.5, an important element of the IEA undertaken at Gate 1 has been regular engagement with environmental and planning stakeholders. This will continue and intensify at Gate 2 (and subsequent gates), with planned activities including:

- Early engagement with the EA and NE to agree the scope of the technical studies and associated surveys required in relation to the Rivers Tamar, Exe and Stour. These studies will need to be completed in sufficient time to inform a refined options appraisal;
- Monthly progress meetings with the EA and NE throughout Gate 2 to review design and environmental assessment work, discuss environmental issues associated with each scheme (e.g. implications of proposed abstractions) and agree assessment scope;
- Follow-up technical workshops with the EA and NE (and other relevant stakeholders as appropriate) to review environmental monitoring findings, address specific risks and likely significant effects, and review mitigation options.
- Provision of draft environmental reporting for review, followed by meetings to discuss risks identified at component and scheme levels. This will occur at each stage of Gate 2, namely refined options appraisal, refined concept design development and formal environmental assessment & reporting.
- Tailored briefing notes issued to and meetings with Local Planning Authorities hosting major infrastructure components to outline the relevant scheme, discuss how planning and environmental issues are being addressed and to inform the development of detailed consenting strategies for each functionally separate water transfer scheme (building on **Annex 6 – Consenting Strategy**).

Appendix C Environmental Risk Register

West Country South Strategic Resource Options

Annex 3: Environmental Assessment

Appendix 3.1: SEA

On behalf of **South West Water, Wessex Water and Southern Water**

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1 Introduction

1.1 Background

1.1.1 This Strategic Environmental Assessment (SEA) Report forms a technical appendix of Annex 3 - Environmental Assessment of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of likely significant environmental impacts arising from the two schemes being progressed through the WCS SROs at Gate 1.

1.1.2 Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally separate schemes which will be appraised concurrently by RAPID. This report therefore provides a single assessment which considers both schemes.

1.2 Context

1.2.1 Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

1.2.2 PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

1.2.3 Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

- Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
- Potential water source - Roadford pumped storage scheme (WCS2)
- Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

1.2.4 The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within **Annexes 1 – Options Appraisal Report** (including WCS1-3 environmental review technical notes) and **2 – Concept Design Report** respectively.

1.3 Purpose and Objectives

1.3.1 A proportionate level of environmental assessment needs to be carried out at component and scheme level to underpin the collation of robust Gate 1 submissions for the WCS SROs. Guidance issued by Ofwat (April 2020) confirms that Gate 1 environmental appraisal work should focus on establishing scheme feasibility, identifying key environmental (including social and economic) risks, and defining assessment frameworks for further application at Gate 2+.

1.3.2 This report provides technical SEA information to support summary information set out in the submitted **WCS SROs Gate 1 Annex 3 – Environmental Assessment** and **Section 5 - Environmental and Drinking Water Quality Considerations** of the **WCS Gate 1 Submission Summary Reports** (one per SRO) in accordance with appraisal criteria specified by RAPID. In doing so, the report presents a high-level analysis of the feasibility of the two schemes being progressed through the WCS SROs at Gate 1 in environmental, socio-economic and planning terms. In line with best practice this includes the development and initial application of a SEA Framework to define assessment methods, key environmental risks and mitigation requirements which will need to be addressed at Gate 2.

1.3.3 The objectives of this technical appendix report are to:

- Define a suitable SEA Framework and associated methodology to underpin the assessment of likely environmental, socio-economic and planning effects/implications from the two schemes being progressed through the WCS SROs. This SEA Framework includes detailed criteria to apply all Core Objectives as defined through the ACWG Core SEA Objectives Guidance (Mott MacDonald for ACWG, 2020), going beyond high-level qualitative judgements to provide clear justification for the identification (or avoidance) of likely significant effects and to inform the development of mitigation options;

- Underpin integrated environmental assessments (IEA), both between environmental disciplines (in relation to assessment of the WCS SROs) and between related projects. The WCS SEA Framework has been developed initially for use in assessing the WCS SROs but is capable of applying to other SROs in the region (i.e. West Country North at Gate 2) and the wider scope of the emerging West Country Water Resources Group (WCWR) Regional Plan;

- Demonstrate how the SEA has informed Gate 1 optioneering by identifying key environmental (including socio-economic and planning) constraints to be taken account of when defining WCS component and scheme-level options and sub-options. A key element of the SEA at Gate 1 is to advise on the environmental implications of potential concept design options.

- Confirm all 'potentially reasonable alternative options' identifiable at Gate 1 which are associated with the two schemes being progressed through the WCS SROs. This draws upon detailed feasibility analysis and options screening presented in **Annex 1 – Options Appraisal** (inc. WCS1 – 3 Environmental Review appendices); and,

- Apply the SEA Framework to confirm a suite of actual 'reasonable alternative' options associated with the initial concept design of the two schemes being progressed through the WCS SROs. This includes identifying likely significant environmental effects and key (environmental) risks at component and scheme level, as well as developing associated mitigation.

1.4 Report Structure

1.4.1 The remainder of this SEA is structured as follows:

- **Section 2 – WCS Overview** provides an outline of the components and associated options which together comprise the West Country South Strategic Resource Options (WCS SROs);

- **Section 3 – SEA Methodology** sets out the methodology used to develop the SEA assessment for the schemes; outlines the approach adopted to undertake a proportionate SEA of the two schemes being progressed through the WCS SROs at Gate 1 in order to identify key environmental risks;

- **Section 4 – Approach to Reasonable Alternatives** explains the objectives-led SEA approach to optioneering carried out to define all 'reasonable alternative' options (insofar as identifiable at Gate 1) associated with the two schemes being progressed through the WCS SROs. This provides the starting point for undertaking a multi-stage SEA and wider environmental assessments on a robust basis;

- **Section 5 – SEA Results** details the findings of the SEA of the two schemes being progressed through the WCS SROs (i.e. predicted likely significant effects and key risks). This section is directly supported by detailed SEA matrices, constraint mapping and GIS data tables for each component provided in **Appendices A**, **B** and **C** respectively. The also draws upon a Resilience and Integration Benefits Note provided in **Appendix D**;

- **Section 6 – Mitigation and Monitoring** outlines initial mitigation options and monitoring proposals to address identified likely significant adverse environmental effects and key risks at component and scheme level; and,

- **Section 7 – Next Steps**: presents a summary of the WCS Gate 1 SEA findings and outlines the next steps for progressing the SEA at Gate 2.

2 Overview of West Country SROs

2.1 Summary

2.1.1 As noted in **Section 1**, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

- Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
- Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
- Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO Concept Design Components and Schemes

2.2.1 Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

- Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 MLD effluent[1] from Poole Sewage Treatment Works (STW) via River Stour:
    a) Poole STW infrastructure (pumps and tanks)
    b) Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at WRC plant)
    c) River Stour section (in-river)
    d) River Stour abstraction
    e) River Stour bankside storage
    f) River Stour Pre Treatment Works (for onwards transmission)
- Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 MLD for onwards transmission:

[1] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications. As per **Appendix B – Monitoring Plan**, technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.

a) Abstraction from River Tamar at Gatherley intake

b) Gatherley to Roadford Lake including outlet (Lifton North route)

c) Roadford Lake (no major changes to existing reservoir proposed)

d) Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)

e) Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)

- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)

a) Northcombe to Prewley

b) Prewley to Parsonage

c) Parsonage to Pynes WTW

d) River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)

e) River Exe Abstraction (new) at Bolham Weir

f) River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)

g) Allers to Woodgate

h) Woodgate to Kingston St Mary

i) Kingston St Mary to Summerslade

- Component 4: Transmission System to SRN (components 4a - 4b)

a. Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)

b. River Stour Pre Treatment to Testwood

i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage

ii. Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)

- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)

a) Testwood WTW

b) Testwood Lakes (small)

c) Testwood potable storage tanks

2.2.2 Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer
    - River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
    - River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
- Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

2.2.3 Further details regarding each scheme are provided in **Annex 2 – Concept Design Reports**.

2.2.4 The primary levels of assessment are at component and scheme levels as defined above. For the purpose of this assessment, each component part of the two schemes has been considered. Resultant overall impacts for the two schemes and the overarching WCS SROs have also been identified.

3 SEA Methodology

3.1 Overview

3.1.1 In line with best practice, an IEA centred around SEA is being undertaken throughout the development of the two schemes being progressed through the WCS SROs. The assessment is being carried out both to inform concurrent design processes and to provide pertinent information to decision makers regarding the likely effects of implementing the project. This approach is underpinned by the application of established principles SEA processes to provide methodological rigour and allow assessment results for the WCS SROs to be comparable with SEA findings for other emerging SRO, Regional Plan and Water Resource Management (WRMP) options.

3.1.2 As set out in legislation, the purpose of SEA is to identify, assess and evaluate the likely significant environmental effects of an emerging plan or strategy, Advantages of framing this assessment around SEA are that this allows for iterative and proportionate assessments to be undertaken throughout RAPID's multi-gated process to inform design and selection decisions, as well as encompassing a broad scope of impacts. In line with standard SEA practice, the assessment covers a broad range of topics including population, health and material assets as well as a suite of physical environmental aspects. This allows the SEA process to identify and address relevant environmental and socio-economic impacts in accordance with RAPID's appraisal criteria.

3.1.3 It is important to note that SEA is only being carried out on an informal and voluntary basis in respect of the WCS SROs, as they (and associated schemes) do not themselves constitute relevant and qualifying plans or programmes under the Environmental Assessment of Plans and Programmes Regulations 2004 ('the SEA Regulations'). Rather, the two schemes being progressed through the WCS SROs currently represent concept level project options requiring further consideration as a result of PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019), which was itself exempt from statutory SEA requirements owing to being a financial plan (i.e. a funding determination from Ofwat). There is therefore currently no statutory requirement to consult (with the statutory bodies listed within the SEA or more widely) within the SEA+ adopted processes for WCS.

3.2 SEA Technical Methodology

Objectives

3.2.1 A key objective of SEA is to take account of environmental considerations throughout the development of a plan or strategy (or, in this case, the two schemes being progressed through the WCS SROs as project level options) to enhance its environmental (and wider sustainability) performance. At Gate 1, this requires an objective assessment to be undertaken of all key risks (from each WCS scheme and constituent components) to establish scheme feasibility and contribute to concept design development. More detailed assessment to identify and address all likely significant environmental (including social and economic) impacts will then follow at subsequent RAPID gates.

3.2.2 Caselaw has established that SEA also functions as an important evidence base to justify a plan or strategy as prepared, and the non-inclusion of possible other contents, in terms of:

- Demonstrating that, at Gate 1 concept design stage, the two schemes being progressed through the WCS SROs and all constituent components are themselves 'reasonable' (i.e. evidence based and contributing effectively to higher-level objectives); and,
- Determining whether there are any other 'reasonable alternatives' (schemes and/or constituent components) which could achieve the same objectives. In the event that

reasonable alternatives can be identified these should be subject to an equal level of assessment to identify likely significant effects. This process should demonstrate that the selected WCS schemes and constituent components perform better in overall terms than any other identified reasonable alternatives.

WCS1-3 Environmental Reviews

3.2.3 Work packages WCS1-3 generated an initial evidence base to establish a set of potentially feasible component-level options, comprising water sources and transmission routes, to be further developed through concept design and included in WCS SROs at Gate 1. As detailed in Appendix A of **Annex 1 – Options Appraisal**, this included identifying relevant environmental (inc. planning) constraints within specified distance thresholds (in line with ACWG guidance) which could interact with component-level options. To underpin scheme-level SEA work at Gate 1, WCS1-3 Environmental Reviews considered potential interactions between each unconstrained (i.e. initially identified) component-level option and relevant biodiversity, flood risk & water environment, landscape, heritage, and planning & infrastructure constraints as identified through GIS analysis. However, to remain proportionate detailed reporting against a full suite of SEA Objectives was not prepared at screening stage for all component options, as it was recognised that some would quickly be discounted due to showstopper constraints (refer to **Annex 1 – Options Appraisal** for details).

3.2.4 The initially analysis carried out through WCS1-3 informed the identification of potential generic environmental effect types and risks associated with each component option. Findings from the WCS1-3 Environmental Reviews were used to inform a two-stage tabular screening process (pass/fail and RAG based), with screening outcomes subsequently discussed and agreed with the WCWRG and constituent water companies through workshops held in February 2021. A workshop regarding key risks identified through WCS1-3 Environmental Reviews was also held with the Environment Agency and Natural England in March 2021. Component option level screening resulted in only a limited set of component options now being identified as 'potentially reasonable alternative' components (subject to the outcome of Gate 1) for inclusion within the WCS SROs, as detailed in **Section 2**. These retained components now form part of two schemes being progressed through the WCS SROs at Gate 1, each of which has been subject to a proportionate SEA and initial concept design development.

3.2.5 Owing to their focus on identifying key risks and establishing the feasibility of individual options at component level, WCS1-3 Environmental Reviews afforded only limited consideration to options for environmental mitigation and net environmental gain, non-resource related socio-economic benefits and environmental monitoring. It was also not possible at that early stage to identify likely significant effects at scheme level, examine the alignment of the WCS SROs with the emerging Environmental Ambition for the WCWRG Regional Plan or to consider the development of the WCS SRO(s) beyond Gate 1. Each of matters issues therefore required further consideration through this scheme-level SEA.

WCS1: Wessex Effluent Re-Use Source Options

3.2.6 Owing to the focus of the WCS1 Environmental Review on addressing showstopper WFD status risks to confirm scheme feasibility, only a limited set of physical environmental designations and constraints were reviewed (e.g. interactions with planning & infrastructure have not been identified). Further component level analysis of likely environmental impacts identified through WCS1 was therefore needed to support a robust scheme-level assessment in accordance with ACWG guidance. The identified key environmental risk which required further consideration through this scheme-level SEA related to the sensitivity of and potential impacts on the River Stour and associated receptors.

WCS2: Roadford Pumped Storage Source Option

3.2.7 The WCS2 Environmental Review indicates that the locational, physical and operational characteristics of proposed infrastructure within the Roadford Pumped Storage source component (of one of the WCS schemes) are not themselves likely to raise major environmental issues. A proportionate Resource Availability Assessment prepared by South West Water (SWW, April 2021) to accompany the WCS SROs Gate 1 submissions also indicates:

- South of its confluence with the River Lyd the River Tamar has plentiful winter-months flow to accommodate the proposed 125 MLD abstraction at Gatherley (Component 2a); and,
- With addition of a 125 MLD winter-months transfer from the River Tamar, Roadford Lake (reservoir) (Component 2c) can provide 30 MLD resource for WCS SROs (via transfer to Northcombe WTW and onwards) in 1 in 200 year drought scenario.

3.2.8 Owing to the limited scope of the Gate 1 Resource Availability Assessment it was recognised that the environmental acceptability of abstracting from the River Tamar (and potentially discharging increased return flows into the Rivers Wolf and Tamar) would require further analysis and discussions with the EA and NE. To remain proportionate, at Gate 1 this included taking account of potential effects on down-stream sensitive environmental receptors within component and scheme level SEA, Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) Compliance Assessments, as well as developing mitigation and monitoring proposals for further consideration at Gate 2.

WCS3: Inter-Regional Transmission System Options

3.2.9 Unconstrained transmission route options identified through WCS3 focused on utilising existing trunk/spine main corridors to enable the potential development of cascade-based schemes, facilitate resource displacement, provide network integration (to unlock associated resilience benefits) and minimise the extent of dedicated new infrastructure required. This approach dictated that a River Tamar to Testwood Transfer scheme would need to comprise a largely potable transfer, whereas a Poole to Testwood Effluent Re-Use transfer is less suitable for cascade-based transmission or network integration so an independent raw transfer (post tertiary treatment) is instead proposed.

3.2.10 The WCS3 Environmental Review afforded equal consideration to unconstrained transmission route options and, to remain proportionate, focused on identifying environmental interactions within 1km (approximate) route corridors, as such interactions were most likely to constitute potential showstoppers or affect initial routing decisions. To support a robust scheme-level SEA, further analysis was then undertaken to better understand potential indirect impacts on relevant statutory designations across a wider area (i.e. beyond 1km from each component, out to specified buffer zone distances in accordance with ACWG guidance). Reported within the WCS3 Environmental Review and HRA Preliminary European Site Interactions Technical Note provided in Appendix A of **Annex 1 – Options Appraisal**, this analysis also drew upon a review of relevant European Sites across a 15km (radius) Study Area. Identified key risks which required further consideration in this SEA included:

- Direct impacts on a limited number of statutory heritage and ecological designations where interactions were not already minimised through initial concept design;
- Environmental and amenity impacts from watercourse, rail and road crossings; and,
- A need for fresh analysis of some concept design transmission components (route sections outside of the original WCS3 corridors and ancillary infrastructure) to overcome capacity constraints which limit the use of existing infrastructure. This utilised WCS3 outputs (e.g. GIS data and identified environmental risks) where the data remained relevant to 1 – 15km distance thresholds applicable to the location of new components.

3.3 WCS SROs SEA Framework

3.3.1 Early development of a SEA framework is a core element of SEA practice, as it provides a transparent basis to subsequently assess the likely significant effects of implementing a plan or strategy (or, in this case, the WCS schemes as project level options) together with any identifiable reasonable alternatives to it. SEA frameworks also need to be sufficiently flexible to allow a proportionate level of assessment, ranging from initial feasibility assessment to more detailed impact analysis once the plan or project has been fully defined.

3.3.2 The starting point for developing the WCS SEA Framework was to review existing SEA Frameworks used for the West Country North SRO at Accelerated Gate 1 and by the three water companies (South West Water, Wessex Water and Southern Water) to appraise WRMP19 documents, as well as to consider the implications of relevant ACWG Guidance. The SEA Core Objective Identification guidance (ACWG, September 2020) provides a common set of high level SEA objectives for application in assessing SROs to drive consistency between SEA of different SROs. However,

- Core SEA objectives were developed based on a review of WRMP19 SEA Frameworks and are designed to align with WRPG expectations and other current environmental policy requirements. This framing means the objectives are conditioned by the nature of WRMP19 options considered and the key environmental issues identified at Scoping stage which WRMP19 SEAs were designed to respond to proportionately;

- Only six water companies participated in interviews to inform the refinement of the core SEA Objectives. This did not include Wessex Water, which covers the area where the majority of environmental impacts from WCS schemes are likely to occur; and,

- As WRMP19 SEA processes pre-date PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) and the Environment Agency's National Framework for Water Resources (March 2020), this limits the ability of the selected core SEA objectives to assess transboundary and spatially disparate environmental impacts from individual SROs that are fundamentally different to WRMP19 options.

3.3.3 To address the identified deficiency regarding the application of Core SEA Objectives on a comparable basis, detailed criteria were needed (beyond high-level qualitative judgements) to provide a clear justification for the identification (or avoidance) of likely significant effects (i.e. assessment scoring) and to inform development of mitigation options for the two schemes being developed through the WCS SROs at Gate 1.

3.3.4 A suite of detailed assessment criteria was therefore developed through a dedicated (WCS6) Scoping Study to underpin the scheme level SEA of the WCS SROs and for future use in assessing the WCN SRO and emerging WCWR Regional Plan in a consistent manner. These detailed criteria directly relate to the ACWG Core -SEA Objectives and are derived from the WCN SEA+ Framework, as this was based on a review of relevant WRMP19 SEA Frameworks and key environmental issues across the region. Taken together, the Core -SEA Objectives and proposed detailed criteria now provide WCWRG with a robust SEA Framework which can be both applied for both SRO and WCWR Regional Plan purposes. The WCS SROs SEA Framework is detailed in **Table 3.1** below.

Table 3.1: WCS SROs SEA Framework

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
1. Biodiversity	1. To protect designated sites and their qualifying features.	• Impact pathway analysis • Relevant European Sites (conservation objectives, qualifying features, condition, integrity risks) and likely effects as assessed through HRA • Other relevant statutory designations (conservation objectives, qualifying features, condition, integrity risks) and likely effects. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect (and where possible enhance) nationally and internationally designated sites of ecological importance?* - *Protect (and where possible enhance) locally designated biodiversity sites?* Mitigation development to address identified likely (significant) adverse effects
	2. To avoid a net reduction, and where possible enhance, in non-monetised natural capital assets.	• Findings from Natural Capital Assessment workstream. • Development of relevant BNG and wider net environmental gain opportunities – options development and initial testing.
	3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.	• Impact pathway analysis • Findings from HRA and WFD Compliance workstreams. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect and enhance valued species and habitats?* - *Safeguard against habitat loss or fragmentation?* - *Protect or enhance protected trees or important woodland areas?* - *Lead to changes in ecological resources (habitats/species) due to changes in surface or groundwater water quantity or quality?* Mitigation development to address identified likely (significant) adverse effects
	4. To avoid and, where required, manage invasive and non-native species (INNS).	• Impact pathway analysis • Findings from INNS Risk workstream (inc. mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Exacerbate or prevent the spread/introduction of INNS?*
	5. To meet WFD objectives relating to biodiversity.	• Impact pathway analysis • Findings from WFD Compliance workstream (inc. WFD status of waterbody receptors, likely effects and mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Support the achievement of good ecological status?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
2. Population and Human Health	1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise noise emissions to sensitive receptors?* - *Protect air quality and prevent emissions of harmful pollutants?* - *Avoid conflicts with strategic scale land use (employment / industrial / housing / mixed use) planning allocations to meet identified population needs?* - *Avoid traffic congestion and delays?* - *Protect access to local services and facilities?* - *Minimise residential amenity impacts?* - *Minimise land take and sterilisation?* - *Minimise conflict with existing land uses and sensitive landowners (e.g. MOD)?* • Mitigation development to address identified likely (significant) adverse effects
	2. To maintain and enhance tourism and recreation.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Safeguard and improve opportunities for recreational activities?* - *Protect existing tourism activities and assets from adverse development impacts?* - *Protect public access to and the visitor attractiveness of designated recreational routes?* - *Improve access to nature?* Mitigation development to address identified likely (significant) adverse effects
	3. To secure resilient water supplies for the health and wellbeing of customers.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Ensure continuity of a safe and secure drinking water supply?* - *Ensure adequate water infrastructure is in place to meet the health and wellbeing needs of current and future populations?* • Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
	4. To increase access and connect customers to the natural environment, provide education or information resources for the public.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Improve access to nature?* - *Provide education or information resources for the public?* Mitigation development to address identified likely (significant) adverse effects
3. Water	1. To reduce or manage flood risk, taking climate change into account.	• Impact pathway analysis • Review SRO infrastructure encroachments into Flood Zones 2 and 3 • Qualitative assessment via guide questions: *Will the SRO:* - *Cause or exacerbate flooding, either localised or elsewhere within the catchment?* - *Have the potential to help alleviate flood risks, including for donating watercourses?* • Mitigation development to address identified likely (significant) adverse effects
	2. To enhance or maintain groundwater quality and resources.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Result in changes to groundwater levels?* - *Protect and improve groundwater quality?* • Mitigation development to address identified likely (significant) adverse effects
	3. To enhance or maintain surface water quality, flows and quantity.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Result in changes to abstraction or discharge levels?* - *Require changes to abstraction licences?* - *Result in changes to river flows?* - *Protect fish, inverts and macrophytes?* - *Safeguard waterbodies designated as protected areas?* - *Protect and improve surface water quality?* • Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
	4. To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect or improve the quality of waterbodies, helping to WFD and RBMP objectives?* • Mitigation development to address identified likely (significant) adverse effects
	5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	• Findings from socio-economic analysis of non-resource benefits re network resilience and performance benefits • Comparison of cascade-based versus new transmission infrastructure approaches • Mitigation and enhancement development to further improve resilience through SRO
4. Soil	1. To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Avoid (or help to remediate) contaminated land?* - *With respect to areas proposed for permanent land use change, safeguard the best quality, most versatile and locally important agricultural land?* - *Utilise brownfield / previously developed land?* • Mitigation development to address identified likely (significant) adverse effects
5. Air	1. To reduce and minimise air and noise emissions during construction and operation.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise noise emissions to sensitive receptors?* - *Protect air quality and prevent emissions of harmful pollutants* - *Minimise residential amenity impacts?* • Mitigation development to address identified likely (significant) adverse effects
6. Climatic Factors	1. To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	• Impact pathway analysis • Findings from Natural Capital Assessment workstream • Qualitative assessment via guide questions: *Will the SRO:* - *Reduce vulnerability to the effects of climate change through appropriate adaptation?* - *Enhance climate resilience within the water network?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		- *Enhance ecosystem resilience (ability to adapt) to climate change?* • Mitigation development to address identified likely (significant) adverse effects
	2. To reduce embodied and operational carbon emissions.	• Impact pathway analysis • Findings from Carbon Assessment workstream • Findings from Natural Capital Assessment workstream • Qualitative assessment via guide questions: *Will the SRO:* - *Maximise energy efficiency?* - *Minimise operational energy consumption?* - *Minimise greenhouse gas release, including embodied and operational emissions?* - *Support decarbonisation of the water sector?* - *Support the delivery of renewable and low carbon energy?* Mitigation development to address identified likely (significant) adverse effects
7. Landscape	1. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Avoid adverse effects on (and where possible enhance) protected/designated landscapes?* - *Protect (and where possible enhance) landscape and townscape character?* - *Minimise adverse visual impacts?* - *Provide opportunities to enhance visual amenity?* • Mitigation development to address identified likely (significant) adverse effects
8. Historic Environment	1. To conserve, protect and enhance landscape and townscape character and visual amenity.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Affect the integrity or setting of designated heritage assets?* - *Avoid or minimise damage to archaeologically important sites?* - *Affect public access to designated heritage assets?* • Mitigation development to address identified likely (significant) adverse effects
9. Material Assets	1. To minimise resource use and waste production.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise the production of waste?* - *Promote the principles of circular economy?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		- *Treat and process waste with minimal environmental impact?* - *Minimise the demand for raw materials and the need for minerals extraction?* - *Promote the use of local resources and minimise the importation of minerals?* • Mitigation development to address identified likely (significant) adverse effects
	2. To avoid negative effects on built assets / infrastructure.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Avoid conflicts with existing, consented and proposed major transport infrastructure?* - *Avoid constraining the potential growth of existing settlements?* - *Avoid conflicts with existing or planned waste or minerals sites?* - *Minimise land take and sterilisation?* - *Integrate with existing or planned water infrastructure?* - *Ensure adequate infrastructure is in place to meet current and future population needs?* - *Require the provision of new or upgraded infrastructure?* Mitigation development to address identified likely (significant) adverse effects

3.3.5 An associated scoring system was defined for use in conjunction with the SEA Framework, as shown in **Table 3.2**. In accordance with core SEA requirements this scoring system sought to distinguish between likely significant (beneficial or adverse) and all other potential environmental effects.

Table 3.2: SEA Scoring System to Establish Likely Significant Effects

Score	Description	Symbol
Significant (Major) Positive Effect	The proposed scheme / component contributes significantly to the achievement of the SEA Objective.	++
Minor Positive Effect	The proposed scheme / component contributes to the achievement of the SEA Objective but not significantly.	+
Neutral Effect	The proposed scheme / component is related to but does not have any effect on the achievement of the SEA Objective	0
Minor Negative Effect	The proposed scheme / component detracts from the achievement of the SEA Objective but not significantly	-
Significant (Major) Negative Effect	The proposed scheme / component detracts significantly from the achievement of the SEA Objective. Mitigation is therefore required.	--
Uncertain Effect	The proposed scheme / component has an uncertain relationship to the SEA Objective or the relationship would be dependent on the way in which the aspect is managed.	?
No Clear Relationship	There is no clear relationship between the proposed scheme / component and the achievement of the SEA Objective, or the relationship is negligible.	~

3.4 Approach to Identify Likely Significant Effects and Key Risks

3.4.1 Having developed the WCS SROs SEA Framework and scoring system, the second main SEA task at Gate 1 was to apply this methodology to each proposed scheme and all constituent components being progressed through the WCS SROs to inform Gate 1 concept design development, discharge SEA reasonable alternatives requirements and identify likely significant environmental effects. Key risks identified through the WCS1-3 Environmental Reviews against five environmental themes (biodiversity, water environment & flood risk, heritage, landscape and planning & infrastructure – refer to Appendix A of **Annex 1 – Options Appraisal**) needed to be translated into a more detailed scheme-level SEA to identify and address likely significant environmental effects against the WCS SROs SEA Framework (**Table 3.1**) above.

Impact Pathway Analysis

3.4.2 The scheme level SEA firstly required undertaking '*impact pathway analysis'* to cross-match generic potential environmental (inc. socio-economic) effect types identified as being associated with WCS component options (as listed within WCS1-3 Environmental Reviews) with identified specific key risks for the source and transmission components being progressed to concept design for inclusion within the two WCS SRO schemes at Gate 1. This process resulted in the identification of a clear set of likely environmental (inc. socio-economic) effects on individual receptors/receptor groupings for further consideration through this SEA and wider assessment processes.

3.4.3 Drawing upon WCS1-3 Environmental Reviews, impact pathway analysis, headline impacts from other environmental assessment workstreams (e.g. WFD, HRA, etc) and limited further GIS, qualitative and quantitative analysis of concept design components, completion of the Gate 1 SEA involved the preparation of detailed tabular reporting to identify (through scoring) and where possible address (through mitigation development) likely significant environmental effects. This tabular reporting included categorising all identified likely interactions between each component selected for concept design (refer to **Section 2**) and individual environmental receptors (i.e. constraints and features) identified within specified buffer distances in accordance with ACWG guidance. Individual interactions were categorised as follows, taking account of the limited embedded mitigation incorporated within the WCS schemes at Gate 1 but excluding potential further mitigation (refer to **Section 6 – Mitigation and Monitoring**):

- Major: interactions likely to affect compliance with statutory requirements and/or the integrity or value of designations or other environmental features of national or international importance. The interaction is likely to be direct whilst its nature and temporal or spatial scale is likely to be substantial. The interaction will therefore be of importance in decision making.

- Moderate: interactions with noticeable but relatively limited consequences (e.g. spatially or temporally contained) for an impacted receptor. The interaction (direct or indirect) is therefore unlikely to affect compliance with statutory requirements and/or the integrity or value of designations or other environmental features of national or international importance. However, the extent, scale and/or duration of the interaction may still be of importance in decision-making.

- Minor: interactions (direct or indirect) of very limited extent, scale or duration and thus consequence to an impacted receptor. These interactions may be raised as local issues but are unlikely to be of wider importance in decision-making.

3.4.4 Categorisation of individual interactions at component level was distinct from but contributed to scoring at component and scheme level against SEA topics and Core SEA Objectives. Major interactions affecting one or more environmental receptor themselves indicate the potential for likely significant effects, which in the absence of further mitigation may result in the relevant component (or scheme) being discounted due to environmental showstopper constraints. However, likely significant effects could also be generated against Core SEA Objectives owing to other factors (e.g. findings from other technical assessments such INNS Risk) even where no interaction of relevance to a Core SEA Objective was categorised as ‘major’ or indeed where impact pathway data did not contribute to the assessment of components against specific Core SEA Objectives.

Analysis of Resilience and Integration Benefits

3.4.5 In line with RAPID’s expectations regarding consideration of socio-economic impacts and the implications of relevant ACWG guidance, the SEA needs to covers a broad range of topics including population, health and material assets as well as a suite of physical environmental aspects. As detailed in **Appendix D**, further analysis was therefore carried out at scheme level to identify socio-economic, resilience and integration benefits of the two schemes being progressed through the WCS SROs, which directly informed reporting against relevant Core SEA Objectives.

SEA Matrices

3.4.6 Drawing upon the WCS1-3 Environmental Reviews, impact pathway analysis, key findings from other environmental assessment workstreams (e.g. WFD) and limited further GIS and qualitative analysis regarding identified environmental issues, detailed reporting was prepared to assess each WCS scheme and all constituent components against the WCS SROs SEA Framework (**Table 3.1**). In accordance with standard SEA practice a ‘bottom up’ approach was adopted whereby each concept design component forming part of the two WCS schemes was first assessed, with the results used to inform a higher-level SEA of each scheme. SEA matrices for each component forming part of the two schemes are provided in **Appendix A**, supported by constraints mapping and GIS data tables provided in **Appendices B** and **C** respectively.

Derived from this, SEA matrices and summary reporting for the two schemes being progressed through the WCS SROs is provided in **Section 5**.

3.4.7 The scheme-level SEA identified likely environmental effects from all concept design components of the two schemes being progressed through the WCS SRO in order to generate a robust audit trail for SRO decision making. This analysis also enabled the development of initial mitigation and monitoring proposals to address identified likely significant effects (in SEA terms) as outlined in **Section 6**.

4 Approach to Reasonable Alternatives

4.1 Overview

4.1.1 This section explains how an objectives-led SEA approach to optioneering was adopted to identify all ‘potentially reasonable alternative’ options/sub-options within the WCS SROs. The approach helped to establish scheme feasibility and identify key environmental risks at the earliest opportunity.

4.1.2 A fundamental principle of SEA is the likely significant effects of implementing a plan or strategy (or, in this case, the WCS SROs as project level option) and any identifiable reasonable alternatives to it need to be examined equally and at the earliest opportunity to support robust decision making. The SEA Regulations state that to constitute a reasonable alternative, potential options (e.g. alternative designs or approaches) must relate to objectives of the plan or programmes under consideration and its geographical scope. To be eligible for consideration in this SEA process being undertaken for the WCS SROs, reasonable alternatives must therefore be:

- Related to the objectives of the WCS SROs - as defined PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) and by South West, Wessex and Southern Water (‘the water companies’) acting in partnership;
- Within the geographical scope of the WCS SROs - as defined PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) and by the water companies; and,
- Realistic, in that they are credible alternatives which could be implemented by the water companies acting in partnership. This involves taking account of consenting requirements (e.g. national planning policies) and hydraulic, constructability, water treatment and cost constraints from the outset (refer to associated annexes);

4.1.3 A key aspect of SEA work at Gate 1 has therefore been to define all ‘potentially reasonable alternative’ options which could contribute to the development of the schemes being progressed through the WCS SROs and then to assess these for key environmental (including socio-economic and consenting) risks in order to define a set of actual ‘reasonable alternatives’ for further consideration. Of note, consideration of reasonable alternatives has been limited to those *within* the scope of the WCS SROs, as:

- Separate optioneering is being undertaken in tandem for other SROs defined within PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019). This includes development of West Country North as a separate SRO; and,
- The WCS SROs represent two options to deliver strategic water transfers to make use of available resources within the WCWRG area and help address a predicted future water supply deficit in Southern Water’s Hampshire zone, with other options already investigated through the development of Southern Water’s WRMP19 and Accelerated Gate 1 SROs. The WCS SROs are likely to be utilised alongside (rather than instead of) some components of Southern Water’s default ‘Strategy A’ to address the deficit.

4.2 Definition of Reasonable Alternatives

Overview

4.2.1 The identification of all ‘potentially reasonable alternative’ options within the WCS SROs first required the project team to confirm the scope of the project, with reference to four elements of a strategic framework:

- Project Objectives; and,
- Scheme Parameters.

SRO Objectives

4.2.2 The high-level objective for the WCS SROs set within PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) is to develop new water resources and/or utilise capacity within the southern area of the West Country (South West and Wessex Water), and then to transfer the water to the east to Southern Water's Hampshire zone. The overarching aim of this strategic water transfer is to utilise available resources to tackle water stress and enhance drought resilience.

4.2.3 Whilst this high-level objective starts to frame the WCS SROs, it does not consider anything other than functional outcomes. The following supplementary objectives were therefore defined by the project team to help guide optioneering:

- Align with PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019)
- Support delivery of current and emerging WRMPs;
- Provide viable strategic water transfer to enhance network resilience;
- Optimise use of land and existing infrastructure and integrate with existing networks where possible;
- Provide cost effective regional strategic water transfer infrastructure;
- Avoid unacceptable significant adverse environmental, amenity or socio-economic effects, including by applying the environmental mitigation hierarchy; and,
- Deliver net environmental gain.

Scheme Parameters

4.2.4 The above project objectives helped to define the scope of schemes to be progressed through the WCS SROs, equally confirming what was definitely outside of scope. This can be expressed as a series of scheme parameters:

- Source Options: Roadford Pumped Storage scheme, as per South West Water WRMP19 feasibility assessment recommendation, and identified Wessex effluent re-use sub-options (excluding those within West Country North SRO area);
- Transmission:
  - Potable - align with existing trunk/spine mains to allow network integration and potential use of existing/shared assets (to minimise cost and unlock resilience benefits);
  - Raw – effluent re-use requires appropriate tertiary treatment and in-river mixing prior to onwards transmission;
- Reception point in Southern Water's Hampshire Zone: Testwood Lakes WTW complex.
- Follow most efficient route whilst meeting *all* project objectives;
- Surface infrastructure required at West Country sources and Southern delivery points; and,

- Buried pipe infrastructure with limited surface infrastructure for pumping and control.

4.3 Potential and Actual Reasonable Alternative Options

4.3.1 Taken together, these objectives and parameters define the high-level scope of the schemes to be progressed through the WCS SROs. This provided an initial basis upon which to transparently identify potential component level options, which were subsequently appraised and subject to multi-level screening as detailed in **Annex 1 – Options Appraisal** (including associated WCS1-3 Environmental Review).

4.3.2 A consistent screening process was used to determine whether unconstrained (i.e. initially identified) component-level options constituted '*potential reasonable alternative options*' and should therefore be subject to concept design and inclusion within the schemes being progressed through the WCS SROs or should be rejected (i.e. as not constituting a reasonable alternative option). Owing to the rejection of some component-level transmission options due to insufficient capacity with the existing trunk/spine mains network it was necessary to develop new component-level options and confirm the absence of environmental or other showstoppers to demonstrate on a consistent basis that these also constitute potential reasonable alternative options. **Annex 1 – Options Appraisal** provides an audit trail which demonstrates that all potentially reasonable alternative component-level options relating to the WCS SROs have been identified and appraised. For the avoidance of doubt, no other potentially reasonable alternative options could be identified.

4.3.3 All component and scheme level options which passed the options screening process (refer to **Annex 1 – Options Appraisal** for details) constitute potentially reasonable alternative options. These options have been subject to initial concept design development and further assessment (including the SEA reported in this technical appendix) to establish their feasibility and acceptability. This demonstrate that, at Gate 1, the two schemes being progressed through the WCS SROs constitute 'actual reasonable alternatives' and that no other reasonable alternative options could be identified.

5 SEA Results

5.1 Overview

5.1.1 As major infrastructure projects involving new river abstractions, discharge points and pipelines spanning over 100km, the construction and operation of the two schemes (and constituent components) being progressed through the WCS SROs has the potential to generate a very wide range of effects on a wide range of different environmental, social and economic receptors. Having regard to the scale, locational and (concept) design characteristics of the schemes, a high-level overview of the types of environmental, social and economic effects likely to be generated is outlined in **Table 5.1** below. Each of these effects may be experienced by individual (and potentially groups of) receptors in different ways, depending on a wide range of factors (siting, design, construction and operational processes, embedded mitigation, etc).

Table 5.1: Overview of Environmental, Social and Economic Effects from WCS SROs

Environmental Aspect	Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use Direct (land take) and Indirect (off-site) effects
Biodiversity SEA Objectives 1.1 – 1.5	Construction and Operation • Habitat loss or fragmentation (including from abstraction, pollution risks and land-take leading to potential loss of corridors and connectivity for species), • Habitat degradation (including from pollution risks and commissioning activity), • Species disturbance, • Species loss or harm, • INNS transfer pathway, • Opportunities for biodiversity net gain including habitat establishment and improvement.
Population and Health SEA Objectives 2.1 – 2.3	Construction • Noise and vibration impacts, • Local reduction in air quality (construction dust), • Construction traffic impacts. • Disruption to existing economic activities (land uses, increased congestion, etc), • Construction employment from labour market. • Severance and accessibility impacts on community infrastructure, • Temporary severance and accessibility impacts on designated routes, • Increased congestion, • Changes in residential amenity. Operation • Noise, vibration and air quality impacts from operational equipment.

Environmental Aspect	Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use Direct (land take) and Indirect (off-site) effects
Water Environment and Flood Risk SEA Objectives 3.1 – 3.5	Construction and Operation • Pollution and discharge risks to water quality (surface and groundwater) including from pipe sterilisation/maintenance and associated outfalls, • Degradation of water quality due to sedimentation and in-channel works, changes in river flows (resulting from abstractions and discharges), • Changes in of watercourse geomorphology (bed and banks), • Changes in preferential flow regimes (surface and groundwater), • Potential changes in WFD status (all aspects), • Impacts on fish, inverts and macrophyte habitats and behaviours, • Impacts on the characteristics of waterbodies designated as protected areas, • Impacts on public and private water supplies, • Water environment improvements in potential environmental offsetting areas. • Loss of or damage to geological features, • Disturbance and loss of carbon rich soils, • Ground instability and contamination, • Loss or degradation of groundwater dependent terrestrial ecosystems (GWDTE), • Pollution risks to soil and land quality, • Soil erosion and sedimentation of adjacent watercourses. • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. • Ground instability and contamination risks
Soil	Construction and Operation

Environmental Aspect	Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use Direct (land take) and Indirect (off-site) effects
SEA Objective 4.1	• Disturbance or potential remediation of contaminated land • Degradation or loss of the best quality, most versatile and locally important agricultural land • Re-use of brownfield / previously developed land • Use of greenfield land
Air SEA Objective 5.1	Construction • Local reduction in air quality (construction dust), • Construction traffic impacts – congestion and associated emissions, • Changes in residential amenity. Operation • Air quality impacts from operational equipment.
Climatic Factors SEA Objectives 6.1 – 6.2	Construction • Embodied carbon (materials), • Construction energy and fuel usage (carbon impact). Operation • Operational energy consumption (carbon impact), • Opportunities to deploy onsite low/zero carbon generating technologies.
Landscape SEA Objective 7.1	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations.

Environmental Aspect	Likely Effects from WCS SRO Schemes: River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use Direct (land take) and Indirect (off-site) effects
Cultural Heritage SEA Objective 8.1	Construction • Removal or disturbance of known or currently unrecorded archaeological assets, • Temporary effects on the setting of heritage assets. Operational • Permanent effects on the setting of heritage assets (from above ground infrastructure only), • Opportunities to conserve and enhance heritage assets within in potential environmental offsetting areas.
Material Assets SEA Objective 9.1 – 9.2	Construction and Operation • Land, materials and energy (resource usage). • Loss or potential restrictions on use of best quality/most versatile agricultural land (subject to potential access and maintenance requirements), • Loss or sterilisation of private land, • Disturbance to or conflicts with land use activities, • Interfaces with, disruption to or conflicts with existing and proposed infrastructure (water, waste, electricity, gas, transport), changes in infrastructure resilience. • Conflicts with major transport infrastructure, • Land sterilisation effects (potential long-term spatial growth constraints to existing settlements).

5.1.2 As noted in **Section 3**, detailed 'impact pathway analysis' has been carried out to cross-match the wide range of potential environmental interactions and effect types associated with the WCS schemes (**Table 5.1**) with individual environmental receptors of relevance to each constituent component of the schemes being progressed through the WCS SROs. Detailed in **Appendix A**, this analysis resulted in the identification of and assignment of significance to a set of spatially located likely environmental effects on individual receptors/receptor groupings at component and scheme level. Other likely significant effects have also been identified and assigned a significance rating based on the findings of other Gate 1 environmental assessments (e.g. WFD, HRA, etc) and through application of qualitative guide questions detailed within the WCS SROs SEA Framework (**Table 3.1**).

5.2 Component Level Key Environmental Risks

5.2.1 This subsection provides a summary of likely key environmental risks from each component of WCS, as identified through the detailed SEA appraisal matrices for each constituent component provided in **Appendix A**. Key risks are identified for the following high-level components in turn:

- Component 1: Poole Effluent Re-use (components 1a – 1f)
- Component 2: Roadford Pumped Storage (components 2a – 2e)
- Component 3: Transmission System SWW to WSX (components 3a – 3i)
- Component 4: Transmission System to SRN (potable and raw: components 4a - 4b)
- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)

Component 1

5.2.2 Component 1 extends from Poole Sewage Treatment Works (STW) to the River Stour via a new Water Recycling Centre (WRC), where treated effluent will be subject to tertiary treatment prior to discharge into the River Stour. Water is then abstracted from the River Stour and stored in bankside storage to comprise of a pond or tank. The outlet from the bankside storage will be subject to another treatment process prior to onwards raw transmission (Component 4b).

5.2.3 Component 1 comprises the following elements associated with effluent re-use from Poole STW:

a) Poole STW (pumps and tanks)
b) Poole STW to River Stour (inc. Newton WRC)
c) River Stour section
d) River Stour abstraction (up to 30 MLD)
e) River Stour bankside storage
f) River Stour Pre Treatment Works (for onwards transmission)

5.2.4 Elements of Component 1 are likely to generate the following direct interactions and other key environmental risks listed in **Table 5.2** which could result in significant environmental effects:

Table 5.2: Component 1 – Key Environmental Risks

SEA Topic	Component Level Key Risks
1. Biodiversity	Encroachment of ecological features resulting in: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. On the following receptors: • Priority Habitat Inventory (South England): Coastal and floodplain grazing marsh • National Forest Inventory (Great Britain): Woodland • Priority Habitat Inventory (South England): Deciduous woodland
2. Population and Human Health	Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 5 footpaths (combined total) • 5 cycleways (combined total)
3. Water	Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. Discharge of tertiary treated effluent into Lower River Stour, resulting in increased flow and change to water chemistry.
4. Soil	Encroachment of Grades 3 (inc. BMV), 4 and 5 ALC, resulting in: • Temporary reduction in productive land and yields • Pollution risks with the potential to degrade soil quality
5. Air	N/A – only minor air quality impacts are predicted during construction.
6. Climatic Factors	Refer to Technical Appendix 3.5 – Carbon. Each component would generate embodied and operational carbon emissions, but impacts can only be considered at scheme level.

SEA Topic	Component Level Key Risks
7. Landscape	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Character Areas (England): Dorset Heaths • Greenbelt (England) designation for Bournemouth, Christchurch and Poole • National Character Areas (England): Dorset Downs and Cranborne Chase • AONB (England): Cranborne Chase & West Wiltshire Downs.
8. Historic Environment	Temporary effects during construction on the setting of the following Listed Buildings: • Longham Bridge • Canford Bridge (That Part In Poole District) and Viaduct Approach To South • Canford Bridge Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	Additional infrastructure required within Poole STW and dedicated new WRC required at Newton, resulting in land-take. Pipeline elements of Component 1 have direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A349 • B3074 • A31 • B3078 • B3073 • A348 • A347

Component 2

5.2.5 Component 2 is the abstraction of 125MLD (fixed volume) from the River Tamar to provide sufficient water to Roadford Reservoir, with 30MLD surplus for the Project. This extends to Roadford Lake which is known to have surplus capacity in winter months owing to poor catchment characteristics. The route then extends from Roadford Lake to Northcombe using capacity in the existing pipe network, connecting to Northcombe WTW which will have a significant upgrade to divert the required 30MLD for onward transmission.

5.2.6 Component 2 comprises the following elements associated with the Roadford Pumped Storage scheme (components 2a – 2e):

a) Abstraction from River Tamar at Gatherley intake
b) Gatherley to Roadford (Lifton North route, formerly known as 2020 Option 2)
c) Roadford Lake
d) Roadford Lake to Northcombe WTW
e) Northcombe WTW (for 30 MLD onward transmission)

5.2.7 Elements of Component 2 are likely to generate the following direct interactions and other key environmental risks listed in **Table 5.3** which could result in significant environmental effects:

Table 5.3: Component 2 – Key Risks

SEA Topic	Component Level Key Risks
1. Biodiversity	Encroachment of ecological features resulting in: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. • Habitat improvement* On the following receptors: • National Forest Inventory (Great Britain): Woodland • Priority Habitat Inventory (South England): Purple moor grass and rush pastures • Priority Habitat Inventory (South England): Lowland meadows • Nature Improvement Areas (England): Northern Devon • Biosphere Reserves (England): North Devon • Local Nature Reserve (England): Roadford Lake* Potential effects on downstream water-dependent European Sites from proposed River Tamar abstraction at Gatherley are considered in Technical Appendix 3.2 – HRA. New INNS transfer pathway from River Tamar to Roadford Lake and River Wolf, resulting in increased INNS presence (refer to Technical Appendix 3.6 – INNS Risk)
2. Population and Human Health	Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 5 footpaths (combined total) • 1 cycleway (combined total)
3. Water	Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. River Wolf watercourse crossing, resulting in potential pollution risks during construction (HDD installation technique proposed) Abstraction from River Tamar (winter months only) resulting in reduced flow and potential changes to geomorphology. Discharge of transferred River Tamar water into Roadford Lake, resulting in mixing and higher reservoir level (within existing capacity)

SEA Topic	Component Level Key Risks
4. Soil	Encroachment of Grade 3 (inc. BMV) ALC, resulting in: • Temporary reduction in productive land and yields Pollution risks with the potential to degrade soil quality
5. Air	N/A - only minor air quality impacts are predicted during construction.
6. Climatic Factors	Refer to Technical Appendix 3.5 – Carbon. Each component would generate embodied and operational carbon emissions, but impacts can only be considered at scheme level.
7. Landscape	No key risks
8. Historic Environment	Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	Pipeline elements of Component 2 have direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A30 • A3079 • Rexton Cross Solar Farm Additional process units and wider upgrades required at Northcombe WTW

Component 3

5.2.8 Component 3 comprises the development of a potable transmission system from Northcombe WTW to Pynes Water Treatment Works. The first route section runs to Parsonage, an existing small service reservoir where the additional 30 MLD transferred will be added to existing storage. From here the route connect onwards to Pynes, an existing small service reservoir where the additional 30 MLD will be added to the existing storage.

5.2.9 The reach of the River Exe between Allers and Pynes is expected to have up to 30 MLD less flow as a result of Component 3, as this volume of water will be abstracted approximately 20km upstream (Bolham Weir abstraction point) of the existing abstraction point at Pynes.

5.2.10 From the abstraction point on the River Exe 30 MLD raw water will be transferred to Allers WTW for treatment. Potable water will then be subject to onwards transmission to Woodgate and Kingston St Mary which will include the installation of new storage tanks / ponds as required. From Kingston St Mary there will be transmission to Summerslade where works will include the installation of new storage tanks / ponds as required.

5.2.11 Component 3 comprises the following elements associated with a Transmission System from South West to Wessex Water (components 3a – 3i):

a) Northcombe to Prewley
b) Prewley to Parsonage
c) Parsonage to Pynes
d) River Exe: Allers to Pynes (relevant as impacted section of watercourse)
e) River Exe Abstraction at Bolham Weir
f) River Exe (abstraction) to Allers
g) Allers to Woodgate
h) Woodgate to Kingston St Mary
i) Kingston St Mary to Summerslade

5.2.12 Elements of Component 3 are likely to generate the following direct interactions and other key environmental risks listed in **Table 5.4** which could result in significant environmental effects:

Table 5.4: Component 3 – Key Risks

SEA Topic	Component Level Key Risks
1. Biodiversity	Encroachment of ecological features resulting in: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. On the following receptors: • Nature Improvement Areas (England): Northern Devon • Biosphere Reserves (England): North Devon • National Forest Inventory (Great Britain): Woodland • Priority Habitat Inventory (South England): Grass moorland • Priority Habitat Inventory (South England): Deciduous woodland • Priority Habitat Inventory (South England): Coastal and floodplain grazing marsh • Sites of Special Scientific Interest (England): Brampford Speke • Local Nature Reserve (England): Grand Western Canal Country Park • Priority Habitat Inventory (South England): Good quality semi-improved grassland • Priority Habitat Inventory (South England): Lowland calcareous grassland • Sites of Special Scientific Interest (England): Whitesheet Hill Potential effects on aquatic habitats and fisheries interests from 30 MLD reduced flow between proposed new abstraction at Bolham Weir and Pynes.
2. Population and Human Health	Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 129 footpaths (combined total) • 13 cycleways (combined total) Direct interactions or immediate proximity to COMAH sites, resulting in health and safety risks during construction: • Swallowfield Plc, Wellington Factory • Swallowfield Plc, Lowmoor Warehouse Local reduction in air quality due to dust and traffic emissions during construction: • Exeter City AQMA
3. Water	Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in:

	• Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. Reduction in River Exe flow between Bolham Weir and Pynes, resulting in potential deterioration in water chemistry, changes to geomorphology, reduced fluvial flood risk and potential deterioration of WFD status (refer to Technical Appendix 3.3 – WFD). Watercourse crossings, resulting in potential pollution risks during construction (HDD installation technique proposed): • OS Water Course (England, Scotland and Wales): River Okement • OS Water Course (England, Scotland and Wales): River Troney • OS Water Course (England, Scotland and Wales): River Yeo • OS Water Course (England, Scotland and Wales): River Creedy • OS Water Course (England, Scotland and Wales): Shobrooke Lake • OS Water Course (England, Scotland and Wales): Blackmoor Brook • OS Water Course (England, Scotland and Wales): River Exe • OS Water Course (England, Scotland and Wales): Town Leat • OS Water Course (England, Scotland and Wales): River Tone • OS Water Course (England, Scotland and Wales): River Cale • OS Water Course (England, Scotland and Wales): River Cam • OS Water Course (England, Scotland and Wales): Hornsey Brook • OS Water Course (England, Scotland and Wales): Mill Stream • OS Water Course (England, Scotland and Wales): Oakley Brook • OS Water Course (England, Scotland and Wales): Trutts Brook • OS Water Course (England, Scotland and Wales): River Parrett • OS Water Course (England, Scotland and Wales): Lambrook Brook • OS Water Course (England, Scotland and Wales): River Isle • OS Water Course (England, Scotland and Wales): Fivehead River • OS Water Course (England, Scotland and Wales): River Stour

	Earthworks in proximity to safeguarding zones, resulting in pollution risks: • Surface Water Safeguarding Zones (England): Leigh & Luxhay Reservoirs • Surface Water Safeguarding Zones (England): Durleigh Reservoir • Surface Water Safeguarding Zones (England): Roadford Lake
4. Soil	Encroachment of Grades 1- 5 (inc. BMV) ALC, resulting in: • Temporary reduction in productive land and yields • Pollution risks with the potential to degrade soil quality
5. Air	Local reduction in air quality due to dust and traffic emissions during construction: • Exeter City AQMA
6. Climatic Factors	Refer to Technical Appendix 3.5 – Carbon. Each component would generate embodied and operational carbon emissions, but impacts can only be considered at scheme level.
7. Landscape	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Parks (England): Dartmoor • National Character Areas (England): Devon Redlands • National Character Areas (England): The Culm • Country Parks (England): Grand Western Canal • National Character Areas (England): Blackdowns • Aonb (England): Blackdown Hills • National Character Areas (England): Vale Of Taunton And Quantock Fringes • Aonb (England): Quantock Hills • National Character Areas (England): Somerset Levels And Moors • National Character Areas (England): Yeovil Scarplands • National Character Areas (England): Mid Somerset Hills • National Character Areas (England): Blackmoor Vale And Vale Of Wardour • Aonb (England): Cranborne Chase & West Wiltshire Downs • National Character Areas (England): Salisbury Plain And West Wiltshire Downs

8. Historic Environment	Effects on the setting of the following heritage assets (temporary and permanent where receptor is in close proximity to above ground infrastructure): • Listed Buildings (England): Thorverton Bridge • Historic Parks And Gardens (England): Knightshayes Court • Historic Parks And Gardens (England): Hestercombe Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	Direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A3079 • A30 • A386 • B3215 • B3260 • A3124 • A382 • A377 • A3072 • A396 • A361 • M5 • B3391 • A38 • B3187 • B3227 • A358 • A378 • B3168 • B3165 • A303 • A3088 • A37 • A371 • B3081 • B3092 • B3095 • Bristol To Exeter Train Line • Heart Of Wessex Train Line • Pynes WTW

Component 4

5.2.13 Component 4 partially utilises West Country North SRO Accelerated Gate 1 route corridor sections 2e, 2f, 3a, 4b, 4e, whilst requiring additional route sections. The component encompasses a potable transfer from Summerslade to Testwood Lakes and a raw transfer from River Stour pre-treatment and WBS/Storage (i.e. post River Stour abstraction) to Testwood WTW.

5.2.14 Component 4 comprises the following elements associated with a Transmission System from Wessex to Southern Water (components 4a - 4b):

a) Summerslade to Testwood
b) River Stour Pre Treatment to Testwood
    i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage
    ii. Sub-component 4b.2: Redlynch to Testwood

5.2.15 Elements of Component 4 are likely to generate the following direct interactions and other key environmental risks listed in **Table 5.5** which could result in significant environmental effects:

Table 5.5: Component 4 – Key Risks

SEA Topic	Component Level Key Risks
1. Biodiversity	Encroachment of ecological features resulting in: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. On the following receptors: • Priority Habitat Inventory (South England): Lowland Calcareous Grassland • Priority Habitat Inventory (South England): Coastal And Floodplain Grazing Marsh • Special Areas Of Conservation (England): River Avon • Priority Habitat Inventory (South England): Lowland Meadows • Sites Of Special Scientific Interest (England): River Avon System • Ancient Woodland (England): Upper Lower Shelley Copses • Ancient Woodland (England): Squab Copse • Priority Habitat Inventory (South England): Traditional Orchard • Sites Of Special Scientific Interest (England): Ebsbury Down • Local Nature Reserve (England): Stour Valley • Sites Of Special Scientific Interest (England): Moors River System • RAMSAR (England): Avon Valley • Special Protection Area (England): Avon Valley • Sites Of Special Scientific Interest (England): Avon Valley (Bickton To Christchurch) • Sites Of Special Scientific Interest (England): Breamore Marsh • National Forest Inventory (Great Britain): Woodland
2. Population and Human Health	Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 102 Footpaths (Combined Total)

	• 6 Cycleways (Combined Total)
3. Water	Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. Watercourse crossings, resulting in potential pollution risks during construction (HDD installation technique proposed): • OS Water Course (England, Scotland And Wales): River Wylye • OS Water Course (England, Scotland And Wales): River Avon • OS Water Course (England, Scotland And Wales): River Bourne • OS Water Course (England, Scotland And Wales): Park Water • OS Water Course (England, Scotland And Wales): Cadnam River • OS Water Course (England, Scotland And Wales): River Test • OS Water Course (England, Scotland And Wales): River Blackwater • OS Water Course (England, Scotland And Wales): Mill Stream • OS Water Course (England, Scotland And Wales): River Isle • OS Water Course (England, Scotland And Wales): Lambrook Brook • OS Water Course (England, Scotland And Wales): River Parrett • OS Water Course (England, Scotland And Wales): Trutts Brook • OS Water Course (England, Scotland And Wales): River Yeo • OS Water Course (England, Scotland And Wales): Oakley Brook • OS Water Course (England, Scotland And Wales): River Cam • OS Water Course (England, Scotland And Wales): River Cale • OS Water Course (England, Scotland And Wales): River Stour • OS Water Course (England, Scotland And Wales): Moors River • OS Water Course (England, Scotland And Wales): Turmer Brook • OS Water Course (England, Scotland And Wales): Ashford Water • OS Water Course (England, Scotland And Wales): Sweatfords Water

	Earthworks in proximity to safeguarding zones, resulting in pollution risks: • Surface Water Safeguarding Zones (England): Durleigh Reservoir • Surface Water Safeguarding Zones (England): River Test
4. Soil	Encroachment of Grades 1- 5 (inc. BMV) ALC, resulting in: • Temporary reduction in productive land and yields • Pollution risks with the potential to degrade soil quality
5. Air	N/A – only minor air quality impacts are predicted during construction.
6. Climatic Factors	Refer to Technical Appendix 3.5 – Carbon. Each component would generate embodied and operational carbon emissions, but impacts can only be considered at scheme level.
7. Landscape	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Parks (England): New Forest • National Character Areas (England): South Hampshire Lowlands • National Character Areas (England): Salisbury Plain And West Wiltshire Downs • National Character Areas (England): New Forest • AONB (England): Cranborne Chase & West Wiltshire Downs • National Character Areas (England): Vale Of Taunton And Quantock Fringes • AONB (England): Quantock Hills • National Character Areas (England): Somerset Levels And Moors • National Character Areas (England): Yeovil Scarplands • National Character Areas (England): Mid Somerset Hills • National Character Areas (England): Blackmoor Vale And Vale Of Wardour
8. Historic Environment	Effects on the setting of the following heritage assets (temporary and permanent where receptor is in close proximity to above ground infrastructure): • Scheduled Monuments (England): Pair Of Bowl Barrows 1050m NNW Of Pertwood Wood • Scheduled Monuments (England): Romano-British Village On Tytherington Hill • Cluster of Listed Buildings Around Corton • Cluster of Listed Buildings Around Upper Lovell • Cluster of Listed Buildings Around Codford • Cluster of Listed Buildings Around Boyton

	• Cluster of Listed Buildings Around Sherrington • Cluster of Listed Buildings Around Stockton • Historic Parks And Gardens (England): Hestercombe Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	Direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A350 • A303 • A36 • A360 • A345 • A338 • M27 • A326 • A38 • A3259 • M5 • A378 • B3168 • B3165 • A3088 • A37 • A359 • A371 • A3081 • A3095 • B3073 • A31 • B3081 • B3078 • B3080 • A27

Component 5

5.2.16 Component 5 comprises the reception point in Southern Water's Hampshire zone, including

a) Testwood WTW
b) Testwood Lakes (small)
c) Testwood potable storage tanks (existing and potential additional)

5.2.17 Capacity to store additional water received from strategic transfer schemes (SROs) in existing storage facilities at Testwood WTW and any potential need for additional storage requires to be confirmed through the West Country North SRO at Gate 2. As such, potential environmental effects associated with the development of additional storage is excluded from the scope of the WCS SROs at Gate 1.

5.2.18 Elements of Component 5 are likely to generate the following direct interactions and other key environmental risks listed in **Table 5.6** which could result in significant environmental effects:

Table 5.6: Component 5 – Key Risks

SEA Topic	Component Level Key Risks
1. Biodiversity	N/A – only minor air quality impacts are predicted on habitats within and surrounding the Testwood Lakes complex during construction.
2. Population and Human Health	N/A – only minor traffic impacts and potential localised disruption is predicted within and surrounding the Testwood Lakes complex during construction.
3. Water	Immediate proximity of the Testwood Lakes complex to the River Test means development (e.g. intake to Testwood Lake or WTW) would be needed within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. Earthworks in proximity to safeguarding zones, resulting in pollution risks: • Surface Water Safeguarding Zones (England): River Test
4. Soil	N/A – only minor impacts are predicted during construction as works would largely be within the existing curtilage of the Testwood complex.
5. Air	N/A – only minor air quality impacts are predicted during construction.
6. Climatic Factors	Refer to Technical Appendix 3.5 – Carbon. Each component would generate embodied and operational carbon emissions, but impacts can only be considered at scheme level.
7. Landscape	Construction • Temporary reduction in local landscape character and visual amenity during construction activities. Operational (above ground infrastructure only) • Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Character Areas (England): South Hampshire Lowlands
8. Historic Environment	Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	Direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • Testwood WTW

In-Combination Effects Between WCS SROs Components

5.2.19 Construction of the two schemes being progressed through the WCS SROs would have direct impacts on 47 major transport infrastructure routes including the M5 and M27, two mainline railways (Bristol to Exeter and Heart of Wessex), 241 footpaths and 25 cycleways. In the absence of mitigation, the construction of multiple components in tandem (to develop each proposed WCS scheme) could result in cumulative effects (road and path closures or diversions, congestion, delays, etc) across the transport network and associated recreational receptors.

5.2.20 Disturbance to or conflicts with land use activities across multiple components is also evident, including likely land-take and construction phase impacts on Rexton Cross Solar Farm and Wellington Factory and Lowmoor Warehouse COMAH sites. Easements would also need to be agreed along extensive agricultural land corridors, including some BMV land.

5.2.21 Impact pathway analysis has identified 14 direct interactions between pipeline sections and heritage assets. Similarly, impacts on landscape character and visual amenity need to be considered between components, in particular likely impacts on Dartmoor and New Forest National Parks.

5.2.22 Component level interactions associated with proposed abstractions along the River Stour, River Tamer and River Exe require to be assessed further for in-combination effects and to establish the environmental acceptability of reduced flows along specific reaches.

5.3 Scheme Level SEA

5.3.1 Formed from combinations of concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer
    - River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
    - River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
- Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

5.3.2 **Tables 5.7** and **Table 5.8** below present scheme level SEA matrices for each proposed scheme. This analysis builds on key component level risks identified in **Section 5.2** above detailed SEA matrices for each constituent component provided in **Appendix A**.

River Tamar to Testwood Transfer Scheme

Table 5.7: SEA of River Tamar to Testwood Transfer Scheme (components 2a – 2e, 3a – 3i, 4a, 5a – 5c)

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
1. Biodiversity	1. To protect designated sites and their qualifying features.	• Impact pathway analysis • Relevant European Sites (conservation objectives, qualifying features, condition, integrity risks) and likely effects as assessed through HRA • Other relevant statutory designations (conservation objectives, qualifying features, condition, integrity risks) and likely effects. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect (and where possible enhance) nationally and internationally designated sites of ecological importance?* - *Protect (and where possible enhance) locally designated biodiversity sites?* - Mitigation development to address identified likely (significant) adverse effects
		Commentary Encroachment of ecological features resulting in direct and indirect: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. • Habitat improvement* On the following designations and their qualifying or special features: • Relevant European Sites as assessed in Technical Appendix 3.2 – HRA (see summary below) • Local Nature Reserve (England): Roadford Lake* • Nature Improvement Areas (England): Northern Devon • Sites of Special Scientific Interest (England): Brampford Speke • Local Nature Reserve (England): Grand Western Canal Country Park • Sites of Special Scientific Interest (England): Whitesheet Hill • Special Areas of Conservation (England): River Avon • Sites of Special Scientific Interest (England): River Avon System • Sites of Special Scientific Interest (England): Ebsbury Down

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria

		The HRA Screening (Appendix 3.2: HRA) has identified this scheme as having the following RAG Score interactions of note with European Sites (SAC, SPA and RAMSAR). Refer to Appendix 3.2 for the scoring rationale (all interaction scores of at least 1 indicate clear potential for at least one Likely Significant Effect in HRA terms):
		• Component 2a:
		  ○ Plymouth Sound & Estuaries SAC: Red RAG Score of 5 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest.
		  ○ Tamar Estuaries Complex SPA: Red RAG Score of 5 meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest.
		• Components 2b, 2c, 2d and 2e have Green RAG Scores of 0 meaning they avoid impact pathways with the European Site and have no potential to result in Likely Significant Effects.
		• Component 3a:
		  ○ Dartmoor SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest.
		• Component 3b:
		  ○ Dartmoor SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest.
		• Component 3c:
		  ○ Exe Estuary Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest.
		  ○ Exe Estuary SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest.
		• Component 3d has a Green RAG Score of 0 meaning that it avoids impact pathways with the European Site and has no potential to result in Likely Significant Effects
		• Component 3e:

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		○ Exe Estuary Ramsar: Red RAG Score of 5 meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest. ○ Exe Estuary SPA: Red RAG Score of 5 meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest. • Component 3f has a Green RAG Score of 0 meaning that it avoids impact pathways with the European Site and has no potential to result in Likely Significant Effects • Component 3g has a Green RAG Score of 0 meaning that it avoids impact pathways with the European Site and has no potential to result in Likely Significant Effects • Component 3h: ○ Hestercombe House SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Component 3i: ○ Hestercombe House SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Somerset Levels & Moors Ramsar: : Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Somerset Levels & Moors SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Component 4a: ○ River Avon SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ The New Forest SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Solent & Southampton Water Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent & Southampton Water SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Avon Valley Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Avon Valley SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Components 5a, 5b and 5c have Green RAG Scores of 0 meaning they avoid impact pathways with European Site and have no potential to result in Likely Significant Effects In summary the scheme has been identified as having a number of direct interactions with designated sites through SEA impact pathway analysis and HRA screening, resulting in the potential for likely significant adverse effects on this SEA Objective.
		Score: Major Negative (--)
	2. To avoid a net reduction, and where possible enhance, in non-monetised natural capital assets.	• Findings from Natural Capital Assessment workstream. • Development of relevant BNG and wider net environmental gain opportunities – options development and initial testing.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria

		Commentary
		
		As detailed in Appendix 3.4: NCA and BNG, this scheme is likely to result in a range of impacts including:
		
		• Temporary construction impacts:
		  ○ Construction will lead to loss or degradation of pasture, woodland, floodplain grazing marsh and small amounts of heathland natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence
		• Operational impacts:
		  ○ Disbenefits to biodiversity potentially related to discharge of treated effluent into associated rivers and associated flow and water quality changes, which may affect habitat quality. Disbenefits related to construction of water treatment infrastructure is unknown as size and location of sites are yet to be determined.
		  ○ Potential biodiversity, natural hazard regulation and recreation benefits related to bankside storage components, although these will depend on component design.
		  ○ Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
		  ○ Potential water purification benefits depending on the % increase in flow during drought along the Rivers and the quality of the treated discharge. May result in dilution of any existing contaminants.

		Score Minor Negative (-)

	3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.	• Impact pathway analysis
		• Findings from HRA and WFD Compliance workstreams.
		• Qualitative assessment via guide questions: *Will the SRO:*
		  - *Protect and enhance valued species and habitats?*
		  - *Safeguard against habitat loss or fragmentation?*
		  - *Protect or enhance protected trees or important woodland areas?*
		  - *Lead to changes in ecological resources (habitats/species) due to changes in surface or groundwater water quantity or quality?*
		• Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Commentary Encroachment of ecological features resulting in direct and indirect: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. • Habitat improvement* On the following receptors and associated species and habitats: • Relevant European Sites as assessed in Technical Appendix 3.2 - HRA ○ National Forest Inventory (Great Britain): Woodland ○ Priority Habitat Inventory (South England): Purple moor grass and rush pastures ○ Priority Habitat Inventory (South England): Lowland meadows ○ Local Nature Reserve (England): Roadford Lake* ○ Nature Improvement Areas (England): Northern Devon ○ Biosphere Reserves (England): North Devon ○ Priority Habitat Inventory (South England): Grass moorland ○ Priority Habitat Inventory (South England): Deciduous woodland ○ Priority Habitat Inventory (South England): Coastal and floodplain grazing marsh ○ Sites of Special Scientific Interest (England): Brampford Speke ○ Local Nature Reserve (England): Grand Western Canal Country Park ○ Priority Habitat Inventory (South England): Good quality semi-improved grassland ○ Priority Habitat Inventory (South England): Lowland calcareous grassland ○ Sites of Special Scientific Interest (England): Whitesheet Hill ○ Special Areas of Conservation (England): River Avon ○ Sites of Special Scientific Interest (England): River Avon System ○ Ancient Woodland (England): Upper+Lower Shelley Copses ○ Ancient Woodland (England): Squab Copse ○ Priority Habitat Inventory (South England): Traditional orchard ○ Sites of Special Scientific Interest (England): Ebsbury Down
		Score Major Negative (--)
	4. To avoid and, where required, manage invasive and non-native species (INNS).	• Findings from INNS Risk workstream (inc. mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Exacerbate or prevent the spread/introduction of INNS?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Commentary • Component 2a has been identified as a Very High magnitude of risk. The transfer of raw water from the River Tamer to the Roadford Lake creates a new pathway for the distribution of INNS.2b: • Component 2b has been identified as a Very High magnitude of risk. The transfer of raw water from the River Tamer to the Roadford Lake creates a new pathway for the distribution of INNS. • Component 2c has been identified as a Very High magnitude of risk. The dam impounds water from the River Wolf so there is potential for the distribution of INNS to other river waterbodies as well. The Roadford Lake provides a secondary pathway from the introduction for INNS, but it is noted that the Roadford Lake discharges into the River Tamar and there is an existing downstream direction pathway for this component. • Component 2d has been identified as a High magnitude of risk. The location of the abstraction location is downstream of the confluence of the River Tamar with the rivers Lydd and Thrushel would, however, result in an increase in the size of the catchment that can act as a source of INNS and subsequently the Roadford Lake. • Component 2e has been identified as a Low magnitude of risk. The source of water for the WTW is raw water which presents a high risk of containing INNS. • Component 3a, 3b and 3c has been identified as a Low magnitude of risk. The source of the water that will be transferred via the transmission system to Wessex Water will be treated water from the Northcombe WTW. The destination of the water will be the Pynes WTW. The connection will be via a new pipeline (66km). As such, the risk at the source and the destination point is considered very low, despite the distance of the transfer and the fact that the scheme might be operational permanently/regularly. While there is a risk of introduction of INNS during construction, this can be mitigated through adopting standard biosecurity measures. • Component 3d has been identified as a High magnitude of risk. Raw water will be abstracted from the River Exe near Allers. This will result in a reduction in flow in the River Exe. • Component 3e has been identified as a High magnitude of risk. This component is considered a high risk as it represents a new distribution pathway and the source is raw water. The transfer is also likely to operate regularly/permanently. • Component 3f has been identified as a High magnitude of risk. This component is considered a high risk as it represents a new distribution pathway and the source is raw water. • Component 3g has been identified as a Low magnitude of risk. • Component 3h has been identified as a Low magnitude of risk.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• Component 3i has been identified as a Low magnitude of risk. • Component 4a has been identified as a Low magnitude of risk. This component will be transferring treated water from Allers WTW and therefore the INNS risk will be low. • Component 5a has been identified as a Low magnitude of risk. As the end point is a treatment works the risk is considered low as the treatment process will eradicate any INNS and there will be no onward distribution of INNS. • Component 5b and 5c have been identified as a Very High magnitude of risk. Transfer of raw water from the River Exe of the River Stour would consist of a raw water transfer via a pipeline. As the end point is another waterbody, the risk is considered high, despite the transfer via a closed system. As the lakes are being used by the public, there is a risk that any new INNS can be further distributed into the wider catchment without biosecurity measures in place (i.e. secondary pathways).
		Score Major Negative (--)
	5. To meet WFD objectives relating to biodiversity.	• Impact pathway analysis • Findings from WFD Compliance workstream (inc. WFD status of waterbody receptors, likely effects and mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Support the achievement of good ecological status?*
		Commentary As presented in Appendix 3.3: WFD, the assessment identified that Roadford Lake, the River Wolf, River Thrushel, Lower River Lyd, Tamar (Lyd to Inny) and Lower Tamar (Component 2) are potentially non-compliant with WFD objectives. Within Component 3, both the Exe (Culm to Creedy) and Exe (Creedy to Estuary) are potentially non-compliant with WFD objectives. Components 4 and 5 have been treated as a “closed” system with no waterbody interaction and therefore have not been assessment under WFD.
		Score Minor Negative (-)
2. Population and Human Health	1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise noise emissions to sensitive receptors?* - *Protect air quality and prevent emissions of harmful pollutants?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		- *Avoid conflicts with strategic scale land use (employment / industrial / housing / mixed use) planning allocations to meet identified population needs?* - *Avoid traffic congestion and delays?* - *Protect access to local services and facilities?* - *Minimise residential amenity impacts?* - *Minimise land take and sterilisation?* - *Minimise conflict with existing land uses and sensitive landowners (e.g. MOD)?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As detailed in Resilience and Integration Benefits Note (**Appendix D**), socio-economic benefits associated with the construction of the West Country South SROs relate to employment supported by the capital expenditure to build the scheme, and the Gross Value Added (GVA) generated by the construction jobs. Construction employment opportunities will be available to people within the local region of the various WCS SRO route section or component. This means that the socioeconomic impacts in terms of employment and GVA will be spread across the scheme's geography and will benefit multiple communities.
		Score Minor Positive (+)
	2. To maintain and enhance tourism and recreation.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Safeguard and improve opportunities for recreational activities?* - *Protect existing tourism activities and assets from adverse development impacts?* - *Protect public access to and the visitor attractiveness of designated recreational routes?* - *Improve access to nature?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 134 Footpaths • 14 Cycleways The scheme also has direct interactions with the following: • COMAH site: Swallowfield Plc, Wellington Factory • COMAH site: Swallowfield Plc, Lowmoor Warehouse • COMAH Sites (England and Wales): Salisbury, Pains Fireworks Limited • Air Quality Management Areas (United Kingdom): Exeter City Council The scheme may reduce or mitigate the risk of flooding in some locations. This may have the effect of removing key development constraints and unlocking new plots of land for future commercial or residential development. The development benefits would be measured in terms of additional residential units delivered and the amount of industrial or commercial floorspace enabled. Additionally, this mitigation of flood risk may increase access and connectivity to recreation and the natural environment.
		Score Major Negative (--)

	3. To secure resilient water supplies for the health and wellbeing of customers.	• Impact pathway analysis
		• Findings from socio-economic analysis of non-resource benefits
		• Qualitative assessment via guide questions: *Will the SRO:*
		  - *Ensure continuity of a safe and secure drinking water supply?*
		  - *Ensure adequate water infrastructure is in place to meet the health and wellbeing needs of current and future populations?*
		• Mitigation development to address identified likely (significant) adverse effects

		Commentary The scheme will create new water storage and transfer infrastructure, and with modest additional investment the scheme can provide the additional resilience required to ensure that the critical infrastructure at Maudown is able to meet system demands in the event of primary source failure. Moreover, the added resilience and capacity of the water storage and transfer network will enable Maundown to be taken offline for a period of time to allow much-needed refurbishing and upgrade works to be undertaken in the medium term without disruption to the supply of water.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		As integration of strategic water infrastructure can lead to additional resilience benefits as well as lower operating costs and reduced infrastructure footprints, wherever possible and practical the new WCS SROs infrastructure will be designed to accommodate integration and interface with the existing network, i.e. there is potential to share existing storage reservoirs and pumping stations. Where integration is not possible, the additional infrastructure will be developed adjacent (or in proximity to) the existing infrastructure. This will minimise the additional footprint of water storage and transfer infrastructure.
		Score Major Positive (++)
	4. To increase access and connect customers to the natural environment, provide education or information resources for the public.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Improve access to nature?* - *Provide education or information resources for the public?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As identified in the Resilience and Integration Benefits Note (Appendix A of this SEA), infrastructure for capture, storage and transfer of water resources may reduce or mitigate the risk of flooding in some locations. This mitigation of flood risk may increase access and connectivity to recreation and the natural environment.
		Score Minor Positive (+)
3. Water	1. To reduce or manage flood risk, taking climate change into account.	• Impact pathway analysis • Review SRO infrastructure encroachments into Flood Zones 2 and 3 • Qualitative assessment via guide questions: *Will the SRO:* - *Cause or exacerbate flooding, either localised or elsewhere within the catchment?* - *Have the potential to help alleviate flood risks, including for donating watercourses?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary Development of some components within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns.

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th>WCS Gate 1 SEA Criteria</th></tr>
<tr><td rowspan="7"></td><td></td><td>Score Minor Negative (-)</td></tr>
<tr><td rowspan="3">2. To enhance or maintain groundwater quality and resources.</td><td>Impact pathway analysis
Findings from WFD Compliance workstream.
Qualitative assessment via guide questions: Will the SRO:
- Result in changes to groundwater levels?
- Protect and improve groundwater quality?
Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary
As presented in Technical Appendix 3.3 – WFD, various groundwater waterbodies have been identified as potentially at risk of WFD non-compliance as a consequence of pipeline construction and operation. There is insufficient information available on the design, construction and operation plans for these pipelines to make an assessment of the potential issues that may cause WFD non-compliance with tests for groundwater</td></tr>
<tr><td>Score Uncertain (?)</td></tr>
<tr><td rowspan="2">3. To enhance or maintain surface water quality, flows and quantity.</td><td>Impact pathway analysis
Findings from WFD Compliance workstream.
Qualitative assessment via guide questions: Will the SRO:
- Result in changes to abstraction or discharge levels?
- Require changes to abstraction licences?
- Result in changes to river flows?
- Protect fish, inverts and macrophytes?
- Safeguard waterbodies designated as protected areas?
- Protect and improve surface water quality?
Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary

Reduction in River Exe flow between Bolham Weir and Pynes, resulting in potential deterioration in water chemistry, changes to geomorphology, reduced fluvial flood risk and potential deterioration of WFD status (refer to Technical Appendix 3.3 – WFD).

Abstraction from River Tamar (winter months only) resulting in reduced flow and potential changes to geomorphology.</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Discharge of transferred River Tamar water into Roadford Lake, resulting in mixing and higher reservoir level (within existing capacity) Watercourse crossings and other works in proximity to the water environment, resulting in potential pollution risks during construction (HDD installation technique proposed): • Roadford Lake • OS Water Course (England, Scotland and Wales): Breazle Water • OS Water Course (England, Scotland and Wales): River Okement • OS Water Course (England, Scotland and Wales): River Troney • OS Water Course (England, Scotland and Wales): River Yeo • OS Water Course (England, Scotland and Wales): River Creedy • OS Water Course (England, Scotland and Wales): Shobrooke Lake • OS Water Course (England, Scotland and Wales): Jackmoor Brook • OS Water Course (England, Scotland and Wales): River Exe • OS Water Course (England, Scotland and Wales): Town Leat • Surface Water Safeguarding Zones (England): Leigh & Luxhay Reservoirs • Surface Water Safeguarding Zones (England): Durleigh Reservoir • OS Water Course (England, Scotland and Wales): River Tone • OS Water Course (England, Scotland and Wales): River Wylye • OS Water Course (England, Scotland and Wales): River Avon • OS Water Course (England, Scotland and Wales): River Bourne • OS Water Course (England, Scotland and Wales): Park Water • OS Water Course (England, Scotland and Wales): Cadnam River • OS Water Course (England, Scotland and Wales): River Test • OS Water Course (England, Scotland and Wales): River Blackwater • Surface Water Safeguarding Zones (England): River Exe • Surface Water Safeguarding Zones (England): River Test As presented in Technical Appendix 3.3 – WFD, issues surrounding dewatering and associated discharge to surface waterbodies, or issues of groundwater pollution due to pipeline failure will require further consideration when in Gate-2 when the scheme design details are more advanced.
		Score Major Negative (--)
	4. To meet WFD objectives and support the achievement of environmental	• Impact pathway analysis • Findings from WFD Compliance workstream.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
	objectives set out in River Basin Management Plans.	• Qualitative assessment via guide questions: *Will the SRO:* - *Protect or improve the quality of waterbodies, helping to WFD and RBMP objectives?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As presented in Technical Appendix 3.3 – WFD, as Component 4 and 5 are treated as a "closed" system with no waterbody interaction), this has not been assessed under WFD. Components 2 and 3 however have potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to improve P status, preventing deterioration and ensuring there is no impediment to improvement).
		Score Minor Negative (-)
	5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	• Findings from socio-economic analysis of non-resource benefits re network resilience and performance benefits • Comparison of cascade-based versus new transmission infrastructure approaches • Mitigation and enhancement development to further improve resilience through SRO
		Commentary As detailed in the Resilience and Integration Benefits Note (Appendix A of this SEA), with the route mirroring existing transfer infrastructure where possible and appropriate, there will be a range of socio-economic benefits for both the water authority and the communities. The ability to re-use and/or share infrastructure will reduce the requirement for land purchases and the development of capital assets such as pumping stations. Where interfaces exist between the existing infrastructure and the WCS SRO there will be scope to deliver upgrades to assets. These upgrades may result in increased efficiencies, higher capacities, lower downtimes, and the potential share operations and maintenance resources and therefore lower revenue costs.
		Score Minor Positive (+)
4. Soil	1. To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Avoid (or help to remediate) contaminated land?* - *With respect to areas proposed for permanent land use change, safeguard the best quality, most versatile and locally important agricultural land?* - *Utilise brownfield / previously developed land?* • Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria	
		Encroachment of Grades 1- 5 (inc. BMV) ALC, resulting in: • Temporary reduction in productive land and yields • Pollution risks with the potential to degrade soil quality	Score Minor Negative (-)
5. Air	1. To reduce and minimise air and noise emissions during construction and operation.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise noise emissions to sensitive receptors?* - *Protect air quality and prevent emissions of harmful pollutants* - *Minimise residential amenity impacts?* • Mitigation development to address identified likely (significant) adverse effects	
		Commentary Local reduction in air quality due to dust and traffic emissions during construction: • Direct interaction with Exeter City Council AQMA through Component 3	Score Minor Negative (-)
6. Climatic Factors	1. To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	• Findings from Natural Capital Assessment workstream • Qualitative assessment via guide questions: *Will the SRO:* - *Reduce vulnerability to the effects of climate change through appropriate adaptation?* - *Enhance climate resilience within the water network?* - *Enhance ecosystem resilience (ability to adapt) to climate change?* • Mitigation development to address identified likely (significant) adverse effects	
		Commentary Technical Appendix 3.4: NCA and BNG provides a summary of non-traded carbon sequestration values per component. The following is applicable to the River Tamar to Testwood Transfer (components 2a – 2e, 3a – 3i, 4a, 5a – 5c): • Component 2: Roadford Pumped Storage - Change in non-traded carbon sequestration value during construction (£2019): -£9,108.84 - Change in non-traded carbon sequestration value following BNG uplift: -£4,655.05	

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• Component 3: Transmission System to Wessex - Change in non-traded carbon sequestration value during construction (£2019): -£12,980.50 - Change in non-traded carbon sequestration value following BNG uplift: -£3,479.72 • Component 4: Transmission System to Southern Water - Change in non-traded carbon sequestration value during construction (£2019): -£8,192.96 - Change in non-traded carbon sequestration value following BNG uplift: -£3,856.69
		Score Uncertain (?)
	2. To reduce embodied and operational carbon emissions.	• Impact pathway analysis • Findings from Carbon Assessment workstream • Findings from Natural Capital Assessment workstream • Qualitative assessment via guide questions: *Will the SRO:* - *Maximise energy efficiency?* - *Minimise operational energy consumption?* - *Minimise greenhouse gas release, including embodied and operational emissions?* - *Support decarbonisation of the water sector?* - *Support the delivery of renewable and low carbon energy?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As presented in Appendix 3.5: Carbon, a carbon assessment has been undertaken for the project. This assessment has assed WCS Sources & Transfers (component 1, 4 and 5) and WCS Southern Water transfer (components 1, 2 and 3). Embodied carbon associated with SRO construction is assessed as follows: • WCS Sources & Transfers (component 1, 4 and 5): - Embodied carbon (tCO2e): 127,294 - Embodied carbon per ML at full throughput (kgCO2e/ML): 194 - Embodied carbon per ML at Water quality maintenance flow with 25% utilisation (kgCO2e/ML): 444 • WCS Southern Water transfer (components 1, 2 and 3):

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th colspan="2">WCS Gate 1 SEA Criteria</th></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td colspan="2">- Embodied carbon (tCO2e): 45,840
- Embodied carbon per ML at full throughput (kgCO2e/ML): 70
- Embodied carbon per ML at Water quality maintenance flow with 25% utilisation (kgCO2e/ML): 160

The whole life (60 years) carbon assessment is assessed as follows:
• WCS Sources & Transfers (component 1, 4 and 5):
- 1,299,546 tCO2e flow at full design throughput
- 708,387 tCO2e at water quality maintenance flow with 25% utilisation
• WCS Southern Water transfer (components 1, 2 and 3):
- 195,685 tCO2e flow at full design throughput
- 114,486 tCO2e at water quality maintenance flow with 25% utilisation</td></tr>
<tr><td colspan="2">Commentary
The scheme is expected to result in a positive change in non-traded carbon sequestration value through the development and implementation of proposals to deliver BNG.</td></tr>
<tr><td colspan="2">Score Uncertain (?)</td></tr>
<tr><td rowspan="2">7. Landscape</td><td rowspan="2">1. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites.</td><td colspan="2">• Impact pathway analysis
• Qualitative assessment via guide questions: Will the SRO:
- Avoid adverse effects on (and where possible enhance) protected/designated landscapes?
- Protect (and where possible enhance) landscape and townscape character?
- Minimise adverse visual impacts?
- Provide opportunities to enhance visual amenity?
• Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary

Construction
• Temporary reduction in local landscape character and visual amenity during construction activities.
Operational (above ground infrastructure only)
• Effects on host and surrounding landscape fabric and character areas,</td><td>Score Minor Negative (-)</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria	
		• Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Character Areas (England): South Hampshire Lowlands • National Parks (England): Dartmoor • National Character Areas (England): Devon Redlands • National Character Areas (England): The Culm • Country Parks (England): Grand Western Canal • National Character Areas (England): Blackdowns • AONB (England): Blackdown Hills • National Character Areas (England): Vale Of Taunton And Quantock Fringes • AONB (England): Quantock Hills • National Character Areas (England): Somerset Levels And Moors • National Character Areas (England): Yeovil Scarplands • National Character Areas (England): Mid Somerset Hills • National Character Areas (England): Blackmoor Vale And Vale Of Wardour • AONB (England): Cranborne Chase & West Wiltshire Downs • National Character Areas (England): Salisbury Plain And West Wiltshire Downs	
8. Historic Environment	1. To conserve, protect and enhance landscape and townscape character and visual amenity.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Affect the integrity or setting of designated heritage assets?* - *Avoid or minimise damage to archaeologically important sites?* - *Affect public access to designated heritage assets?* • Mitigation development to address identified likely (significant) adverse effects	
		Commentary Effects on the setting of the following heritage assets (temporary and permanent where receptor is in close proximity to above ground infrastructure): • Listed Buildings (England): Thorverton Bridge • Historic Parks And Gardens (England): Knightshayes Court • Historic Parks And Gardens (England): Hestercombe	Score Major Negative (-)

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th>WCS Gate 1 SEA Criteria</th></tr>
<tr><td></td><td></td><td>Scheduled Monuments (England): Pair of bowl barrows 1050m NNW of Pertwood Wood
Scheduled Monuments (England): Romano-British village on Tytherington Hill
Cluster of listed buildings around Corton
Cluster of listed buildings around Upper Lovell
Cluster of listed buildings around Codford
Cluster of listed buildings around Boyton
Cluster of listed buildings around Sherrington
Cluster of listed buildings around Stockton</td></tr>
<tr><td rowspan="4">9. Material Assets</td><td rowspan="3">1. To minimise resource use and waste production.</td><td>Impact pathway analysis
Qualitative assessment via guide questions: Will the SRO:
- Minimise the production of waste?
- Promote the principles of circular economy?
- Treat and process waste with minimal environmental impact?
- Minimise the demand for raw materials and the need for minerals extraction?
- Promote the use of local resources and minimise the importation of minerals?
Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary
No identified effects on mineral resources or waste management
Concept design components (3, 4 and 5) included within the scheme have been selected to enable the potential development of cascade-based schemes, facilitate resource displacement, provide network integration (to unlock associated resilience benefits) and minimise the extent of dedicated new infrastructure required.</td></tr>
<tr><td>Score No Clear Relationship (~)</td></tr>
<tr><td>2. To avoid negative effects on built assets / infrastructure.</td><td>Impact pathway analysis
Findings from socio-economic analysis of non-resource benefits
Qualitative assessment via guide questions: Will the SRO:
- Avoid conflicts with existing, consented and proposed major transport infrastructure?
- Avoid constraining the potential growth of existing settlements?
- Avoid conflicts with existing or planned waste or minerals sites?
- Minimise land take and sterilisation?
- Integrate with existing or planned water infrastructure?
- Ensure adequate infrastructure is in place to meet current and future population needs?</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		- *Require the provision of new or upgraded infrastructure?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary Direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A350 • A303 • A36 • A360 • A345 • A338 • M27 • A326 • A30 • A3079 • A386 • B3215 • B3260 • A3124 • A382 • A377 • A3072 • A396 • A361 • M5 • B3391 • A38 • B3187 • B3227 • A358 • A378 • B3168 • B3165 • A3088

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• A37 • A371 • B3081 • B3092 • B3095 • Bristol To Exeter Train Line • Heart Of Wessex Train Line • Rexton Cross Solar Farm • Northcombe WTW • Pynes WTW • Testwood Water Supply Works • Camp Hill Reservoir
		Score: Major Negative (--)

Poole to Testwood Effluent Re-Use Transfer

Table 5.8: Poole to Testwood Effluent Re-Use Transfer (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
1. Biodiversity	1. To protect designated sites and their qualifying features.	• Impact pathway analysis • Relevant European Sites (conservation objectives, qualifying features, condition, integrity risks) and likely effects as assessed through HRA • Other relevant statutory designations (conservation objectives, qualifying features, condition, integrity risks) and likely effects. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect (and where possible enhance) nationally and internationally designated sites of ecological importance?* - *Protect (and where possible enhance) locally designated biodiversity sites?* - Mitigation development to address identified likely (significant) adverse effects
		Commentary Encroachment of ecological features resulting in direct and indirect: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. On the following designations and their qualifying or special features: • Relevant European Sites as assessed in Technical Appendix 3.2 – HRA (see summary below) • Local Nature Reserve (England): Stour Valley • Sites of Special Scientific Interest (England): Moors River System • Sites of Special Scientific Interest (England): Avon Valley (Bickton to Christchurch) • Sites of Special Scientific Interest (England): Breamore Marsh The HRA Screening (Appendix 3.2: HRA) has identified this scheme as having the following RAG Score interactions of note with European Sites (SAC, SPA and RAMSAR). Refer to Appendix 3.2 for the scoring rationale (all interaction scores of at least 1 indicate clear potential for at least one Likely Significant Effect in HRA terms): • Component 1a:

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		◦ Poole Habour SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ◦ Poole Harbour Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Component 1b: ◦ Poole Habour SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ◦ Poole Harbour Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ◦ Solent and Dorset Coast SPA: Red RAG Score meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest. ◦ Dorset Heaths SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ◦ Dorset Heathlands Ramsar: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest ◦ Dorset Heathland SPA: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest • Component 1c: ◦ Solent and Dorset Coast SPA: Red RAG Score of 5 meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• Component 1d: ○ Dorset Heaths SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Dorset Heathlands Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent and Dorset Coast SPA: Red RAG Score of 5 meaning that is has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest. • Component 1e: ○ Dorset Heaths SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Dorset Heathlands Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent and Dorset Coast SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Component 1f: ○ Dorset Heaths SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Dorset Heathlands Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent and Dorset Coast SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Component 4b(i): ○ River Avon SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ The New Forest SAC: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent and Dorset Coast SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Avon Valley Ramsar: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Avon Valley SPA: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Dorset Heathlands Ramsar: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Dorset Heathlands SPA: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Dorset Heathlands SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. • Component 4b (ii): ○ The New Forest SAC: Red+ RAG Score of 10 meaning that is has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. ○ Solent & Southampton Water Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ Solent & Southampton Water SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest Ramsar: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. ○ New Forest SPA: Amber RAG Score of 1 meaning that it has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. • Components 5a, 5b and 5c have Green RAG Scores of 0 meaning they avoid impact pathways with European Site and have no potential to result in Likely Significant Effects •
		Score Major Negative (--)
	2. To avoid a net reduction, and where possible enhance, in non-monetised natural capital assets.	• Findings from Natural Capital Assessment workstream. • Development of relevant BNG and wider net environmental gain opportunities – options development and initial testing.
		Commentary

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th>WCS Gate 1 SEA Criteria</th></tr>
<tr><td rowspan="3"></td><td rowspan="2"></td><td>As detailed in Technical Appendix 3.4: NCA and BNG, WCS Sources & Transfers will result in a range of impacts including the following:

• Temporary construction impacts:
  ○ Construction will lead to loss or degradation of pasture, woodland, floodplain grazing marsh and small amounts of heathland natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence

• Operational impacts:
  ○ Disbenefits to biodiversity potentially related to discharge of treated effluent into associated rivers and associated flow and water quality changes, which may affect habitat quality. Disbenefits related to construction of water treatment infrastructure is unknown as size and location of sites are yet to be determined.
  ○ Potential biodiversity, natural hazard regulation and recreation benefits related to bankside storage components, although these will depend on component design.
  ○ Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
  ○ Potential water purification benefits depending on the % increase in flow during drought along the Rivers and the quality of the treated discharge. May result in dilution of any existing contaminants.</td></tr>
<tr><td>Score Minor Negative (-)</td></tr>
<tr><td>3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.</td><td>• Impact pathway analysis
• Findings from HRA and WFD Compliance workstreams.
• Qualitative assessment via guide questions: Will the SRO:
  - Protect and enhance valued species and habitats?
  - Safeguard against habitat loss or fragmentation?
  - Protect or enhance protected trees or important woodland areas?
  - Lead to changes in ecological resources (habitats/species) due to changes in surface or groundwater water quantity or quality?
• Mitigation development to address identified likely (significant) adverse effects</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Commentary Encroachment of ecological features resulting in direct and indirect: • Habitat loss or fragmentation • Habitat degradation • Species disturbance • Species loss or harm. On the following receptors and associated species and habitats: • Relevant European Sites as assessed in Technical Appendix 3.2 - HRA o Priority Habitat Inventory (South England): Coastal and floodplain grazing marsh o National Forest Inventory (Great Britain): Woodland o Priority Habitat Inventory (South England): Deciduous woodland o Local Nature Reserve (England): Stour Valley o Sites of Special Scientific Interest (England): Moors River System o Sites of Special Scientific Interest (England): Avon Valley (Bickton to Christchurch) o Sites of Special Scientific Interest (England): Breamore Marsh
		Score Major Negative (--)
	4. To avoid and, where required, manage invasive and non-native species (INNS).	• Findings from INNS Risk workstream (inc. mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Exacerbate or prevent the spread/introduction of INNS?*
		Commentary As identified in the INNS Risk Assessment (Technical Appendix 3.3): • Component 1a has been identified as a Low magnitude of risk. The source of the water associated with this component is wastewater and sewerage which will be subject to standard treatment processes. It is assumed that treated effluent will require further (secondary and/or tertiary treatment to ensure compliance water quality standards prior to discharge into the River Stour. As such, any INNS or propagules will be removed prior to discharge into the River Stour. • Component 1b has been identified as a Low magnitude of risk. The proposed transfer of treated effluent will be via a pipe. • Component 1c has been identified as a Moderate magnitude of risk. The transfer mechanism at this point will be a river. As noted above, the discharge of treated effluent is

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		unlikely to result in the distribution of INNS. However, as the transfer mechanism is open water (the River Stour) the risk is considered moderate. • Component 1d has been identified as a High magnitude of risk. The abstraction of raw water from the River Stour and the subsequent transfer to a bankside storage system creates a new INNS distribution pathway. Any INNS present within the River Stour would likely be transferred to the bankside storage system. • Component 1e and 1f have been identified as a High magnitude of risk. The abstraction of raw water from the River Stour and the subsequent transfer to a bankside storage system creates a new INNS distribution pathway. Any INNS present within the River Stour would likely be transferred to the bankside storage system. Depending on the design of the bankside storage system (e.g. open vs closed system), INNS could also potentially be introduced into the River Stour as the presence of the bankside storage system provides a secondary pathway. This is of particular concern should the bankside storage system include recreational access (e.g. open ponds). • Component 4b(ii) has been identified as a High magnitude of risk for the same reasons as Components 1d – 1f. • Component 5a has been identified as a Low magnitude of risk. Transfer of raw water from the River Exe of the River Stour would consist of a raw water transfer via a pipeline. As the end point is a treatment works the risk is considered low as the treatment process will eradicate any INNS and there will be no onward distribution of INNS. • Component 5a has been identified as a Low magnitude of risk. As the end point is a treatment works the risk is considered low as the treatment process will eradicate any INNS and there will be no onward distribution of INNS. • Component 5b and 5c have been identified as a Very High magnitude of risk. Transfer of raw water from the River Stour would consist of a raw water transfer via a pipeline. As the end point is another waterbody, the risk is considered high, despite the transfer via a closed system. As the lakes are being used by the public, there is a risk that any new INNS can be further distributed into the wider catchment without biosecurity measures in place (i.e. secondary pathways).
		Score Major Negative (--)
	5. To meet WFD objectives relating to biodiversity.	• Impact pathway analysis • Findings from WFD Compliance workstream (inc. WFD status of waterbody receptors, likely effects and mitigation options) • Qualitative assessment via guide questions: *Will the SRO:* - *Support the achievement of good ecological status?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Commentary As presented in Appendix 3.3: WFD, the assessment identified that Roadford Lake, the River Wolf, River Thrushel, Lower River Lyd, Tamar (Lyd to Inny) and Lower Tamar (Component 2) are potentially non-compliant with WFD objectives. Within Component 3, both the Exe (Culm to Creedy) and Exe (Creedy to Estuary) are potentially non-compliant with WFD objectives. Components 4 and 5 have been treated as a “closed” system with no waterbody interaction and therefore have not been assessment under WFD.
		Score Minor Negative (-)
2. Population and Human Health	1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise noise emissions to sensitive receptors?* - *Protect air quality and prevent emissions of harmful pollutants?* - *Avoid conflicts with strategic scale land use (employment / industrial / housing / mixed use) planning allocations to meet identified population needs?* - *Avoid traffic congestion and delays?* - *Protect access to local services and facilities?* - *Minimise residential amenity impacts?* - *Minimise land take and sterilisation?* - *Minimise conflict with existing land uses and sensitive landowners (e.g. MOD)?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As detailed in Resilience and Integration Benefits Note (**Appendix D**), socio-economic benefits associated with the construction of the West Country South SROs relate to employment supported by the capital expenditure to build the scheme, and the Gross Value Added (GVA) generated by the construction jobs. Construction employment opportunities will be available to people within the local region of the various WCS SRO route section or component. This means that the socioeconomic impacts in terms of employment and GVA will be spread across the scheme’s geography and will benefit multiple communities.

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Score Minor Positive (+)
	2. To maintain and enhance tourism and recreation.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Safeguard and improve opportunities for recreational activities?* - *Protect existing tourism activities and assets from adverse development impacts?* - *Protect public access to and the visitor attractiveness of designated recreational routes?* - *Improve access to nature?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary Interactions with recreational routes resulting in temporary severance and accessibility impacts during construction (and subsequent maintenance periods): • 60 Footpaths • 6 Cyclepaths
		Score Major Negative (--)
	3. To secure resilient water supplies for the health and wellbeing of customers.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Ensure continuity of a safe and secure drinking water supply?* - *Ensure adequate water infrastructure is in place to meet the health and wellbeing needs of current and future populations?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary The proposed discharge into the River Stour will result in a higher flow with potential downstream benefits to resilience arrangements between Wessex and South West (Bournemouth) Water.
		Score Major Positive (++)
		• Impact pathway analysis

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
	4. To increase access and connect customers to the natural environment, provide education or information resources for the public.	• Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Improve access to nature?* - *Provide education or information resources for the public?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As identified in the Resilience and Integration Benefits Note (Appendix D of this SEA), infrastructure for capture, storage and transfer of water resources may reduce or mitigate the risk of flooding in some locations. This mitigation of flood risk may increase access and connectivity to recreation and the natural environment.
		Score Minor Positive (+)
3. Water	1. To reduce or manage flood risk, taking climate change into account.	• Impact pathway analysis • Review SRO infrastructure encroachments into Flood Zones 2 and 3 • Qualitative assessment via guide questions: *Will the SRO:* - *Cause or exacerbate flooding, either localised or elsewhere within the catchment?* - *Have the potential to help alleviate flood risks, including for donating watercourses?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary Development of some components within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in: • Loss or reduction of flood plains (natural storage), • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns.
		Score Minor Negative (-)
	2. To enhance or maintain groundwater quality and resources.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Result in changes to groundwater levels?* - *Protect and improve groundwater quality?*

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• Mitigation development to address identified likely (significant) adverse effects
		Commentary As presented in Technical Appendix 3.3 – WFD, various groundwater waterbodies have been identified as potentially at risk of WFD non-compliance as a consequence of pipeline construction and operation. There is insufficient information available on the design, construction and operation plans for these pipelines to make an assessment of the potential issues that may cause WFD non-compliance with tests for groundwater.
		Score Uncertain (?)
	3. To enhance or maintain surface water quality, flows and quantity.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Result in changes to abstraction or discharge levels?* - *Require changes to abstraction licences?* - *Result in changes to river flows?* - *Protect fish, inverts and macrophytes?* - *Safeguard waterbodies designated as protected areas?* - *Protect and improve surface water quality?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary Discharge (of tertiary treated effluent water) into and re-abstraction from River Stour: changes in flow, potential changes in water chemistry and geomorphology. Watercourse crossings and other works in proximity to the water environment, resulting in potential pollution risks during construction (HDD installation technique proposed): • Surface Water Safeguarding Zones (England): Lower River Stour • OS Water Course (England, Scotland and Wales): River Stour • OS Water Course (England, Scotland and Wales): Moors River • OS Water Course (England, Scotland and Wales): River Avon • OS Water Course (England, Scotland and Wales): Turmer Brook • OS Water Course (England, Scotland and Wales): Ashford Water • OS Water Course (England, Scotland and Wales): Sweatfords Water • OS Water Course (England, Scotland and Wales): Park Water

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		• OS Water Course (England, Scotland and Wales): River Blackwater • OS Water Course (England, Scotland and Wales): Cadnam River • OS Water Course (England, Scotland and Wales): Golden Gutter As presented in Technical Appendix 3.3 – WFD, issues surrounding dewatering and associated discharge to surface waterbodies, or issues of groundwater pollution due to pipeline failure will require further consideration when in Gate-2 when the scheme design details are more advanced.
		Score Major Negative (--)
	4. To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	• Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: *Will the SRO:* - *Protect or improve the quality of waterbodies, helping to WFD and RBMP objectives?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As presented in Technical Appendix 3.3 – WFD, as Component 4 and 5 are treated as a "closed" system with no waterbody interaction), this has not been assessed under WFD. Components 1 however has potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to improve P status, preventing deterioration and ensuring there is no impediment to improvement).
		Score Minor Negative (-)
	5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	• Findings from socio-economic analysis of non-resource benefits re network resilience and performance benefits • Comparison of cascade-based versus new transmission infrastructure approaches • Mitigation and enhancement development to further improve resilience through SRO
		Commentary As detailed in the Resilience and Integration Benefits Note (Appendix A of this SEA), with the route mirroring existing transfer infrastructure where possible and appropriate, there will be a range of socio-economic benefits for both the water authority and the communities. The ability to re-use and/or share infrastructure will reduce the requirement for land purchases and the development of capital assets such as pumping stations. Where interfaces exist between the existing infrastructure and the WCS SRO there will be scope to deliver upgrades to assets. These upgrades may result in increased efficiencies, higher capacities, lower downtimes, and the potential share operations and maintenance resources and therefore lower revenue costs.

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th colspan="2">WCS Gate 1 SEA Criteria</th></tr>
<tr><td></td><td></td><td colspan="2">Score Minor Positive (+)</td></tr>
<tr><td rowspan="2">4. Soil</td><td rowspan="2">1. To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.</td><td colspan="2">• Impact pathway analysis
• Qualitative assessment via guide questions: Will the SRO:
- Avoid (or help to remediate) contaminated land?
- With respect to areas proposed for permanent land use change, safeguard the best quality, most versatile and locally important agricultural land?
- Utilise brownfield / previously developed land?
• Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary

Encroachment of Grades 2- 5 (inc. BMV) ALC, resulting in:
• Temporary reduction in productive land and yields
• Pollution risks with the potential to degrade soil quality</td><td>Score Minor Negative (-)</td></tr>
<tr><td rowspan="2">5. Air</td><td rowspan="2">1. To reduce and minimise air and noise emissions during construction and operation.</td><td colspan="2">• Impact pathway analysis
• Qualitative assessment via guide questions: Will the SRO:
- Minimise noise emissions to sensitive receptors?
- Protect air quality and prevent emissions of harmful pollutants
- Minimise residential amenity impacts?
• Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary
Components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c) do not have direct interactions with AQMA's</td><td>Score No Clear Relationship (~)</td></tr>
<tr><td rowspan="2">6. Climatic Factors</td><td rowspan="2">1. To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.</td><td colspan="2">• Findings from Natural Capital Assessment workstream
• Qualitative assessment via guide questions: Will the SRO:
- Reduce vulnerability to the effects of climate change through appropriate adaptation?
- Enhance climate resilience within the water network?
- Enhance ecosystem resilience (ability to adapt) to climate change?
• Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td colspan="2">Commentary</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		Appendix 3.4: NCA and BNG provides a summary of non-traded carbon sequestration values per component. The following is applicable to the Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c): • Component 1: Poole Effluent Re-use o Change in non-traded carbon sequestration value during construction (£2019): -£1,772.53 o Change in non-traded carbon sequestration value following BNG uplift: -£288.03 • Component 4: Transmission System to Southern Water o Change in non-traded carbon sequestration value during construction (£2019): -£8,192.96 o Change in non-traded carbon sequestration value following BNG uplift: -£3,856.69
		Score Uncertain (?)
	2. To reduce embodied and operational carbon emissions.	• Impact pathway analysis • Findings from Carbon Assessment workstream • Findings from Natural Capital Assessment workstream • Qualitative assessment via guide questions: *Will the SRO:* - *Maximise energy efficiency?* - *Minimise operational energy consumption?* - *Minimise greenhouse gas release, including embodied and operational emissions?* - *Support decarbonisation of the water sector?* - *Support the delivery of renewable and low carbon energy?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary As presented in Appendix 3.5: Carbon, a carbon assessment has been undertaken for the project. This assessment has assessed WCS Sources & Transfers (component 1, 4 and 5) and WCS Southern Water transfer (components 1, 2 and 3) . Embodied carbon associated with SRO construction is assessed as follows: • WCS Sources & Transfers (component 1, 4 and 5): o Embodied carbon (tCO2e): 127,294 o Embodied carbon per ML at full throughput (kgCO2e/ML): 194 o Embodied carbon per ML at Water quality maintenance flow with 25% utilisation (kgCO2e/ML): 444

<table>
<tr><th>SEA Topic</th><th>Core SEA Objective</th><th colspan="2">WCS Gate 1 SEA Criteria</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td colspan="2">WCS Southern Water transfer (components 1, 2 and 3):
Embodied carbon (tCO2e): 45,840
Embodied carbon per ML at full throughput (kgCO2e/ML): 70
Embodied carbon per ML at Water quality maintenance flow with 25% utilisation (kgCO2e/ML): 160
The whole life (60 years) carbon assessment is assessed as follows:
WCS Sources & Transfers (component 1, 4 and 5):
1,299,546 tCO2e flow at full design throughput
708,387 tCO2e at water quality maintenance flow with 25% utilisation
WCS Southern Water transfer (components 1, 2 and 3):
195,685 tCO2e flow at full design throughput
114,486 tCO2e at water quality maintenance flow with 25% utilisation</td></tr>
<tr><td>Commentary
The scheme is expected to result in a positive change in non-traded carbon sequestration value through the development and implementation of proposals to deliver BNG.</td><td>Score Uncertain (?)</td></tr>
<tr><td rowspan="2">7. Landscape</td><td rowspan="2">1. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites.</td><td colspan="2">Impact pathway analysis
Qualitative assessment via guide questions: Will the SRO:
- Avoid adverse effects on (and where possible enhance) protected/designated landscapes?
- Protect (and where possible enhance) landscape and townscape character?
- Minimise adverse visual impacts?
- Provide opportunities to enhance visual amenity?
Mitigation development to address identified likely (significant) adverse effects</td></tr>
<tr><td>Commentary

Construction
Temporary reduction in local landscape character and visual amenity during construction activities.
Operational (above ground infrastructure only)</td><td>Score Minor Negative (-)</td></tr>
</table>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria	
		• Effects on host and surrounding landscape fabric and character areas, • Reduction in visual amenity, • Impacts on special qualities and setting of landscape designations. On the following receptors: • National Character Areas (England): South Hampshire Lowlands • National Character Areas (England): Dorset Heaths • Greenbelt (England): Bournemouth, Christchurch and Poole • Country Parks (England): Avon Heath • National Character Areas (England): New Forest • Country Parks (England): Moors Valley • National Character Areas (England): Dorset Downs and Cranborne Chase • National Character Areas (England): Salisbury Plain and West Wiltshire Downs • National Parks (England): New Forest • Greenbelt (England) designation for Bournemouth, Christchurch and Poole • AONB (England): Cranborne Chase & West Wiltshire Downs.	
8. Historic Environment	1. To conserve, protect and enhance landscape and townscape character and visual amenity.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Affect the integrity or setting of designated heritage assets?* - *Avoid or minimise damage to archaeologically important sites?* - *Affect public access to designated heritage assets?* • Mitigation development to address identified likely (significant) adverse effects	
		Commentary Effects on the setting of the following heritage assets (temporary and permanent where receptor is in close proximity to above ground infrastructure): • Listed Buildings (England): Longham Bridge • Listed Buildings (England): Canford Bridge (That Part In Poole District) And Viaduct Approach To South • Listed Buildings (England): Canford Bridge	Score Minor Negative (-)

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
9. Material Assets	1. To minimise resource use and waste production.	• Impact pathway analysis • Qualitative assessment via guide questions: *Will the SRO:* - *Minimise the production of waste?* - *Promote the principles of circular economy?* - *Treat and process waste with minimal environmental impact?* - *Minimise the demand for raw materials and the need for minerals extraction?* - *Promote the use of local resources and minimise the importation of minerals?* • Mitigation development to address identified likely (significant) adverse effects
		Commentary • No identified effects on mineral resources or waste management • Concept design components (4b and 5) included within the scheme have been selected to enable the potential development of cascade-based schemes, facilitate resource displacement, provide network integration (to unlock associated resilience benefits) and minimise the extent of dedicated new infrastructure required.
		Score Minor Positive (+)
	2. To avoid negative effects on built assets / infrastructure.	• Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: *Will the SRO:* - *Avoid conflicts with existing, consented and proposed major transport infrastructure?* - *Avoid constraining the potential growth of existing settlements?* - *Avoid conflicts with existing or planned waste or minerals sites?* - *Minimise land take and sterilisation?* - *Integrate with existing or planned water infrastructure?* - *Ensure adequate infrastructure is in place to meet current and future population needs?* - *Require the provision of new or upgraded infrastructure?* • Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria	
		Commentary Direct interactions with the following receptors, resulting in potential traffic effects and local disruption during construction (and subsequent maintenance periods): • A36 • A27 • B3073 • A31 • B3081 • B3078 • A338 • B3080 • A349 • B3074 • A348 • A347 • Poole STW • Testwood WTW • Hale Solar Farm	
		Summary Commentary The component has a direct interaction with existing built infrastructure including a number of major transport infrastructure routes.	Score: Major Negative (--)

5.4 Summary of Likely Significant Effects and Key Risks

5.4.1 Based on the component level SEA provided in **Appendix A** and the scheme level analysis presented in **Sections 5.2** and **5.3** above, **Tables 5.9** and **5.10** below provide a summary of predicted likely significant environmental (including socio-economic) effects and identified key environmental risks associated with each scheme being progressed through the WCS SROs.

Table 5.9: Likely Significant Effects and Key Risks from River Tamar to Testwood Transfer Scheme

SEA Topic	Likely Significant Effects and Key Risks
1. Biodiversity	Component Level SEA - Likely Significant Effects: • Major Negative (--): ○ Component 2a. Abstraction from River Tamar at Gatherley intake ○ Component 2b. Gatherley to Roadford (Lifton North route) ○ Component 2c. Roadford Lake ○ Component 2d. Roadford Lake to Northcombe (Roadford Northcombe route) ○ Component 3a. Northcombe to Prewley (Northcombe to Prewley route) ○ Component 3b. Prewley to Parsonage (Prewley to Parsonage) ○ Component 3d. River Exe: Allers to Pynes (relevant as impacted section of watercourse) ○ Component 3e. River Exe Abstraction (new) at Bolham Weir ○ Component 3f. River Exe to Allers ○ Component 3g. Allers to Woodgate ○ Component 3h. Woodgate to Kingston St Mary ○ Component 3i. Kingston St Mary to Summerslade ○ Component 4a. Summerslade to Testwood Scheme Level SEA - Likely Significant Effects: • Major Negative (--): ○ Core SEA Objective 1.1. To protect designated sites and their qualifying features. ○ Core SEA Objective 1.3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. ○ Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS). Identified Key Risks (Component and Scheme level): • Encroachment of important ecological features resulting in direct and indirect:

SEA Topic	Likely Significant Effects and Key Risks
	- Habitat loss or fragmentation - Habitat degradation (including to downstream Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA from River Tamar abstraction) - Species disturbance - Species loss or harm.
2. Population and Human Health	Component Level SEA - Likely Significant Effects: • Major Negative (--): o Component 3h. Woodgate to Kingston St Mary Scheme Level SEA - Likely Significant Effects: • Major Negative (--): o Core SEA Objective: 2.1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing Identified Key Risks (Component and Scheme level): • Temporary severance and accessibility impacts during construction Identified Benefits (Component and Scheme level): • Enhanced network resilience • Local non-resource social and economic benefits
3. Water	Component Level SEA - Likely Significant Effects: • Major Positive (++): o Component 3e. River Exe Abstraction (new) at Bolham Weir o Component 3f. River Exe to Allers o Component 3g. Allers to Woodgate o Component 3h. Woodgate to Kingston St Mary o Component 3i. Kingston St Mary to Summerslade o Component 4a. Summerslade to Testwood

SEA Topic	Likely Significant Effects and Key Risks

	Scheme Level SEA - Likely Significant Effects:
	• Major Positive (++):
	  ○ Core SEA Objective: 3.5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.
	
	Identified Key Risks (Component and Scheme level):
	• Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in:
	  - Loss or reduction of flood plains (natural storage),
	  - Increased flood risks resulting from temporary and permanent changes to ground conditions and/or drainage patterns.
	• Changes to river flow, water chemistry and geomorphology
	• Watercourse crossings, resulting in potential pollution risks during construction (HDD installation technique proposed)
	• Earthworks in proximity to safeguarding zones, resulting in pollution risks

4. Soil	No component or scheme level likely significant effects.
	Identified Key Risks (Component and Scheme level):
	• Encroachment of Grades 1-5 (inc. BMV) ALC, resulting in:
	  - Temporary reduction in productive land and yields
	  - Pollution risks with the potential to degrade soil quality

5. Air	No likely significant effects.
6. Climatic Factors	No likely significant effects.

7. Landscape	Component Level SEA - Likely Significant Effects:
	• Major Negative (--):
	  ○ Component 3a. Northcombe to Prewley (Northcombe to Prewley route)
	  ○ Component 3b. Prewley to Parsonage (Prewley to Parsonage)
	
	Scheme Level SEA - Likely Significant Effects:

SEA Topic	Likely Significant Effects and Key Risks
	- Major Negative (--): - Core SEA Objective: 7.1. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites. Identified Key Risks (Component and Scheme level): - Temporary reduction in local landscape character and visual amenity during construction activities. - Effects on host and surrounding landscape fabric and character areas, - Reduction in visual amenity, - Impacts on special qualities and setting of landscape designations.
8. Historic Environment	Component Level SEA - Likely Significant Effects: - Major Negative (--): - Component 4a. Summerslade to Testwood Scheme Level SEA - Likely Significant Effects: - Major Negative (--): - Core SEA Objective: 8.1. To conserve, protect and enhance landscape and townscape character and visual amenity Identified Key Risks (Component and Scheme level): - Effects (temporary or permanent) on the setting of heritage assets - Risk of removal or disturbance of known or currently unrecorded archaeological assets
9. Material Assets	No likely significant effects.

Table 5.10: Likely Significant Effects and Key Risks from Poole to Testwood Effluent Re-Use Transfer Scheme

SEA Topic	Likely Significant Effects and Key Risks
1. Biodiversity	Component Level SEA - Likely Significant Effects: • Major Negative (--): ○ Component 1c. River Stour section (River Stour route) ○ Component 1d. River Stour abstraction ○ Sub-component 4b.1: River Stour to Redlynch WBS/Storage ○ Component 5b. Testwood Lakes (small) Scheme Level SEA - Likely Significant Effects: • Major Negative (--): ○ Core SEA Objective 1.1. To protect designated sites and their qualifying features ○ Core SEA Objective 1.3: To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. ○ Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS). Identified Key Risks (Component and Scheme level): • Encroachment of important ecological features resulting in direct and indirect: - Habitat loss or fragmentation - Habitat degradation - Species disturbance - Species loss or harm.
2. Population and Human Health	No likely significant effects.
3. Water	No likely significant effects.
4. Soil	No likely significant effects.
5. Air	No likely significant effects.

SEA Topic	Likely Significant Effects and Key Risks
6. Climatic Factors	No likely significant effects.
7. Landscape	No likely significant effects.

8. Historic Environment	Component Level SEA - Likely Significant Effects:
	• Major Negative (--):
	  ○ Component 1c. River Stour section (River Stour route)
	
	Scheme Level SEA - Likely Significant Effects:
	• Major Negative (--):
	  ○ Core SEA Objective: 8.1. To conserve, protect and enhance landscape and townscape character and visual amenity
	
	Identified Key Risks (Component and Scheme level):
	• Effects (temporary or permanent) on the setting of heritage assets
	• Risk of removal or disturbance of known or currently unrecorded archaeological assets

9. Material Assets	No likely significant effects.

6 Mitigation and Monitoring

6.1 Overview

6.1.1 Building on scheme level SEA presented in **Section 5**, this section outlines initial mitigation options and monitoring proposals to address predicted likely significant adverse environmental effects and key risks.

6.2 Embedded Mitigation

6.2.1 As detailed in **Annex 2 – Concept Design Report**, at Gate 1 the following environmental mitigation and associated design assumptions have been embedded into the initial concept design of the schemes being progressed through the WCS SROs:

- No demolition of buildings proposed;
- 50m construction working width, 25m either side of linear components, with the exception of infrastructure below/along roads where working width will be limited to road carriageway and any verges. In addition to accommodating construction working areas this approach provides design flexibility to enable micro-siting through refined concept design at Gate 2 to minimise direct interactions with environmental constraints;
- New 600mm diameter pipes for most transmission components to support 30 MLD transmission. Only exceptions are:
    - Component 2b Gatherley – Roadford where 1200mm diameter pipe is required to support 125 MLD transfer;
    - Component 2d Roadford Lake - Northcombe WTW where capacity in existing pipe (900mm) will be used. This avoids the need for major infrastructure works in this area and therefore minimises potential environmental impacts.
- Adequate eel screen included within initial concept design of Component 2a – Gatherley Intake (abstraction from River Tamar) to comply with the Eels (England and Wales) Regulations 2009 (as amended).
- Crossings of A roads, motorways, railways and watercourses all by ‘trenchless’ Horizontal Direction Drilling (HDD) with dualled pipes to facilitate maintenance. Single pipes for all other sections including minor track/road crossings.
- Temporary severance, accessibility, public access and traffic effects during construction to be managed through Construction Environmental Management Plan (CEMP), Construction Traffic Management Plan (CTMP) and Access Management Plan (AMP). In due course these plans will detail procedures, site-specific mitigation measures and contingency arrangements to avoid unacceptable adverse environmental and amenity impacts. At Gate 2, the principles and scope of each plan will be outlined and agreed with relevant stakeholders.

6.2.2 These embedded mitigation measures have been taken account of in the component and scheme level SEA results at Gate 1.

6.3 Further Mitigation and Monitoring

6.3.1 The findings of Gate 1 environmental assessments including this SEA will be used at Gate 2 to identify environmentally sensitive areas where potential design refinements and additional use of HDD techniques will be considered within a refined concept design, taking account of engineering constraints and wider viability considerations. All direct major interactions identified through the SEA matrices provided in **Section 5** and **Appendix A** will be subject to individual review at Gate 2, with localised pipeline diversions or other design changes implemented where feasible to further reduce the potential for each scheme to result in likely significant adverse effects on specific SEA Objectives.

6.3.2 The SEA matrices provided in **Section 5** and **Appendix A** indicate that, despite consideration of environmental constraints within component level screening (refer to **Annex 1 – Options Appraisal**) and significant environmental inputs to initial concept design work, each scheme being progressed through the WCS SROs is likely to result in adverse effects on receptors including priority habitats, woodlands and watercourses/flood zones where encroachment may be required. The localised nature of these likely adverse impacts mean that individually most (but not all) direct and indirect interactions can be considered as relatively minor, but given the scale of each scheme it is also necessary to consider likely cumulative impacts resulting from multiple encroachments into woodland, priority habitats, watercourse crossings, flood risk zones, BMV agricultural land and other physical environmental interactions across the full extent of each scheme.

6.3.3 To address potential cumulative effects in line with the mitigation hierarchy, opportunities to further reduce the number of direct interactions with environmentally sensitive areas through design refinements and the identification of potential areas for environmental offsetting will be considered at Gate 2 as part of the Preferred Design of each scheme being progressed through the WCS SROs. Proposals for environmental offsetting will initially focus on identifying land (and potentially watercourse) availability and suitability to undergo environmental improvements (e.g. wetland creation, native woodland planting, etc) which can be properly assigned to each scheme as a beneficial impact. An important principle is that local environmental enhancement should go beyond simply compensating for predicted adverse effects elsewhere on a like for like basis to deliver net biodiversity and wider net environmental gain, as measured through changes in biodiversity metrics and natural capital (e.g. contributions to specific ecosystem services). Further consideration of options to achieve biodiversity net gain and enhance natural capital is provided in **Technical Appendix 3.4 – Natural Capital and Biodiversity Net Gain**.

6.3.4 Further mitigation measures and environmental monitoring (i.e. surveys and modelling) to better understand and address likely significant adverse environmental effects and key risks as predicted through this SEA (refer to **Tables 5.9** and **5.10**) are outlined in **Table 6.1** below. Where relevant and proportionate, these measures should be applied at Gate 2 (and subsequent gates where appropriate) to inform a refined concept design for each scheme in order to minimise likely significant adverse environmental effects.

Table 6.1: Further Mitigation and Monitoring Measures for WCS SROs Schemes at Gate 2+

SEA Topic	Further Mitigation	Recommended Environmental Monitoring
1. Biodiversity	• Review opportunities for design refinements to avoid important ecological features (direct interactions) and reduce indirect effects • Additional use of HDD to avoid important ecological features • Iterative development of CEMP including procedures and physical measures to protect habitats and species • Consider opportunities to provide local ecological benefits directly through each scheme • Identify the potential scope of and role for environmental offsetting areas	• River Tamar fisheries and aquatic habitat surveys • River Exe fisheries and aquatic habitat surveys • River Stour fisheries and aquatic habitat surveys • Site walkovers and relevant habitat or species surveys. - To remain proportionate, at Gate 2 any surveys should focus on the main 'risk areas' where Gate 1 environmental assessments have predicted major interactions and/or likely significant adverse effects in order to inform potential design refinements. - Specification at Gate 2 of a wider suite of relevant ecological surveys and assessments to underpin pre-planning activities at Gate 3.
2. Population and Human Health	• Review opportunities for design refinements to reduce severance, accessibility and amenity impacts during construction • Consider opportunities to provide local recreational, amenity and accessibility benefits through the delivery of each scheme • Iterative development of CTMP and AAP	• Land title searches to inform initial landowner engagement and confirm acquisition requirements
3. Water	• Review opportunities for design refinements to reduce encroachment into flood risk areas and watercourse crossings • Further develop the Gate 1 design assumption of utilising HDD (dual pipes) for all watercourse crossings and demonstrate the application of this to major watercourse interactions • Iterative development of CEMP including pollution prevention procedures and physical measures relevant to working in the water environment	• River Tamar water quality and geomorphological surveys, hydrological modelling. • River Exe water quality and geomorphological surveys, hydrological modelling, resource availability assessment. • River Stour water quality and geomorphological surveys, hydrological modelling to inform refined options appraisal. Subsequent flood risk assessment also required. • Site walkovers, water quality and geomorphological surveys at the location of watercourse crossings within or otherwise likely to impact nationally and internationally designated sites.

SEA Topic	Further Mitigation	Recommended Environmental Monitoring
4. Soil	• Review opportunities for design refinements to reduce encroachment into BMV agricultural land • Iterative development of CEMP including pollution prevention procedures and physical measures relevant to protect soil quality during earthworks	• Land title searches to inform initial landowner engagement, including specifically to identify easement requirements for buried pipe infrastructure on agricultural land.
5. Air	• Specification and application of construction dust suppression measures applicable to the risk level of construction working areas (multiple types) within each scheme as per relevant IAQM Guidance.	• No monitoring considered to be necessary or proportionate
6. Climatic Factors	• Development and implementation of scheme level strategies to align with statutory and water company net zero emission targets.	No monitoring considered to be necessary or proportionate
7. Landscape	• Review opportunities for design refinements to reduce visual impacts from above ground surface infrastructure in or otherwise adversely affecting AONB and National Parks. This includes consideration of opportunities to deploy vegetation or topographical screening to minimise impacts.	• Site walkovers and proportionate Landscape and Visual Appraisal of the main 'risk areas' where major direct interactions with AONB and National Parks and likely significant adverse landscape effects have been predicted through this Gate 1 SEA to inform potential design refinements. • Any remaining major direct interactions or likely significant adverse landscape effects following refined concept design at Gate 2 is likely to trigger a detailed LVIA at Gate 3.
8. Historic Environment	• Review opportunities for design refinements to avoid physical disturbance and reduce setting effects from above ground surface infrastructure on heritage assets. This includes consideration of opportunities to deploy vegetation or topographical screening to minimise impacts. • Iterative development of CEMP including procedures and physical measures to protect unrecorded archaeological assets.	• Site walkovers of the main 'risk areas' where major direct interactions (setting effects) on heritage assets have been predicted through this Gate 1 SEA to inform potential design refinements.
9. Material Assets	• Review opportunities for design refinements to avoid land use conflicts and reduce traffic and amenity impacts during construction • Consider opportunities to provide local access and amenity benefits through the delivery of each scheme • Iterative development of CTMP and AAPAP	• Land title searches to inform initial landowner engagement and confirm acquisition requirements

7 Conclusion

7.1 Overview

7.1.1 This Strategic Environmental Assessment (SEA) Report forms an appendix of **Annex 3 - Environmental Assessment** of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report has presented an initial analysis of likely significant environmental impacts arising from the two schemes being progressed through the WCS SROs at Gate 1. Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally separate schemes which will be appraised concurrently by RAPID.

7.2 WCS SROs Gate 2 SEA

7.2.1 The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

7.2.2 An important part of the SEA work completed at Gate 1 has been the development of a detailed SEA Framework for the WCS SROs, as detailed in **Table 3.1**. This SEA Framework has been developed initially for use in assessing the WCS SROs but is capable of applying to other SROs in the region (i.e. West Country North at Gate 2) and the wider scope of the emerging West Country Water Resources Group (WCWR) Regional Plan.

7.2.3 The SEA Framework can be utilised for the WCS SROs at Gate 2 without a need for modification, although minor changes (e.g. insertion of additional qualitative guide questions) may be introduced through formal SEA Scoping for the emerging WCWR Regional Plan in the interim. At Gate 2, the main SEA task will therefore be to re-apply the SEA Framework to firstly provide environmental advice to influence and then to formally assess refined concept designs for each scheme. This work will need to be informed by proportionate mitigation and monitoring proposals (including further technical assessments) as detailed in **Table 6.1**, with a particular focus on reviewing opportunities for design refinements to avoid or minimise currently predicted major interactions with environmental receptors and associated likely significant adverse environmental effects.

Appendix A SEA of WCS SROs Components

Appendix B Constraints Mapping

Appendix C Component Level GIS Data Tables

Appendix D Resilience and Integration Benefits Note

West Country South Strategic Resource Options Gate 1

Annex 3 – Environmental Assessment

Appendix 2: Informal HRA Screening Statement

On behalf of **Wessex Water, South West Water and Southern Water**

Project Ref: 332010527/HRA/WCS6b/002i2| Rev: FINAL | Date: July 2021

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Project Name: **West Country South Strategic Resource Options – Gate 1**

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Report Title: **Annex 3 – Environmental Assessment: Appendix 2 - Informal HRA Screening Statement**

Date: **July 2021**

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
1.0	Jul 2021	Minor Amendments to address EA and NE Comments	[redacted]	[redacted]	[redacted]

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1 Introduction

1.1 Background

1.1.1 This Habitats Regulation Assessment (Informal HRA Screening Statement) forms an appendix of **Annex 3 - Environmental Assessment** of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of the potential for the two schemes being progressed through the WCS SROs at Gate 1 to result in Likely Significant Effects (LSE) on relevant European Sites.

1.1.2 Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally separate schemes which will be appraised concurrently by RAPID. This Informal HRA Screening Statement therefore provides a single assessment which considers both schemes.

1.1.3 Whilst the current report relates to the stated SRO's only, it is noted that all SROs within the WCWRG area need to be taken account of within the future West Country Water Resources Regional Plan ('the Regional Plan') in terms of balancing future supply and demand needs. In February 2021, an Integrated Environmental Assessment Scoping Study for the WCS SROs and emerging Regional Plan was completed to define a proportionate and effective approach to undertaking twin-track environmental assessments. In relation to European Sites, this included a review of the WCS1 – WCS3 feasibility assessments and pre-screening studies, identification of the implications of these studies for the Gate 1 submission and a summary of the work therefore proposed for Gate 1 submission with regard European Sites and a methodology for this.

1.1.4 The assessment methodology (as outlined within **Section 2**) has therefore been proposed such that it is proportionate and appropriate for the informal Screening of the components of the stated SRO's but will also be applicable for use in connection with the emerging WCWR Regional Plan. This approach avoids risks of potential assessment duplication or gaps and enables timeous environmental reporting to inform decision making.

1.2 Context

1.2.1 Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

1.2.2 PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

1.2.3 Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

- Potential water source - strategic effluent re-use options in Wessex Water (WSX) area (WCS1)

- Potential water source - Roadford pumped storage scheme (WCS2)
- Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

1.2.4 The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs). The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within **Annexes 1 – Options Appraisal Report** (including WCS1-3 environmental review technical notes) and **2 – Concept Design Report** respectively.

1.3 Overview of the WCS SROs

1.3.1 The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

- Water recycling (tertiary treatment and indirect re-use) of up to 30 ML/D effluent[1] from Poole Sewage Treatment Works (STW) for onwards transmission via River Stour.
- Abstraction and transfer of 125 ML/D raw water (winter months only) between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
- Long-distance transmission system (pipeline and associated infrastructure) to transfer above-ground water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

1.3.2 Following review of the Integrated Environmental Assessment Scoping Study (Stantec, 2021a), the scheme was fixed for consideration at Gate 1. Five 'Complete Components' were identified through initial concept design, each made up of a number of 'Components' and 'Sub-Components'. Together, the five Complete Components are hereafter referred to as 'the Project'. They are outlined with a summary of additional details provided within **Table 1.1** below.

1.3.3 Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer
    - River Tamar to Pynes WTW pumped storage and displacement (Components 2a – 2e, 3a – 3c)
    - River Exe to Testwood transfer (Components 3d – 3i, 4a, 5a – 5c)

[1] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). Technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.

- Poole to Testwood Effluent Re-Use (Components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

1.3.4 Further details regarding each scheme and the constituent components are provided in **Annex 1.2 – Concept Design Reports**.

Table 1.1: Summary of Components included in Gate 1 WCS SRO Schemes

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
Complete Component 1: Poole Effluent Re-use (Components 1a – 1f)	1a	Poole Sewage Treatment Works (STW)	N/A	SWT	Point	- Treatment of effluent (wastewater).	- Poole STW currently discharges into Holes Bay, Poole Harbour; - The Project will require treatment of between 8 and 30 million litres / day (MLD) as effluent re-use; - This will be diverted into new raw tanks (rather than being discharged to Holes Bay); - As such, the works associated with this Component will include a new raw tank and HL pumps only, which will be located within the existing STW curtilage. - A benefit of this Component is that the treatment and diversion of effluent will result in less wastewater input into Poole Harbour (and therefore a reduction in nitrate loading into Poole Harbour).	WCS Sources & Transfer SRO

[2] A 50m construction working width has been identified, i.e. up to 25m either side of linear, with the exception of infrastructure below / along roads where working width will be limited to road carriageway plus any verges.

600mm diameter pipes have been identified for most components to support 30 MLD transmission, with the exceptions of:

- Component 2b Gatherley – Roadford where 1200mm diameter pipe is required to support 125 MLD transfer.
- Component 2d Roadford Lake - Northcombe WTW where capacity in existing pipe (900mm) will be used.

Crossings of A roads, motorways, railways and watercourses all by HDD with dualled pipes to facilitate maintenance. Single pipes for all other sections including minor track/road crossings.

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
	1b	Poole STW to River Stour discharge point (including tertiary treatment at new WRC plant)	N/A	Transfer Route with WRC	Line/Point	- Water transfer route from the Poole STW to the River Stour via the Poole/ Newton WRC.	- Treated effluent is piped from the STW to the River Stour via dedicated Newton WRC, which is located between the STW and the River Stour; - Treated effluent goes from the STW to Newton WRC where it is subject to tertiary treatment to align with River Stour water quality prior to discharge into the river[3]. - For all transfer routes, works comprise the installation of 600mm pipes (except where otherwise identified), to include a 50m working corridor. - A benefit of this Component is that the treatment and diversion of effluent will result in less wastewater input into Poole Harbour (and therefore a reduction in nitrate loading into Poole Harbour).	
	1c	River Stour Section	N/A	Transfer Route (River)	Line	- Water is carried within the River Stour.	- As noted in relation to Component 1b, treated effluent will be subject to an appropriate level of tertiary treatment prior to discharge into the river[4];	

[3] Note: Tertiary treatment is considered mitigation and as such, cannot be included for consideration at the Screening Stage (see **Section 2**).

[4] As per footnote 3.

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
							- Tertiary treated water is carried within the River Stour; - No in-river works required.	
	1d	River Stour Abstraction	N/A	Abstraction	Point	- Abstraction point from which water is taken from the River Stour.	- Abstraction of between 8 and 30 MLD.	
	1e	River Stour Bankside Storage	N/A	Bankside Storage	Point	- Water storage facility located within the same curtilage as the abstraction point.	- Abstracted water is to be stored in bankside storage to comprise a pond or tank, adjacent to the abstraction site (Component 1d).	
	1f	River Stour Pre-Treatment Works	N/A	Pre-Treatment Works	Point	- Treatment of held water for onwards transmissions to Redlynch WBS / Storage (Component 4b.1).	- The outlet from the bankside storage (Component 1e) will be subject to another treatment process prior to onwards transmission (Component 4b.1).	
Complete Component 2: Roadford Pumped Storage (Components 2a – 2e)	2a	Abstraction from River Tamar at Gatherly Intake	N/A	Abstraction	Point	- Abstraction point from which water is taken from the River Tamar via the Gatherly Intake.	- Abstraction of 125MLD fixed volume to provide sufficient water to Roadford Reservoir with 30MLD surplus for the Project; - No works required.	WCS Sources & Transfer SRO
	2b	Gatherley to Roadford	N/A	Transfer Route	Line	- Water transfer route from the abstraction point at Gatherly Intake to Roadford Lake.	- Lifton North route, formerly known as 2020 Option 2; - Works require installation of 1,200mm diameter pipe to support 125 MLD transfer to include 50m working corridor along transfer route.	

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
	2c	Roadford Lake	N/A	Reservoir	Point	- Water storage reservoir.	- No works required to Roadford Lake as the lake is known to have surplus capacity in winter months owing to poor catchment characteristics.	
	2d	Roadford Lake to Northcombe Water Treatment Works (WTW)	N/A	Transfer Route	Line	- Water transfer route from the reservoir to Northcombe WTW.	- Capacity in existing pipe (900mm) will be used and as such, no works required.	
	2e	Northcombe WTW	N/A	WTW	Point	- Treatment of water from the reservoir for onwards transmission to Component 3a.	- Works will comprise a significant upgrade to the treatment works with additional pumps and units to divert the required 30MLD for onward transmission.	
Complete Component 3: Transmission System to Wessex Water (Components 3a – 3i)	3a	Northcombe to Prewley	N/A	Transfer Route	Line	- Water transfer route from Northcombe WTW to Prewley Pumping Station.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route. - It is possible that additional small intermediate pumping stations may also be required along the transfer routes within Complete Component 3.	WCS Sources & Transfer SRO

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
	3b	Prewley to Parsonage	N/A	Transfer Route	Line	- Water transfer route from Prewley Pumping Station to Parsonage Reservoir.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route; - Parsonage is an existing small service reservoir where the additional 30 MLD will be added to the existing storage; - No further works required as capacity within the reservoir.	
	3c	Parsonage to Pynes	N/A	Transfer Route	Line	- Water transfer route from Parsonage Reservoir to Pynes Reservoir.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route; - Pynes is an existing small service reservoir where the additional 30 MLD will be added to the existing storage; - No further works required as capacity within the reservoir.	
	3d	River Exe: Allers to Pynes	N/A	Impacted Section of River	Line	- Impacted section of River Exe from Allers to Pynes.	- This is not a section of the transfer route but is relevant as the Exe between Allers and Pynes will have 30 MLD less as a result of the Project as water will be abstracted earlier, such that the water course may be affected.	
	3e	River Exe Abstraction at Bolham Weir	N/A	Abstraction	Point	- Abstraction point from which water is take from the River Exe at Bolham Weir.	- Abstraction point is very close to Allers, abstracting 30 MLD upstream of the Allers to Pynes section.	

Complete Component	Component		Sub-Component	Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
	3f	River Exe (Abstraction) to Allers	N/A	Transfer Route	Line	- Water transfer route from the abstraction point at Bolham Weir to Allers.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route.	
	3g	Allers to Woodgate	N/A	Transfer Route	Line	- Water transfer route from Allers to Woodgate Pumping Station.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route.	
	3h	Woodgate to Kingston St Mary	N/A	Transfer Route	Line	- Water transfer route from Woodgate Pumping Station to Kingston St. Mary Reservoir.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route; - Works will also include the installation of new storage tanks / ponds at Kingston St. Mary as there is insufficient capacity within the reservoir.	
	3i	Kingston St Mary to Summerslade	N/A	Transfer Route	Line	- Water transfer route from Kingston St. Mary Reservoir to Summerslade Resrvoir.	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route; - Works will also include the installation of new storage tanks / ponds at Summerslade as there is insufficient capacity within the reservoir.	

Complete Component	Component		Sub-Component		Feature	Point / Line	Component / Sub-Component Summary	Additional Notes[2]	SRO
Complete Component 4: Transmission System to Southern Water (Components 4a - 4b)	4a	Summerslade to Testwood	N/A		Transfer Route	Line	- Water transfer route from Summerslade Resrvoir to Testwood WTW (Component 5a)	- Partially utilises WCN route corridor sections 2e, 2f, 3a, 4b, 4e - Installation of 600mm diameter pipes to include 50m working corridor along transfer route.	WCS Transfer SRO
	4b	River Stour Pre-Treatment to Testwood	4b.1	River Stour to Redlynch Water Balancing Station (WBS) / Storage	Transfer Route	Line	- Water transfer route from the River Stour to Redlynch WBS / Storage	- Partially utilises WCN route corridor sections 3a, 4b, 4e - Installation of 600mm diameter pipes to include 50m working corridor along transfer route.	
			4b.2	Redlynch to Testwood	Transfer Route	Line	- Water transfer route from Redlynch WBS / Storage to Testwood WTW (Component 5a).	- Installation of 600mm diameter pipes to include 50m working corridor along transfer route.	
Complete Component 5: Southern Water Reception Points (Components 5a – 5c)	5a	Testwood WTW	N/A		WTW	Point	- Treatment of water from Component 4 for use as potable water.	- WTW and water storage facilities located at Testwood in Hampshire; - Water to be treated then stored in reservoir (Testwood Lakes (Small)) or within storage tanks, all within the same curtilage; - No works required at this stage.	WCS Transfer SRO
	5b	Testwood Lakes (Small)	N/A		Reservoir	Point	- Water storage reservoir.		
	5c	Testwood Potable Storage Tanks	N/A		Storage Tanks	Point	- Potable water storage facility.		

1.4 Consultation

1.4.1 Early engagement to inform optioneering and the preparation of the environmental assessments has been completed by the project team, the Environment Agency and Natural England through monthly progress meetings. This has included discussions regarding European Sites screened in for consideration within the Informal HRA Screening, the methodology for the Informal HRA Screening and the Gate 1 reporting. Full details are provided in **Annex 3 – Environmental Assessment**.

1.5 Habitats Regulations Assessment Framework

1.5.1 Regulation 63 of the Conservation of Habitats and Species Regulations 2017 ('the Habitats Regulations') requires a Habitats Regulations Assessment to be undertaken in certain circumstances to demonstrate compliance with statutory duties, where a Plan or Project is considered likely to have significant effects on European Sites and is not directly connected with or necessary for the management of that European Site.

1.5.2 The standard approach to HRA comprises four-stages, but given the nature of this assessment, only Stage 1: HRA Screening is considered within this report. HRA Screening (as detailed more fully in **Section 2**) involves identifying the European Sites which could potentially be affected by the Project, determining their qualifying interests, and determining whether or not the Project could result in Likely Significant Effects on European Sites, either alone or in combination with other Plans and Projects.

1.5.3 The Informal HRA Screening has been undertaken in parallel with Strategic Environmental Assessment (SEA) to enable an integrated approach to environmental assessment, and will be used to inform key environmental risks for which further consideration will be required at Gate 2 and beyond.

1.6 Purpose

1.6.1 Considering the HRA Framework as outlined above, the purpose of the current report is therefore to consider whether either individual components, high-level components or the associated schemes being progressed through the WCS SROs at Gate 1 would generate a Likely Significant Effect on identified European Sites and therefore contribute to key environmental risks. This will inform further HRA work at Gate 2 and beyond including, should it be required and once appropriately detailed design is available, HRA Stage 2 Appropriate Assessment. It should be noted that this informal HRA Screening undertaken at Gate 1 indicates components that will be likely be screened out of consideration through Appropriate Assessment. However, all components will be reviewed through detailed HRA Screening (including full consideration of potential in-combination effects) at Gate 2.

2 Methodology

2.1 Overview

2.1.1 It is not possible to complete a full HRA Screening and Appropriate Assessment (see **Plate 2.1**) at Gate 1, based only on initial concept designs and the high-level information provided about each of the Components and Sub-Components at this stage. As such, the following section sets out the background requirements for, and methods used to inform the high-level Informal Screening assessment contained within this report. A detailed Screening and Appropriate Assessment will follow at subsequent gate(s), once a better understanding of the detail (and mitigation solutions) has been determined. This is a proportionate and practical approach to HRA aligned with the design information available at each gate.

2.2 Habitats Regulations Assessment Requirements

2.2.1 The 'Conservation of Habitats and Species Regulations 2017 (as amended)' transposed certain aspects of the Habitats Directive (Council Directive 92/43/EEC) and the Wild Birds Directive (Directive 2009/147/EC) (together known as the 'Nature Directives') (including various amendments) into domestic law.

2.2.2 To make such legislation operable following the UK departure from the European Union (i.e. from 1st January 2021), changes have been made to the 'Conservation of Habitats and Species Regulations 2017 (as amended)' by the 'Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019'. Most of these changes relate to the transfer of functions from the European Commission to the relevant domestic authorities, with all other processes and terms remaining unchanged, such that the strict protection afforded to sites, habitats and species, including wild birds, continues through the 'Conservation of Habitats and Species Regulations 2017 (as amended)'.

2.2.3 Of relevance to HRA, the ‘Conservation of Habitats and Species Regulations 2017 (as amended)’, with changes made by the ‘Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019’, provides for the designation and protection of important ecological sites already designated under the Nature Directives including SAC and SPA and any further sites designated under these Regulations (together forming a new ‘National Site Network’ in the UK), as well as Ramsar Sites (which do not form part of the National Site Network, but require consideration under HRA in the same way as SAC and SPA by government policy (NPPF, 2019)).

2.2.4 The 'Conservation of Habitats and Species Regulations 2017 (as amended)' (‘the Habitats Regulations’) require competent authorities, before granting consent for a Plan or Project, to carry out an ‘Appropriate Assessment’ in circumstances where the Plan or Project (either alone or in combination with other Plans or Projects) is likely to have a significant effect on a European Site, a European Marine site or a Ramsar Site. In England, HRA refers to the whole process of assessment in accordance with the Habitats Regulations, including Stage 1: ‘Screening’ for ‘Likely Significant Effects’ and Stage 2: ‘Appropriate Assessment’ (see **Plate 2.1** below).

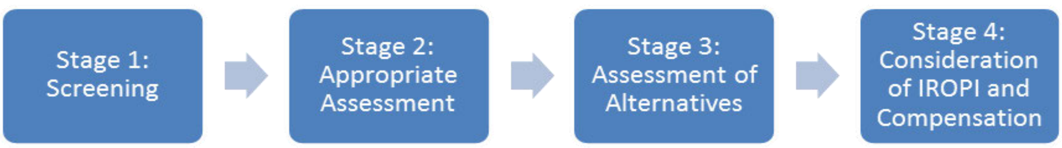

Plate 2.1: Stages of Habitats Regulations Assessment

2.2.5 The current report provides a proportionate, Informal HRA Screening of the two schemes being progressed through the WCS SROs at Gate 1 and their constituent components. The methodology applied in this process is based on good practice guidance for HRA set out in 'The HRA Handbook' (DTA Publications Ltd. available online at www.dtapublications.co.uk). The HRA Handbook provides a regularly updated source of guidance on the understanding and interpretation of the Habitats Regulations and consistency in applying the requirements of the legislation. It is considered that this is the best practice methodology currently available for HRA. The HRA Handbook sets out a four-stage approach to HRA (as illustrated in **Plate 2.1** above) and emphasises the importance of an iterative approach to the process.

2.3 Habitats Regulations Assessment Screening

2.3.1 The Informal HRA Screening involved the identification of European Sites[5] which could potentially be affected by the Project (either directly or indirectly as a result of construction, operation or decommissioning (where relevant)), such that a 'Likely Significant Effect' on an identified European Site could arise.

2.3.2 In accordance with relevant caselaw (Court of Justice of the European Union ('CJEU') People Over Wind and Sweetman v Coillte Teoranta (C-323/17)), mitigation measures intended to avoid or reduce impacts on a European Site could not be regarded as 'part of the Project' and have not therefore been taken into account at this Informal Screening stage. In the context of this assessment, this will allow the potential for Likely Significant Effects on European Sites associated with individual proposed components and the two proposed transfer schemes to be determined and for potential future assessment and mitigation themes (and / or consideration of alternative designs) to be identified. In consideration of the scoring applied to the potential for interactions between individual components and European Sites, the approach to consideration of LSE has been made on a precautionary basis, to take account of the potential for in-combination effects with other plans or projects, the detail of which will be considered at a future gate. This is considered appropriate given that only initial concept designs and high-level information about the Components and Sub-Components are available at this stage.

2.3.3 The Informal HRA Screening has been underpinned by the collation of a detailed baseline dataset, with the following information collated for every European Site within 15km of at least one Component or Sub-Component using a GIS model and freely available data obtained from Natural England and the JNCC[6]. Furthermore, comments from statutory consultees and other stakeholders have been taken into account in screening in European Sites for consideration within the Informal HRA Screening. Where these fall beyond 15km, this has been highlighted, with reason for inclusion:

- The European Site name and designation;
- The distance between that European Site and Components within 15km;
- The qualifying features / criterion for which that European Site is designated;
- The threats / pressures to that European Site;
- The conservation objectives for that European Site;

[5] For the purposes of this report, European Sites are identified to be: Special Protection Areas (SPA) and Potential Special Protection Areas (pSPA), Special Areas of Conservation (SAC) and Candidate Special Areas of Conservation (cSAC) and Ramsar Sites and proposed Ramsar Sites.

[6] A full reference list identifying relevant data sources is provided within **Section 7**.

- The associated Site of Special Scientific Interest (SSSI) and the condition of constituent SSSI units; and
- The Impact Risk Zones from these sites including taking account of buffer zones or sustenance zones identified for specific European Sites.

2.3.4 An analysis of this information has then been completed to identify those features of each European Site which require consideration in relation to the potential for impacts from Components to arise, taking into account the likely activities associated with the Project.

2.3.5 In determining the potential for Likely Significant Effects on European Sites, particular consideration has then been given to the possible source-receptor pathways through which effects may be transmitted, to features contributing to the integrity of that European Site (e.g., ground or surface water catchments, air quality, disturbance impacts, etc.).

2.3.6 Whilst it is acknowledged there are few standards available as a guide to how far impacts will extend, and different types of impacts can occur over different distances, Screening for Likely Significant Effects for the purposes of this assessment has been determined initially on a proximity basis (distance), with a buffer of 15km utilised, or based on initial feedback from consultees. Land outside the boundary of European Sites but which provides a supporting role to their conservation status, is termed ‘Functionally Linked Land’ (or ‘Sustenance Zones’ where relating to bats). Bespoke guidance, where available for any one European Site (e.g., in relation to such ‘Functionally Linked Land’, ‘Sustenance Zones’, other published buffer or impact risk zones) has also been considered to determine the interaction scores (see **Section 2.4** below).

2.4 Habitats Regulations Assessment Screening: RAG Assessment

2.4.1 In order for the outcome of the Informal HRA Screening to be readily interpreted, such that the potential for Likely Significant Effects (LSE) on European Sites associated with different Complete Components can be determined, and the risks associated with identified LSE can be clearly understood, a Red, Amber, Green (RAG) assessment has been carried out. This enables a summed ‘Interaction Score’ to be determined for each Complete Component based on the potential for LSE on each European Site within 15km of a Component or Sub-Component. The parameters for the RAG assessment and the Interaction Scores are detailed within **Table 2.1**. For clarity, only where the Component or Sub-Component completely avoids impact pathways with the European Site and has no potential to result in Likely Significant Effects: either alone, or in combination with other options or other Plans or Projects, is that Component or Sub-Component identified as “green” and anticipated to be screened out for further consideration through Appropriate Assessment (to be confirmed through the Detailed HRA Screening (Gate 2)). This approach has again been made on a precautionary basis, to take account of the potential for in-combination effects with other plans or projects, the detail of which will be considered at a future gate. This is again considered appropriate given that only initial concept designs and high-level information about the Components and Sub-Components are available at this stage.

Component Assessments

2.4.2 In the first instance, the potential Likely Significant Effects on each European Site within 15km of each Component (e.g., 3a, 3b, 3c etc.) or Sub-Component (e.g., 4bi.1, 4b.2 etc.) were assigned a Red, Amber or Green classification to aid easy visual identification of the Components or Sub-Components which have the highest potential for Likely Significant Effects. Individual Interaction Scores were then summed to provide an overall Interaction Score for each Complete Component (e.g., Complete Component 3: Transmission System to Wessex Water). The summed Interaction Scores provide an indication of the relative ecological performance of each Complete Component, to inform ecological risk and identify where further assessment and mitigation (and/or consideration of alternative designs) will be required. This approach is supplementary to the HRA Screening process and does not replace the consideration of potential for Likely Significant Effect of the proposals (see Table 2.1 below).

2.4.3 Note that the overall RAG score for each Complete Component reflects the summed Interaction Scores of a number of Components or Sub-Components. Given this approach, it may be that some of the European Sites and potential impacts pathways will therefore be counted more than once in this tally, as more than one Component or Sub-Component may have the potential for Likely Significant Effects with the same European Site. This approach is considered appropriate as it clearly emphasises potential Likely Significant Effects associated with each Complete Component, for which further consideration is required.

Table 2.1: WCS Gate 1 HRA RAG and Interaction Scoring for European Sites

RAG Score	Description	Interaction Score	Likely Significant Effect?
Green	The Component or Sub-Component avoids impact pathways with the European Site and has no potential to result in Likely Significant Effects: either alone, or in combination with other options or other Plans or Projects. No mitigation required. Consideration at Appropriate Assessment not required.	0	**No** **Screen Out** of Appropriate Assessment
Amber	The Component or Sub-Component has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates, but it is unclear whether there would be adverse effects on the integrity of the European Site interest. If there were adverse effects on integrity, there is clear potential for significant effects to be addressed by mitigation, which would avoid the need for consideration of further tests (Imperative Reasons of Over-Riding Public Interest (IROPI) and Reasonable Alternatives) or need for compensation.	1	**Yes** **Screen In** to Appropriate Assessment
Red	The Component or Sub-Component has clear potential for Likely Significant Effects, therefore Appropriate Assessment likely to be required at future gates. There is also clear potential for adverse effects on integrity of the European Site interest. However, there is also clear potential for significant effects to be addressed by mitigation, which would avoid the need for IROPI and Reasonable Alternatives or need for compensation.	5	**Yes** **Screen In** to Appropriate Assessment
Red+	The Component or Sub-Component has clear potential for Likely Significant Effects and therefore Appropriate Assessment would be required at future gates. There is also, clear potential for adverse effects on integrity of the European Site interest. There may be potential for significant effects to be addressed by mitigation but where there is uncertainty around the mitigation, there would be some effects which trigger the need to consider IROPI and Reasonable Alternatives HRA Stages, along with consideration of appropriate compensation.	10	**Yes** **Screen In** to Appropriate Assessment

2.5 Consideration of Next Steps in HRA

2.5.1 This report focuses on Informal HRA Screening because only initial concept designs and high-level information about the Components and Sub-Components are available at this stage. However, it is anticipated that through the Informal Screening process and review of likely activities associated with each of the Components or Sub-Components, key issues or themes may be identified which will help to shape the development of the designs and the mitigation likely to be associated with them. Therefore, this report also presents those key issues or themes which will need further consideration through further stages of the HRA process at subsequent gates in order for the overall WCS to fulfil HRA requirements and satisfy the necessary legal tests.

3 Habitats Regulations Assessment: Screening

3.1 Overview

3.1.1 This section presents information relevant to the Informal HRA Screening process. In the first instance, activities associated with the two schemes being progressed through the WCS SROs at Gate 1 were considered, taking account of both potential construction and operation stages. Consideration of the potential for impacts and Likely Significant Effects to result from the schemes and constituent components, in the light of the information gathered about the European Sites and limited concept design information available at Gate 1 was then undertaken. Where insufficient detail is available to screen a Component out from further assessment, it has been included as a precaution.

3.2 Summary of European Sites

3.2.1 The coarse screening applied via the GIS model identified all European Sites within 15km of the Project, with additional European Sites based on initial feedback from consultees. This identified 50 European Sites in total, although not all were located within 15km or otherwise connected to all Components. A summary of the qualifying features / criterion for which that European Site is designated; the threats / pressures to that European Site; and the conservation objectives for that European Site are provided in full in **Appendix A**.

3.3 Activities Associated with WCS

3.3.1 As identified in **Section 3.2** above, the vulnerabilities, threats or pressures relevant to the identified European Sites, which have the potential to result in a Likely Significant Effect, are provided in full in **Appendix A**. Whilst the majority of the these are not relevant to the Project (they are associated with the management of the European Site, for example), consideration of those activities that could reasonably be attributed to the Project and as such, have the potential to result in an identified vulnerability / threat / pressure and as such, Likely Significant Effect on an identified European Site, are summarised below.

Construction Activities

3.3.2 The construction activities associated with the Project which may results in threats or pressures on the identified European Sites, such that a Likely Significant Effect may occur will likely include, but not be limited to:

- Facilitating / support works within the 50m working corridor including but not limited to: site mobilisation, fencing and welfare and plant delivery; earthworks, drainage works, and haul road construction; creation of temporary works areas (construction compounds etc.) and, following construction, habitat reinstatement and landscaping and demobilisation;
- Pipieline installation works within the 50m working corridor including installation of transfer pipes via open cut installation. It is assumed the exception to open cut installation will be at major road and railway crossings, as well as river and stream crossings, where Horizontal Directional Drilling (HDD) will be used. At Gate 1 it is assumed that HDD would be the default construction method for watercourse crossings and as such, this forms an integral part of the Project (i.e. it is not considered mitigation); and
- Construction or enhancement of supporting infrastructure including but not limited to: abstraction / discharge facilities, WTW, bankside storage etc.

Operation Activities

3.3.3 The operation phase activities associated with the Project which may results in threats or pressures on the identified European Sites, such that a Likely Significant Effect may occur will likely include, but not be limited to:

- Water abstraction; and
- Monitoring, maintenance and repair works.

3.4 HRA Screening Outputs

3.4.1 The results of the Informal HRA Screening are presented in full in a set of tables in **Appendix B**. Summary tables (**Tables 3.2-3.6** below) present the summary interaction scores for each Component and Sub-Component which together make up the interaction score for each Complete Component. The Complete Component interaction scores and RAG scoring can be summarised as follows:

Table 3.1: Complete Components: Summary Interaction Scores and Informal HRA Screening Outcome

Complete Component	Summed Interaction Score and RAG rating	Informal HRA Screening Outcome
1	59	Potential for LSE identified, therefore Appropriate Assessment required
2	15	Potential for LSE identified, therefore Appropriate Assessment required
3	22	Potential for LSE identified, therefore Appropriate Assessment required
4	106	Potential for LSE identified, therefore Appropriate Assessment required
5	0	No potential for LSE identified. Appropriate Assessment not specifically required.

3.4.2 Note that both the water transfer schemes included within the WCS SROs (River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use) include Components and Sub-Components where the potential for LSE is identified. Therefore, Appropriate Assessment will be required for both water transfer schemes.

Table 3.2: Complete Component 1: Interaction Scores (Note N/A refers to where the component falls beyond the 15km screening distance).

European Site	Component 1a	Component 1b	Component 1c	Component 1d	Component 1e	Component 1f	**Total Interaction Score[7]**
Poole Harbour SPA	1	1	0	0	0	0	**2**
Poole Harbour Ramsar	1	1	0	0	0	0	**2**
Dorset Heaths SAC	0	10	0	1	1	1	**13**
Dorset Heathlands Ramsar	0	10	0	1	1	1	**13**
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	0	0	0	0	0	0	**0**
Solent and Dorset Coast SPA	0	5	5	5	1	1	**17**
Isle of Portland to Studland Cliffs SAC	0	0	0	0	0	0	**0**
Studland to Portland SAC	0	0	0	0	0	0	**0**
Avon Valley SPA	0	0	0	0	0	0	**0**
Avon Valley Ramsar	0	0	0	0	0	0	**0**
River Avon SAC	0	0	0	0	0	0	**0**
Dorset Heathland SPA	N/A	10	0	N/A	N/A	N/A	**10**
The New Forest SAC	N/A	N/A	0	0	0	0	**0**
New Forest Ramsar	N/A	N/A	0	0	0	0	**0**
New Forest SPA	N/A	N/A	0	0	0	0	**0**
Solent Maritime SAC	N/A	1	1	N/A	N/A	N/A	**2**

[7] With highest RAG categorisation identified.

European Site	Component 1a	Component 1b	Component 1c	Component 1d	Component 1e	Component 1f	**Total Interaction Score[7]**
Complete Component 1 Interaction Score with Highest RAG Categorisation Identified:							**59**

Table 3.3: Complete Component 2: Interaction Scores (Note N/A refers to where the component falls beyond the 15km screening distance)

European Site	Component 2a	Component 2b	Component 2c	Component 2d	Component 2e	**Total Interaction Score**
Plymouth Sound & Estuaries SAC	5	0	N/A	N/A	N/A	**5**
Tamar Estuaries Complex SPA	5	0	N/A	N/A	N/A	**5**
Culm Grasslands SAC	N/A	0	0	0	0	**0**
Dartmoor SAC	5	0	0	0	0	**5**
Complete Component 2 Interaction Score with Highest RAG Categorisation Identified:						**15**

Table 3.4: Complete Component 3: Interaction Scores (Note N/A refers to where the component falls beyond the 15km screening distance)

European Site	Component 3a	Component 3b	Component 3c	Component 3d	Component 3e	Component 3f	Component 3g	Component 3h	Component 3i	**Total Interaction Score**
Dartmoor SAC	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**2**
Culm Grasslands SAC	0	0	N/A	0	0	0	0	N/A	N/A	**0**
South Dartmoor Woods SAC	N/A	0	0	0	N/A	N/A	N/A	N/A	N/A	**0**
Exe Estuary Ramsar	N/A	0	1	0	5	0	N/A	N/A	N/A	**6**
Exe Estuary SPA	N/A	0	1	0	5	0	N/A	N/A	N/A	**6**
East Devon Pebblebed Heaths SAC	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	**0**
East Devon Heaths SPA	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	**0**
Exmoor Heaths SAC	N/A	N/A	N/A	0	0	0	0	N/A	N/A	**0**
Exmoor & Quantock Oakwoods SAC	N/A	N/A	N/A	0	0	1	1	1	1	**4**
Quants SAC	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	**0**
Holme Moor & Clean Moor SAC	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	**0**
Hestercombe House SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1	**2**
Somerset Levels & Moors Ramsar	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	**1**
Somerset Levels & Moors SPA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	**1**
Severn Estuary Ramsar	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	**0**
Severn Estuary SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	**0**
Severn Estuary SPA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	**0**

European Site	Component 3a	Component 3b	Component 3c	Component 3d	Component 3e	Component 3f	Component 3g	Component 3h	Component 3i	**Total Interaction Score**
River Avon SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Salisbury Plain SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Salisbury Plain SPA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Chilmark Quarries SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Bracket's Coppice SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Holnest SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Mendip Woodlands SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Fontmell & Melbury Down SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	**0**
Complete Component 3 Interaction Score with Highest RAG Categorisation Identified:										**22**

Table 3.5: Complete Component 4: Interaction Scores (Note N/A refers to where the component falls beyond the 15km screening distance)

European Site	Component 4a	Component 4b.1	Component 4b.2	**Total Interaction Score**
River Avon SAC	10	10	0	**20**
The New Forest SAC	10	1	10	**21**
Solent & Southampton Water Ramsar	1	N/A	1	**2**
Solent & Southampton Water SPA	1	N/A	1	**2**
Solent Maritime SAC	0	N/A	0	**0**
New Forest Ramsar	1	1	1	**3**
New Forest SPA	1	1	1	**3**
Solent and Dorset Coast SPA	0	1	0	**1**
Porton Down SPA	0	0	0	**0**
Salisbury Plain SAC	0	0	0	**0**
Salisbury Plain SPA	0	N/A	N/A	**0**
Mottisfont Bats SAC	1	0	1	**2**
Chilmark Quarries SAC	0	N/A	N/A	**0**
Emer Bog SAC	0	N/A	0	**0**
Great Yews SAC	0	0	0	**0**
River Itchen SAC	0	N/A	0	**0**
Prescombe Down SAC	0	N/A	N/A	**0**

European Site	Component 4a	Component 4b.1	Component 4b.2	**Total Interaction Score**
Avon Valley Ramsar	1	10	0	**11**
Avon Valley SPA	1	10	0	**11**
Dorset Heathlands Ramsar	N/A	10	0	**10**
Dorset Heathlands SPA	N/A	10	0	**10**
Dorset Heathlands SAC	N/A	10	0	**10**
Poole Harbour Ramsar	N/A	0	N/A	**0**
Poole Harbour SPA	N/A	0	N/A	**0**
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	N/A	0	N/A	**0**
Studland to Portland SAC	N/A	0	N/A	**0**
Isle of Portland to Studland Cliffs SAC	N/A	0	N/A	**0**
Complete Component 4 Interaction Score with Highest RAG Categorisation Identified:				**106**

Table 3.6: Complete Component 5: Interaction Scores

European Site	Component 5a	Component 5b	Component 5c	**Total Interaction Score**
Solent & Southampton Water Ramsar	0	0	0	**0**
Solent & Southampton Water SPA	0	0	0	**0**
Solent Maritime SAC	0	0	0	**0**
Solent & Dorset Coast SPA	0	0	0	**0**
The New Forest SAC	0	0	0	**0**
New Forest Ramsar	0	0	0	**0**
New Forest SPA	0	0	0	**0**
Emer Bog SAC	0	0	0	**0**
River Itchen SAC	0	0	0	**0**
Mottisfont Bats SAC	0	0	0	**0**
River Avon SAC	0	0	0	**0**
Complete Component 5 Interaction Score with Highest RAG Categorisation Identified:				**0**

4 Key Issues and Next Steps

4.1 Overview

4.1.1 This section considers the results of the above Informal Screening assessment and identifies the key issues and emerging themes for which further consideration will be required in advance of Gate 2. Suggestions of mitigation have been made for discussion with the project team and stakeholders.

4.2 Key Issues and Emerging Themes

4.2.1 The Informal Screening assessment carried out for the Project found that the potential for Likely Significant Effects on the interest features of a total of 26 European Sites could not be discounted based on the information available at the time of writing, and in the absence of mitigation (Note that some European Sites have been counted in relation to more than one Component). Of the interactions identified, the following were identified to be the key issues for which further consideration and Appropriate Assessment would be required:

- **Red+ Interactions:** Direct impacts on European Sites as a result of construction phase activities either within or immediately adjacent to a European Site. Such impacts could result in destruction, damage or fragmentation of qualifying habitat or killing, injury or disturbance of qualifying species. This includes areas where proposed transfer routes are proposed. The installation of a pipeline based on open-cut working could follow with reinstatement of any loss of habitats. However, caselaw precedent states that such an approach would be considered compensation in HRA terms (and not mitigation). Such a requirement would therefore trigger the need for consideration of Appropriate Assessment which would also need to include consideration of other tests in Habitats Regulations Assessment: consideration of suitable alternatives and demonstration of Imperative Reasons of Overriding Public Interest (IROPI) (see Plate 2.1, Section 2.2). These tests are stringent and should not be taken on lightly. The European Sites to which these interactions relate comprise: Dorset Heaths SPA, SAC and Ramsar, River Avon SAC and Avon Valley SPA and Ramsar and The New Forest SAC (as summarised in **Table 4.1** below) and relate to potential LSE as a result of components or sub-components within Complete Component 1 and 4 and therefore are a consideration for both water transfer schemes.

- **Red Interactions:** Largely indirect impacts on European Sites as a result of water abstraction, transfer or discharge in to / through / out of waterbodies which are hydrologically linked to European Sites. Such impacts could result in changes in hydrology or flow regime, changes in sedimentation or siltation, water pollution, introduction or transfer or invasive species (see **Paragraph 4.2.2** below), all of which could result in changes in qualifying or habitat suitability for qualifying species. Such interactions are relevant to both water transfer schemes; and

- **Orange Interactions:** Largely indirect impacts on European Sites as a result of indirect effects arising from temporary construction phase activities, such as preparatory and construction works. Such impacts could result in water or air pollution and as such, changes in qualifying habitat, or disturbance of qualifying species. Such interactions are relevant to both water transfer schemes.

4.2.2 In addition to this, and as outlined under the ‘red’ interactions above, whilst not formally identified as part of the Informal Screening of any Components or Sub-Components individually, many of the European Sites from within the vicinity of the Project or otherwise hydrologically connected to it, are considered to be at threat from invasive, non-native species albeit that these are not identified formally as threats / pressures on their Standard Data Forms. Further to the above therefore, for those European Sites that are hydrologically linked to waterbodies from which water is abstracted, through which it is transported or into which it is discharged, Likely Significant Effects arising as a result of the transfer of invasive, non-native species, cannot be ruled out. These relate to: Solent and Dorset Coast SPA and distantly connected European Sites via the River Stour; Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA via the River Tamar; Exe Estuary SPA and Ramsar via the River Exe; and Avon Valley SPA and Ramsar via the River Avon SAC.

Table 4.1: Summary of European Sites Interactions – All Components

Component Number	No. of European Sites (Total)	No. of European Sites with Interaction s	No. of European Sites with Direct Impacts	Identified European Sites with Direct Impacts
Complete Component 1	15	6	3	Dorset Heaths SAC Dorset Heathlands Ramsar Dorset Heathland SPA
Complete Component 2	4	2	0	-
Complete Component 3	25	6	0	-
Complete Component 4	27	12	7	River Avon SAC The New Forest SAC Avon Valley Ramsar Avon Valley SPA Dorset Heathlands Ramsar Dorset Heathlands SPA Dorset Heathlands SAC
Complete Component 5	11	0	0	-

4.3 Potential Mitigation and Next Steps

4.3.1 The following key issues (i.e., impacts for which there is the potential for Likely Significant Effects) were identified for further consideration and assessment:

- Direct impacts on European Sites as a result of construction;
- Indirect impacts on European Sites as a result of water abstraction, transfer or discharge in to / through / out of waterbodies which are hydrologically linked to European Sites;
- Indirect impacts on European Sites as a result of temporary construction phase activities; and
- Indirect impacts on European Sites as a result of the transfer of invasive, non-native species (INNS).

4.3.2 To fully assess these impacts and determine whether there is potential for the Project to adversely affect the integrity of the European Sites, an Appropriate Assessment (Stage 2 of HRA) will be required (see **Section 5**). To complete this process, the following will be required:

- Full details in relation to each Component / Sub-Component of the Project including any subsidiary or supporting infrastructure or works (e.g., access routes, interim pumping facilities, linking pipelines etc.), not currently available at this time;

- Full details in relation to other Projects and Plans for which consideration 'in-combination' will be required; and
- For those key issues identified above, confirmation of mitigation measures to be included within the Project. A summary of potential mitigation considerations or alternative considerations is outlined within **Table 4.2** below.

Table 4.2: Summary of European Sites Interactions – All Components

Type of European Site Potential LSE	Potential Mitigation **or Alternative Considerations**	Next Steps (Required in Advance of AA) (see **Section 5**)
Direct Impacts on European Sites as a Result of Construction	Review route realignment to see if amendments can avoid direct impacts on European Sites.	Review of alternative route alignments with the project team. If alternative route alignments not available, Stages 3 and 4 of the HRA process will be triggered and evidence will be required that 'no suitable alternatives' are available, and that the Project is required for 'Imperative Reasons of Overriding Public Interest'. Appropriate compensatory measures will also be necessary.
Indirect Impacts on European Sites as a Result of Abstraction / Transfer / Discharge	Consideration of timing of abstraction / discharge, volume of abstraction / transfer / discharge, methods to be employed when crossing rivers and streams or other sensitive habitats, which may indirectly link to European Sites, on-going monitoring etc.	Review mitigation with the project team to determine abstraction / transfer / discharge requirements in relation to European Sites. This includes in relation to the crossing rivers and streams or other sensitive habitats.
Indirect Impacts on European Sites as a Temporary Result of Construction	Implementation of a Construction Environmental Management Plan to minimise indirect effects resulting from construction.	Review construction phase mitigation proposals with the project team to determine measures specifically required in relation to European Sites. This includes in relation to drilling methodologies to be implemented when crossing rivers and streams.
Indirect Impacts on European Sites as a Result of Transfer of INNS	Consideration of INNS control measures, to be advised by INNS specialist.	Review INNS requirements with the project team, to determine measures to control release and transfer of INNS, specifically required in relation to European Sites.

5 Gate 2 Assessment Requirements

5.1 Overview

5.1.1 To underpin the Gate 1 submission, a proportionate Informal HRA Screening assessment has been carried out. This has identified the presence of European Sites within the vicinity of the Project or through which the Project passes, for which further assessment and consideration will be required. The potential for LSE has been identified for both the transfer schemes included within the WCS SROs. Therefore, Appropriate Assessment will be required for both water transfer schemes. Next steps to be completed prior to and for Gate 2 submission, to inform further Detailed HRA Screening and determine scope of subsequent Appropriate Assessment, are outlined below.

5.2 Pre-Gate 2: Next Steps

5.2.1 Prior to Gate 2 submission, a full and thorough review of the Project will be required to inform the detailed scope of the Gate 2 submission and the methodology. This review will include the following:

i. A review of alternative route alignments where the Components pass through European Sites to (a) determine if suitable alternative route alignments are available or (b) document that 'no suitable alternatives' are available. If it is agreed that 'no suitable alternatives' are available, Stages 3 and 4 of the HRA process will be triggered. Evidence will then need to be compiled to justify this conclusion (i.e., the 'no suitable alternatives' are available), and to confirm that the Project is required for 'Imperative Reasons of Overriding Public Interest'. Impacts on European Sites would also need to be appropriately compensated;

ii. Liaison with the project team to determine measures suitable to mitigate for other identified impacts, including: construction phase mitigation measures, measures to mitigation against impacts associated with abstraction, water transfer and discharge, and mitigation measures in relation to the release and transfer of INNS (see **Table 3.7**);

iii. Liaison with the project team to influence the design of each Component / Sub-Component of the Project including any subsidiary or supporting infrastructure or works (e.g., access routes, interim pumping facilities, linking pipelines etc.), not currently available at this time; and

iv. Liaison with the project team to determine opportunities to improve the integrity of European Sites through wider habitat creation or enhancement opportunities (i.e. beyond that required to avoid, mitigate or compensate for adverse effects on European Sites as a result of the Project). Such discussions are also likely to be relevant for the considerations being undertaken for Water Framework Directive Assessment, Biodiversity Net Gain and wider SEA.

5.2.2 The Environment Agency and Natural England should be re-engaged at this stage to discuss the findings of the review of alternative route alignments, the proposed mitigation measures, the options for wider habitat creation and enhancement and the further details of the Project. At this time, confirmation will be sought for the alternative route alignments, modifications or mitigation measures that Natural England are content to be recognised as embedded mitigation, such that they can be relied upon in the Detailed Screening Statement (to be undertaken at Gate 2), with further mitigation taken into account within the future Appropriate Assessment (with reference to the Sweetman case (C-323/17) – see **Section 2.3**). Where alternative route alignments, modifications or mitigation are agreed, an archive will be created to document the progress of Components / Sub-Components from their initial alignment and design to an alternative, modified or mitigated option (where required), with acknowledgement of those which can be relied upon within the Detailed Screening Statement and those which may only be considered within the future Appropriate Assessment.

5.3 Gate 2 Submission: Detailed Screening

5.3.1 The Gate 2 submission is required to provide further environmental analysis of the risks to European Sites highlighted at Gate 1. This will comprise a second and more detailed Screening assessment of each separate water transfer scheme (Stage 1 of the HRA process), to further refine the potential for Likely Significant Effects within 15km of the Project, in light of the revisions to the Project and further detail as determined through the 'next steps' outlined in **Section 5.2** above. This will include consideration of the Components / Sub-Components, and any reasonable alternatives or modifications derived, as a result of the Project review and agreed with Natural England as embedded mitigation.

5.3.2 For ease of comparison, the Gate 2 submission will use the Gate 1 Screening outputs contained within this report as a base for reporting, with the same two-phased approach to assessment carried out. In the first instance, the potential Likely Significant Effects on European Sites within 15km of each Component or Sub-Component will be reviewed and the potential for LSE will be determined. Individual Interaction Scores will be summed to provide an overall Interaction Score for each Complete Component. Where Interaction Scores and risk have changed in light of alternative route alignments or additional detail (i.e., from Gate 1 to Gate 2), these will be clearly identified, and a justification will be provided. For Components where Likely Significant Effects still cannot be ruled out, further mitigation options will be outlined for consideration by the project team. Other Projects or Plans required for 'in-combination' assessment will also be identified within the Gate 2 submission, to be agreed in consultation with Natural England and the Environment Agency. As it stands, these are anticipated to include, but not be limited to:

- South West Water Draft Drought Plan (2021);
- Wessex Water Draft Drought Plan (2021);
- West Country North Sources & Transfers SRO (progressing to Gate 2 from Summer 2021);
- Relevant Local Plans (existing and emerging);
- West of England Spatial Development Strategy (emerging);
- Actions and commitments arising from WINEP investigations (where relevant);
- Dorset Heaths Planning Framework;
- Stour Valley Park;
- Solent Nutrient Neutral Development (emerging scheme)
- South Hampshire Joint Spatial Strategy (emerging)

5.3.3 At the outset of Gate 2 a review of potentially relevant plans and projects should be undertaken to underpin a robust assessment of in-combination effects.

5.3.4 The results of the Gate 2 submission will be used to shape the requirement for and detail of an Appropriate Assessment (Stage 2 of the HRA process), to be delivered at Gate 3 and beyond.

6 Conclusion

6.1.1 This Informal HRA Screening Statement forms an appendix of **Annex 3 - Environmental Assessment** of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. This report presents the outcome of an Informal HRA Screening process, to determine whether either individual components, Complete Components or the associated schemes being progressed through the WCS SROs at Gate 1 would generate a Likely Significant Effect on identified European Sites (either alone or in-combination) and therefore contribute to key environmental risks.

6.1.2 Early engagement to inform optioneering and the preparation of the environmental assessments has been completed by the project team, the Environment Agency and Natural England through monthly progress meetings. This has included discussions regarding European Sites screened in for consideration within the Informal HRA Screening, the methodology for the Informal HRA Screening and the Gate 1 reporting. Full details are provided in **Annex 3 – Environmental Assessment**.

6.1.3 The Complete Component interaction scores and RAG scoring, and Informal HRA Screening outcome is summarised as follows:

Table 6.1: Complete Components: Summary Interaction Scores and Informal HRA Screening Outcome

Complete Component	Summed Interaction Score and RAG rating	Informal HRA Screening Outcome
1	59	Potential for LSE identified, therefore Appropriate Assessment required
2	15	Potential for LSE identified, therefore Appropriate Assessment required
3	22	Potential for LSE identified, therefore Appropriate Assessment required
4	106	Potential for LSE identified, therefore Appropriate Assessment required
5	0	No potential for LSE identified. Appropriate Assessment not required.

6.1.4 Note that both the water transfer schemes included within the WCS SROs (River Tamar to Testwood Transfer and Poole to Testwood Effluent Re-Use) include Components and Sub-Components where the potential for LSE is identified. Therefore, based on the findings of this Gate 1 Informal HRA Screening, it is currently anticipated that Appropriate Assessment will be required for both water transfer schemes.

6.1.5 Within this Gate 1 report, key issues and next steps are outlined based on the identification of the European Sites where the potential for LSE has been confirmed, and the key types of LSE identified, as a result of the Informal HRA Screening exercise. To inform assessment and reporting at Gate 2, discussion will be required within the Project Team, and with Consultees, regarding potential alternative considerations and mitigation requirements which will inform separate Detailed HRA Screening at Gate 2 for each water transfer scheme, and which will further shape the requirement and scope for an Appropriate Assessment (Stage 2 of the HRA process), to be delivered at Gate 3 and beyond.

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8 Figures

Figure 1: European Sites within 15km of the WCS SROs

Figure 2: Sites of Special Scientific Interest within 15km of the WCS SROs

Refer to separately uploaded zip folder containing figures

Appendix A European Sites within 15km

A.1.1 **Table A1** overleaf provides a summary of the European Sites within 15km of the overall route alignment, with details of the designation, qualifying features, threats and pressures and conservation objectives. The closest associated SSSI are also identified with a summary of the SSSI condition.

Table A.1: European Sites from Within 15km of the Route Alignment

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
Avon Valley Ramsar	River Avon System SSSI. This SSSI is comprised of 49 units, of which 3.48% are in favourable condition, 8.79% are in favourable condition, but recovering, 84.93% are in unfavourable condition, with no change and 2.8% are in unfavourable condition and declining.	**Ramsar criterion 1** The site shows a greater range of habitats than any other chalk river in Britain, including fen, mire, lowland wet grassland and small areas of woodland. **Ramsar criterion 2** The site supports a diverse assemblage of wetland flora and fauna including several nationally-rare species. **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in winter: Gadwall, *Anas strepera strepera*, NW Europe 537 individuals, representing an average of 3.1% of the GB population (5 year peak mean 1998/9- 2002/3) Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species with peak counts in winter: Northern pintail, *Anas acuta*, NW Europe 715 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9- 2002/3) Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1142 individuals, representing an average of 3.2% of the population (5 year peak mean 1998/9-2002/3)	The information sheet on Ramsar wetlands does not identify any specific threats or vulnerabilities. Factors identified as (past, present or potential) adversely affecting the site's ecological character include: 1. Vegetation succession: Major issue arising from decline in traditional pastoral agriculture and lack of maintenance of ditch network 2. Drainage/land claim for agriculture: Management of water levels driven partly by agriculture but also urban flood risk management continues to have adverse effect on habitats. 3. Sedimentation/siltation: High levels of silt in river continue to degrade its interest, especially aquatic species but also contribute to silting-up ditches and deterioration of grasslands after flood events. 4. Introduction/invasion of non-native plant species: *Crassula helmsii* is increasing problem in Blashford Lakes following restoration of gravel pits, not controlled adequately through planning consents and technically difficult to control following withdrawal of herbicide approval. 5. Pollution – domestic sewage 6. Pollution -agricultural fertilisers	The following conservation measures are being undertaken: – Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR) – Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Other – Environmentally Sensitive Area (ESA) – Special Area of Conservation (SAC) – Management plan in preparation

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			7. Recreational/tourism disturbance (unspecified): Site is subject to wildfowling and game shooting, and associated activities (e.g. shooting hides, game cover management, pheasant release pens, etc); full extent/intensity unknown but known to be considerable. Likewise fishing and related activities (e.g. fish stocking, vehicular and pedestrian access, fencing of river banks, vegetation management etc.). Access by people and dogs both on and off public rights of way is also a significant cause of disturbance in some areas. 8. Reservoir/barrage/dam impact: flow regime	
Avon Valley SPA	River Avon System SSSI. This SSSI is comprised of 49 units, of which 3.48% are in favourable condition, 8.79% are in unfavourable condition, but recovering, 84.93% are in unfavourable condition with no change and 2.8% are in unfavourable condition and declining.	**Qualifying Species:** A037: Tundra swan *Cygnus columbianus bewickii* A051: Gadwall *Anas strepera*	Avon Valley SPA is identified to be at threat / pressure from: – Modification of cultivation practices – Mowing / cutting of grassland – Grazing – Forest and plantation management & use – Pollution to groundwater (point sources and diffuse sources) – Human induced changes in hydraulic conditions – Changes in biotic conditions In addition to the above, the Site Improvement Plan for the Avon River and Valley identifies the SPA to be at threat / pressure from:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			− Physical modification − Siltation; − Water pollution; − Water abstraction; − Changes in species distributions; − Invasive species; − Public access/disturbance; − Hydrological changes; − Inappropriate weed control; − Change in land management; and − Habitat fragmentation	Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Bracket's Coppice SAC	Bracket's Coppice and Ryewater Farm SSSI This SSSI is comprised of 17 units, of which 57.9% are in favourable condition, 39.2% are in unfavourable condition but recovering and 2.9% are in unfavourable condition with no change.	**Qualifying Habitats:** H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) **Qualifying Species:** S1323: Bechstein's bat *Myotis bechsteinii*	Bracket's Coppice is identified to be at threat / pressure from: − modification of cultivation practices − grazing − Forest and Plantation management & use − Air pollution, air-borne pollutants − problematic native species In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: − Undergrazing − Deer − Air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; − The extent and distribution of qualifying natural habitats and habitats of qualifying species − The structure and function (including typical species) of qualifying natural habitats − The structure and function of the habitats of qualifying species − The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely − The populations of qualifying species, and, − The distribution of qualifying species within the site

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
				Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Chilmark Quarries SAC	Chilmark Quarries SSSI This SSSI is comprised of 4 units, of which 16.27% are in favourable condition, and 83.73% are in unfavourable condition but recovering.	**Qualifying Species:** S1303: Lesser horseshoe bat *Rhinolophus hipposideros* S1304: Greater horseshoe bat *Rhinolophus ferrumequinum* S1308: Barbastelle bat *Barbastella barbastellus* S1323: Bechstein's bat *Myotis bechsteinii*	Chilmark Quarries SAC is identified to be at threat / pressure from: – Forest and Plantation management & use – Other urbanisation, industrial and similar activities – Outdoor sports and leisure activities, recreational activities – Air pollution, air-borne pollutants – abiotic (slow) natural processes – Changes in biotic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Public access/disturbance – Natural changes to site conditions – Offsite habitat availability/management – Planning permission: general – Air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of habitats of qualifying species – The structure and function of the habitats of qualifying species – The supporting processes on which the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
Culm Grasslands SAC	Hollow Moor & Odham Moor SSSI This SSSI comprises four units, all of which (100%) are in favourable condition.	**Qualifying Habitats:** H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*): 'purple moor-grass meadows' H4010: Northern Atlantic wet heaths with *Erica tetralix:* 'wet heathland with cross-leaved heath' **Qualifying Species:** S1065: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	Culm Grasslands SAC is identified to be at threat / pressure from: – A01: Cultivation; – A02: Modification of cultivation practices; – A04: Grazing; – B02: Forest and plantation management and use; – H04: Air pollution, air-borne pollutants; – J02: Human induced changes in hydraulic conditions; and – M02: Changes in biotic conditions. In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Air pollution: impact of atmospheric nitrogen deposition; – Agricultural management practices; – Hydrological changes; – Change in land management; – Change in species distributions; – Invasive species; – Inappropriate scrub control; – Agricultural management practices; and – Direct impact from third parties (e.g. fires).	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species; – The structure and function (including typical species) of qualifying natural habitats; – The structure and function of the habitats of qualifying species; – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; – The populations of qualifying species; and – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Dartmoor SAC	North Dartmoor SSSI	**Qualifying Habitats:**	Dartmoor SAC is identified to be at threat / pressure from:	Ensure that the integrity of the site is maintained or restored as appropriate,

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
	This SSSI comprises 18 units of which 0.22% are in favourable condition, 46.28% in unfavourable condition, but recovering and 53.50% in unfavourable condition, with no change.	H4010: Northern Atlantic wet heaths with *Erica tetralix:* 'wet heathland with cross-leaved heath' H4030: European dry heaths H7130: Blanket bogs H91A0: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles: 'western acidic oak woodland' **Qualifying Species:** S1044: Southern damselfly *Coenagrion mercuriale* S1106: Atlantic salmon *Salmo salar* S1355: Otter *Lutra lutra*	– A02: Modification of cultivation practices; – A04: Grazing; – D05: Improved access to site; – G05: Other human intrusions and disturbances; – H02: Pollution to groundwater (point sources and diffuse sources); – H04: Air pollution, air-borne pollutants; and – J02: Human induced changes in hydraulic conditions. In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Hydrological changes; – Wildfire / arson; – Air pollution: impact of atmospheric nitrogen; – Water pollution; – Over grazing; – Undergrazing; – Invasive species; – Changes in land management; and – Disease (within tree species).	and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species; – The structure and function (including typical species) of qualifying natural habitats; – The structure and function of the habitats of qualifying species; – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; – The populations of qualifying species; and – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Dorset Heathlands Ramsar	Corfe & Barrow Hills SSSI.	**Ramsar criterion 1** Contains particularly good examples of (i) northern Atlantic wet heaths with	The information sheet on Ramsar wetlands does not identify any specific threats or vulnerabilities. Factors (past,	The following conservation measures are being undertaken:

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	This SSSI comprises 9 units, of which 93.04% are in unfavourable condition, but recovering, 1.2% are unfavourable with no change, and 5.76% are in unfavourable condition and declining.	cross-leaved heath *Erica tetralix* and (ii) acid mire with *Rhynchosporion*. Contains largest example in Britain of southern Atlantic wet heaths with Dorset heath *Erica ciliaris* and cross-leaved heath *Erica tetralix*. **Ramsar criterion 2** Supports 1 nationally rare and 13 nationally scarce wetland plant species, and at least 28 nationally rare wetland invertebrate species. **Ramsar criterion 3** Has a high species richness and high ecological diversity of wetland habitat types and transitions, and lies in one of the most biologically-rich wetland areas of lowland Britain, being continuous with three other Ramsar sites: Poole Harbour, Avon Valley and The New Forest.	present or potential) adversely affecting the site's ecological character include: 1. Acid rain: Modelling by the relevant air quality authority indicates that the average or minimum deposition from airborne Sox and Nox exceed the maximum critical load for acidity on at least part of the site. 2. Pollution (unspecified)	– Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR) – Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Special Area of Conservation (SAC)
Dorset Heathlands SPA	Corfe & Barrow Hills SSSI. This SSSI comprises 9 units, of which 93.04% are in unfavourable condition, but recovering, 1.2% are unfavourable with no change, and 5.76% are in unfavourable condition and declining.	**Qualifying Species:** A082: Hen harrier *Circus cyaneus* A098: Merlin *Falco columbarius* A224: European nightjar *Caprimulgus europaeus* A246: Wood lark *Lullula arborea* A302: Dartford warbler *Sylvia undata*	Dorset Heathlands SPA is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Forest and plantation management & use – Improved access to site – Outdoor sports and leisure activities, recreational activities – Interpretative centres – Invasive non-native species – Human induced changes in hydraulic conditions – Biocenotic evolution, succession	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and,

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			In addition to the above, the Site Improvement Plan for Dorset Heaths identifies the SPA to be at threat / pressure from: – Inappropriate scrub control – Public access/disturbance – Undergrazing – Forestry and woodland management – Drainage – Water pollution – Invasive species – Habitat fragmentation – Conflicting conservation objectives – Wildfire/arson – Air pollution: impact of atmospheric nitrogen deposition – Deer	– The distribution of the qualifying features within the site
Dorset Heaths SAC	Corfe & Barrow Hills SSSI. This SSSI comprises 9 units, of which 93.04% are in unfavourable condition, but recovering, 1.2% are unfavourable with no change, and 5.76% are in unfavourable condition and declining.	**Qualifying Habitats:** H4010: Northern Atlantic wet heaths with *Erica tetralix* H4020: Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* H4030: European dry heaths H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) H7150: Depressions on peat substrates of the *Rhynchosporion* H7210: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* H7230: Alkaline fens H9190: Old acidophilous oak woods with *Quercus robur* on sandy plains	Dorset Heathlands SPA is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Forest and plantation management & use – Improved access to site – Outdoor sports and leisure activities, recreational activities – Interpretative centres – Invasive non-native species – Human induced changes in hydraulic conditions – Biocenotic evolution, succession In addition to the above, the Site Improvement Plan for Dorset Heaths	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely

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		H91D0: Bog woodland **Qualifying Species:** S1166: Great crested newt *Triturus cristatus* S1044: Southern damselfly *Coenagrion mercuriale*	identifies the SPA to be at threat / pressure from: – Inappropriate scrub control – Public access/disturbance – Undergrazing – Forestry and woodland management – Drainage – Water pollution – Invasive species – Habitat fragmentation – Conflicting conservation objectives – Wildfire/arson – Air pollution: impact of atmospheric nitrogen deposition – Deer	– The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	Poole Harbour SSSI This SSSI is comprised of 55 units, of which 26.11% are in favourable condition, 10.89% are in unfavourable condition but recovering and 62.78% are in unfavourable and declining.	**Qualifying Habitats:** H1140: Mudflats and sandflats not covered by seawater at low tide H1210: Annual vegetation of drift lines H2110: Embryonic shifting dunes H2120: Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") H2130: Fixed coastal dunes with herbaceous vegetation ("grey dunes") H2150: Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) H2190: Humid dune slacks H3110: Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) H4010: Northern Atlantic wet heaths with *Erica tetralix*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Forest and Plantation management & use – Improved access to site – Outdoor sports and leisure activities, recreational activities – Interpretative centres – invasive non-native species – human induced changes in hydraulic conditions – Biocenotic evolution, succession	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
		H4020: Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* H4030: European dry heaths H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) H7150: Depressions on peat substrates of the *Rhynchosporion* H7210: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* H7230: Alkaline fens H9190: Old acidophilous oak woods with *Quercus robur* on sandy plains H91D0: Bog woodland **Qualifying Species:** S1166: Great crested newt *Triturus cristatus* S1044: Southern damselfly *Coenagrion mercuriale*	In addition to the above, the Site Improvement Plan for Dorset Heaths identifies the SPA to be at threat / pressure from: - Inappropriate scrub control - Public access/disturbance - Undergrazing - Forestry and woodland management - Drainage - Water pollution - Invasive species - Habitat fragmentation - Conflicting conservation objectives - Wildfire/arson - Air pollution: impact of atmospheric nitrogen deposition - Deer	- The populations of qualifying species, and, - The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
East Devon Heaths SPA	East Devon Pebblebed Heaths SSSI. This SSSI is comprised of 17 units, of which 27.6% are in favourable condition, 67.82% are in unfavourable condition, but recovering and 4.42% are in unfavourable condition with no change.	**Qualifying Species:** A224: European nightjar *Caprimulgus europaeus* A302: Dartford warbler *Sylvia undata*	This SPA is identified to be at threat / pressure from: - modification of cultivation practices - grazing - Forest and Plantation management & use - Improved access to site - Outdoor sports and leisure activities, recreational activities - Air pollution, air-borne pollutants - Biocenotic evolution, succession In addition to the above, the Site Improvement Plan for East Devon	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; - The extent and distribution of the habitats of the qualifying features - The structure and function of the habitats of the qualifying features - The supporting processes on which the habitats of the qualifying features rely - The population of each of the qualifying features, and,

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			Heaths identifies the SPA to be at threat / pressure from: – Inappropriate scrub control – Undergrazing – Change in land management – Public access/disturbance – Air pollution: impact of atmospheric nitrogen deposition – Water pollution – Hydrological changes	– The distribution of the qualifying features within the site.
East Devon Pebblebed Heaths SAC	East Devon Pebblebed Heaths SSSI. This SSSI is comprised of 17 units, of which 27.6% are in favourable condition, 67.82% are in unfavourable condition, but recovering and 4.42% are in unfavourable condition with no change.	**Qualifying Habitats:** H4010: Northern Atlantic wet heaths with *Erica tetralix* H4030: European dry heaths **Qualifying Species:** S1044: Southern damselfly *Coenagrion mercuriale*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Forest and Plantation management & use – Improved access to site – Outdoor sports and leisure activities, recreational activities – Air pollution, air-borne pollutants – Biocenotic evolution, succession In addition to the above, the Site Improvement Plan for East Devon Heaths identifies the SPA to be at threat / pressure from: – Inappropriate scrub control – Undergrazing – Change in land management – Public access/disturbance – Air pollution: impact of atmospheric nitrogen deposition – Water pollution – Hydrological changes	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.

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				Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Emer Bog SAC	Baddesley Common SSSI. This SSSI is comprised of 3 units, of which 31.02% are in unfavourable condition but recovering and 68.98% are in unfavourable condition with no change.	**Qualifying Habitats:** H7140: Transition mires and quaking bogs	This is identified to be at threat / pressure from: − modification of cultivation practices − Forest and Plantation management & use − Outdoor sports and leisure activities, recreational activities − Air pollution, air-borne pollutants − human induced changes in hydraulic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: − public access/disturbance − hydrological changes − air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; − The extent and distribution of the qualifying natural habitat − The structure and function (including typical species) of the qualifying natural habitat, and, − The supporting processes on which the qualifying natural habitat rely Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.

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Exe Estuary Ramsar	Exe Estuary SSSI This SSSI is comprised of 45 units, of which 83.95% are in favourable condition, 15.67% are in unfavourable condition but recovering, and 0.38% are in unfavourable condition and declining.	**Ramsar criterion 5** Assemblages of international importance Species with peak counts in winter: 20263 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in winter: Dark-bellied brent goose, *Branta bernicla bernicla*, 1509 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3) Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species with peak counts in winter Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 857 individuals, representing an average of 2.4% of the population (5 year peak mean 1998/9- 2002/3)	No factors (past, present or potential) were identified as adversely affecting the site's ecological character.	The following conservation measures are being undertaken: – Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR) – Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Other – Area of Outstanding National Beauty (AONB) – Special Area of Conservation (SAC) – Management plan in preparation
Exe Estuary SPA	Exe Estuary SSSI This SSSI is comprised of 45 units, of which 83.95% are in favourable condition, 15.67% are in unfavourable condition but recovering, and 0.38% are in	**Qualifying Species:** A007: Slavonian grebe *Podiceps 13ubbute* A130: Eurasian oystercatcher *Haematopus ostralegus* A132: Pied avocet *Recurvirostra avosetta* A141: Grey plover *Pluvialis squatarola* A616: Black-tailed godwit *Limosa limosa islandica*	This SPA is identified to be at threat / pressure from: – modification of cultivation practices – mowing / cutting of grassland – grazing – Improved access to site – Outdoor sports and leisure activities, recreational activities – Changes in abiotic conditions – Changes in biotic conditions	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features

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	unfavourable condition and declining.	A672: Dunlin *Calidris 14ubbut 14ubbut* A675: Dark-bellied brent goose *Branta bernicla bernicla*	In addition to the above, the Site Improvement Plan for Exe Dawlish identifies the SPA to be at threat / pressure from: – Public access/disturbance – Changes in species distributions – Coastal squeeze – Change in land management – Fisheries: commercial marine and estuarine	– The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.
Exmoor Heaths SAC	South Exmoor SSSI. This SSSI is comprised of 23 units, of which 5.83% are in favourable condition, 90.78% are unfavourable conditions but recovering, 2.96% are in unfavourable condition with no change and 0.42% are in unfavourable condition and declining,	**Qualifying Habitats:** H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts H4010: Northern Atlantic wet heaths with *Erica tetralix* H4030: European dry heaths H7130: Blanket bogs (* if active bog) H7140: Transition mires and quaking bogs H7230: Alkaline fens H91A0: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Forest and Plantation management & use – Air pollution, air-borne pollutants – invasive non-native species – human induced changes in hydraulic conditions – Interspecific faunal relations In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – air pollution: impact of atmospheric nitrogen deposition – drainage – inappropriate pest control – agricultural management practices – invasive species – managed rotational burning – change in land management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which qualifying natural habitats rely Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of

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			– direct impact from 3rd party	which are of particular relevance to the Project.
Exmoor & Quantock Oakwoods SAC	North Exmoor SSSI This SSSI comprises 95 units, of which 18.21% are in favourable condition, 77.97% are in unfavourable condition but recovering, 3.52% are in unfavourable condition with no change, and 0.3% are in unfavourable condition and declining.	**Qualifying Habitats:** H4030: European dry heaths H9120: Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) H91A0: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles H91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Qualifying Species:** S1096: Brook lamprey *Lampetra planeri* S1106: Atlantic salmon *Salmo salar* S1163: Bull head *Cottus gobio* S1083: Stag beetle *Lucanus cervus* S1303: Lesser horseshe bat *Rhinolophus hipposideros* S1308: Barbastelle bat *Barbastella barbastellus* S1323: Bechstein's bat *Myotis bechsteinii* S1355: Otter *Lutra lutra*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Forest and Plantation management & use – Forest and Plantation management & use – grazing in forests/ woodland – Air pollution, air-borne pollutants – invasive non-native species – Interspecific floral relations In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Invasive species – Forestry and woodland management – Disease – air pollution: impact of atmospheric nitrogen deposition – change in land management – deer	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of

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				which are of particular relevance to the Project.
Fontmell & Melbury Downs SAC	Fontmell and Melbury Downs SSSI This SSSI is comprised of 23 units, of which 67.56% are in favourable condition, 31.96% are in unfavourable condition but recovering and 0.48% is destroyed.	**Qualifying Habitats:** H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) **Qualifying Species:** S1065: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* S1654: Early gentian *Gentianella anglica*	This SAC is identified to be at threat / pressure from: – Cultivation – modification of cultivation practices – grazing – Forest and Plantation management & use – Air pollution, air-borne pollutants – Biocenotic evolution, succession In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – air pollution: impact of atmospheric nitrogen deposition – inappropriate scrub control – agriculture: agricultural operations – change in land management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of

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				which are of particular relevance to the Project.
Great Yews SAC	Great Yews SSSI. This SSSI is comprised of 1 unit, which is in favourable (100%) condition.	**Qualifying Habitats:** H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) H91J0: *Taxus baccata* woods of the British Isles	This SAC is identified to be at threat / pressure from: – Forest and Plantation management & use – problematic native species In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – deer – air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which qualifying natural habitats rely Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Hestercombe House SAC	Hestercombe House SSSI This SSSI is comprised of 2 units, of which 64.86% are in	**Qualifying Species:** S1303: Lesser horseshoe bat *Rhinolophus hipposideros*	This SAC is identified to be at threat / pressure from: – Other urbanisation, industrial and similar activities – Outdoor sports and leisure activities, recreational activities	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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	favourable condition and 35.14% are in unfavourable condition but recovering.		– Human induced changes in hydraulic conditions – Biocenotic evolution, succession – Changes in biotic conditions In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – Changes in species distributions – Inappropriate scrub control – Public access/disturbance – Physical modification – Planning permission: general	– The extent and distribution of the habitats of qualifying species – The structure and function of the habitats of qualifying species – The supporting processes on which the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Holme Moor & Clean Moor SAC	Holme Moor & Clean Moor SSSI This SSSI is comprised of 5 units, of which 31.20% are in favourable condition, 62.53% are in unfavourable condition but recovering and 6.27% are in unfavourable condition and declining.	**Qualifying Habitats:** H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) H7210: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* H7230: Alkaline fens H91D0: Bog woodland	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – Forest and Plantation management & use – Pollution to groundwater (point sources and diffuse sources) – Air pollution, air-borne pollutants In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which qualifying natural habitats rely

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			– Change in land management – Water pollution – air pollution: impact of atmospheric nitrogen deposition	Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Holnest SAC	Holnest SSSI. This SSSI is comprised of 5 units, of which all (100%) are in favourable condition.	**Qualifying Species:** S1166: Great crested newt *Triturus cristatus*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – mowing / cutting of grassland – grazing – Forest and Plantation management & use	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of the habitats of qualifying species – The structure and function of the habitats of qualifying species – The supporting processes on which the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.
Isle of Portland to Studland Cliffs SAC	Isle of Portland to Studland Cliffs SSSI. This SSSI is comprised of 39 units, of which	**Qualifying Habitats:** H1210: Annual vegetation of drift lines H1220: Perennial vegetation of stony banks	This SAC is identified to be at threat / pressure from: – Cultivation – modification of cultivation practices – mowing / cutting of grassland	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the

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	36.89% are in favourable condition, 47.03% are in unfavourable condition but recovering, 6.74% are in unfavourable condition with no change, 9.08% are in unfavourable condition and declining and 0.27% is destroyed.	H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) **Qualifying Species:** S1166: Great crested newt *Triturus cristatus* S1654: Early gentian *Gentianella anglica*	− grazing − annual and perennial non-timber crops − Forest and Plantation management & use − Outdoor sports and leisure activities, recreational activities − invasive non-native species − Biocenotic evolution, succession addition to the above, the Site Improvement Plan for Portland-Studland & St Albans-Durlston identifies the SPA to be at threat / pressure from: − Undergrazing − Inappropriate scrub control − Invasive species − Agricultural management practices − Public access/disturbance − Water pollution − Habitat fragmentation − Inappropriate coastal management − Natural changes to site conditions − Managed rotational burning	site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; − The extent and distribution of qualifying natural habitats and habitats of qualifying species − The structure and function (including typical species) of qualifying natural habitats − The structure and function of the habitats of qualifying species − The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely − The populations of qualifying species, and, − The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Mendip Woodlands SAC	Asham Wood SSSI This SSSI is comprised of 3 units, of which all	**Qualifying Habitats:** H6210: Semi-natural dry grasslands and scrubland facies on calcareous	This SAC is identified to be at threat / pressure from: − grazing	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site

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	(100%) are in favourable condition.	substrates (*Festuco-Brometalia*) (* important orchid sites) H9180: *Tilio-Acerion* forests of slopes, screes and ravines H91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Qualifying Species:** S1303: Lesser horseshoe bat *Rhinolophus hipposideros* S1304: Greater horseshoe bat *Rhinolophus ferrumequinum*	– Improved access to site – Other human intrusions and disturbances – Air pollution, air-borne pollutants – problematic native species – Interspecific floral relations In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Vehicles: illicit – Deer – Disease – Air pollution: impact of atmospheric nitrogen deposition	contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which qualifying natural habitats rely
Mottisfont Bats SAC	Mottisfont Bats SSSI. This SSSI is comprised of 6 units, of which 51.78% are in favourable condition and 48.22% are in unfavourable condition but recovering.	**Qualifying Species:** S1308: Barbastelle bat *Barbastella barbastellus*	This SAC is identified to be at threat / pressure from: – Forest and Plantation management & use – Changes in biotic conditions – Unknown threat or pressure In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Feature location/extent/condition unknown – Forestry and woodland management – Offsite habitat availability/ management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of the habitats of qualifying species – The structure and function of the habitats of qualifying species – The supporting processes on which the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.

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				Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
New Forest SAC	The New Forest SSSI. This SSSI is comprised of 582 units, of which 54.68% are in favourable condition, 41.65% are in unfavourable condition but recovering, 2.11% are in unfavourable condition with no change, 1.55% are in unfavourable condition and declining and 0.01% is destroyed.	**Qualifying Habitats:** H3110: Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) H3130: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the Isoëto-Nanojuncetea H4010: Northern Atlantic wet heaths with *Erica tetralix* H4030: European dry heaths H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) H7140: Transition mires and quaking bogs H7150: Depressions on peat substrates of the *Rhynchosporion* H7230: Alkaline fens H9120: Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) H9130: *Asperulo-Fagetum* beech forests	This SAC is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Forest and plantation management & use – Improved access to site – Outdoor sports and leisure activities, recreational activities – Problematic native species – Human induced changes in hydraulic conditions – Biocenotic evolution, succession In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – Drainage – Inappropriate scrub control – Fishing stock – Deer – air pollution: impact of atmospheric nitrogen deposition – public access/disturbance	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This

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		H9190: Old acidophilous oak woods with *Quercus robur* on sandy plains H91D0: Bog woodland H91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Qualifying Species:** S1166: Great crested newt *Triturus cristatus* S1096: Brook lamprey *Lampetra planeri* S1163: Bullhead *Cottus gobio* S1044: Southern damselfly *Coenagrion mercuriale* S1083: Stage beetle *Lucanus cervus* S1308: Barbastelle bat *Barbastella barbastellus* S1323: Bechstein's bat *Myotis bechsteinii* S1355: Otter *Lutra lutra*	– change in land management – changes in species distributions – water pollution – forestry and woodland management – inappropriate ditch management – invasive species – vehicles – inappropriate cutting/mowing – direct impact from 3rd party	identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
New Forest Ramsar	The New Forest SSSI. This SSSI is comprised of 582 units, of which 54.68% are in favourable condition, 41.65% are in unfavourable condition but recovering, 2.11% are in unfavourable condition with no change, 1.55% are in unfavourable condition and declining and 0.01% is destroyed.	**Ramsar criterion 1** Valley mires and wet heaths are found throughout the site and are of outstanding scientific interest. The mires and heaths are within catchments whose uncultivated and undeveloped state buffer the mires against adverse ecological change. This is the largest concentration of intact valley mires of their type in Britain. **Ramsar criterion 2** The site supports a diverse assemblage of wetland plants and animals including several nationally rare species. Seven species of nationally rare plant are found	The information sheet on Ramsar wetlands does not identify any specific threats or vulnerabilities. However, major factors identified as (past, present or potential) adversely affecting the site's ecological character include: 1. Commercial-scale forest exploitation 2. Drainage/land claim: unspecified 3. Introduction/invasion of non-native plant species 4. Recreational/tourism disturbance (unspecified)	The following conservation measures are being undertaken: – Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR) – Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Special Area of Conservation (SAC)

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
		on the site, as are at least 65 British Red Data Book species of invertebrate. **Ramsar criterion 3** The mire habitats are of high ecological quality and diversity and have undisturbed transition zones. The invertebrate fauna of the site is important due to the concentration of rare and scare wetland species. The whole site complex, with its examples of semi-natural habitats is essential to the genetic and ecological diversity of southern England.		
New Forest SPA	The New Forest SSSI. This SSSI is comprised of 582 units, of which 54.68% are in favourable condition, 41.65% are in unfavourable condition but recovering, 2.11% are in unfavourable condition with no change, 1.55% are in unfavourable condition and declining and 0.01% is destroyed.	**Qualifying Species:** A072: European honey buzzard *Pernis apivorus* A082: Hen harrier *Circus cyaneus* A099: Eurasian hobby *Falco 24ubbuteo* A224: European nightjar *Caprimulgus europaeus* A246: Woodlark *Lullula arborea* A302: Dartford warbler *Sylvia undata* A314: Wood warbler *Phylloscopus sibilatrix*	This SPA is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Forest and plantation management & use – Improved access to site – Fishing and harvesting aquatic resources – Air pollution, air-borne pollutants – Human induced changes in hydraulic conditions – Biocenotic evolution, succession In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – Drainage – Inappropriate scrub control – Fishing stock – Deer	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat /

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			– air pollution: impact of atmospheric nitrogen deposition – public access/disturbance – change in land management – changes in species distributions – water pollution – forestry and woodland management – inappropriate ditch management – invasive species – vehicles – inappropriate cutting/mowing – direct impact from 3rd party	species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Plymouth Sound & Estuaries SAC	Tamar-Tavy Estuary SSSI This SSSI comprises 13 units of which 96.97% are in favourable condition, with 3.03% in unfavourable, but recovering condition.	Qualifying Habitats: H1110: Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks H1130: Estuaries H1140: Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats H1160: Large shallow inlets and bays H1170: Reefs H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Qualifying Species: S1102: Allis shad *Alosa alosa* S1441: Shore dock *Rumex rupestris*	Plymouth Sounds & Estuaries SAC is identified to be at threat / pressure from: – A02: Modification of cultivation practices; – A04: Grazing; – A06: Annual and perennial non-timber crops; – B02: Forest and plantation management & use; – E06: Other urbanisation, industrial and similar activities; – G01: Outdoor sports and leisure activities, recreational activities; – H02: Pollution to groundwater (point sources and diffuse sources); – J02: Human induced changes in hydraulic conditions; and – M01: Changes in abiotic conditions. In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species; – The structure and function (including typical species) of qualifying natural habitats; – The structure and function of the habitats of qualifying species; – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; – The populations of qualifying species; and – The distribution of qualifying species within the site.

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			– Coastal squeeze; – Inappropriate weirs, dams and other structures; – Planning permission in general; – Water pollution; – Public access / disturbance; – Invasive species; – Direct land take from development; – Fisheries: Commercial marine and estuarine; and – Air pollution: impact of atmospheric nitrogen deposition.	
Poole Harbour Ramsar	Poole Harbour SSSI This SSSI is comprised of 55 units, of which 26.11% are in favourable condition, 10.89% are in unfavourable condition but recovering and 62.78% are in unfavourable and declining.	**Ramsar criterion 1** The site is the best and largest example of a bar-built estuary with lagoonal characteristics (a natural harbour) in Britain. **Ramsar criterion 2** The site supports two species of nationally rare plant and one nationally rare alga. There are at least three British Red data book invertebrate species. **Ramsar criterion 3** The site includes examples of natural habitat types of community interest – Mediterranean and thermo Atlantic halophilous scrubs, in this case dominated by *Suaeda vera*, as well as calcareous fens with *Cladium mariscus*. Transitions from saltmarsh through to peatland mires are of exceptional conservation importance as few such examples remain in Britain. The site supports nationally important populations	The information sheet on Ramsar wetlands does not identify any specific threats or vulnerabilities. Factors identified as (past, present or potential) adversely affecting the site's ecological character include: 1. Eutrophication: Nutrient enrichment is an issue, compounded by the site's physical characteristic of poor flushing. This is evident from the extensive algal mats covering intertidal mudflats during the summer months. 2. Introduction/invasion of non-native animal species	The following conservation measures are being undertaken: − Site/ Area of Special Scientific Interest (SSSI/ASSI) − National Nature Reserve (NNR) − Special Protection Area (SPA) − Land owned by a non-governmental organisation for nature conservation − Management agreement − Site management statement/plan implemented − Special Area of Conservation (SAC) − Management plan in preparation

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		of breeding waterfowl including Common tern, *Sterna hirundo* and Mediterranean gull *Larus melanocephalus*. Over winter the site also supports a nationally important population of Avocet *Recurvirostra avosetta*. **Ramsar criterion 5** Assemblages of international importance: Species with peak counts in winter: 24709 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in winter: Common shelduck, *Tadorna tadorna*, NW Europe 2120 individuals, representing an average of 2.7% of the GB population (5 year peak mean 1998/9-2002/3) Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1724 individuals, representing an average of 4.9% of the population (5 year peak mean 1998/9-2002/3) Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species with peak counts in winter: Pied avocet, *Recurvirostra avosetta*, Europe/Northwest Africa 1260 individuals, representing an average of		

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		1.7% of the population (5 year peak mean 1998/9-2002/3)		
Poole Harbour SPA	Poole Harbour SSSI This SSSI is comprised of 55 units, of which 26.11% are in favourable condition, 10.89% are in unfavourable condition but recovering and 62.78% are in unfavourable and declining.	**Qualifying Species:** A026: Little egret *Egretta garzetta* A048: Common shelduck *Tadorna tadorna* A132: Pied avocet *Recurvirostra avosetta* A176: Mediterranean gull *Larus melanocephalus* A191: Sandwich tern Sterna *sandvicensis* A193: Common tern *Sterna hirundo* A607: Eurasian spoonbill *Platalea leucorodia leucorodia* A616: Black-tailed godwit *Limosa limosa islandica*	This SPA is identified to be at threat / pressure from: − mowing / cutting of grassland − grazing − Exploration and extraction of oil or gas − Shipping lanes, ports, marine constructions − Improved access to site − Urbanised areas, human habitation − Discharges − Fishing and harvesting aquatic resources − Outdoor sports and leisure activities, recreational activities − Interpretative centres − Other human intrusions and disturbances − Pollution to surface waters (limnic & terrestrial, marine & brackish) − Pollution to groundwater (point sources and diffuse sources) − Air pollution, air-borne pollutants In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: − Water pollution − air pollution: impact of atmospheric nitrogen deposition − fisheries: commercial marine and estuarine	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; − The extent and distribution of the habitats of the qualifying features − The structure and function of the habitats of the qualifying features − The supporting processes on which the habitats of the qualifying features rely − The population of each of the qualifying features, and, − The distribution of the qualifying features within the site

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			– coastal squeeze – public access/disturbance – deer	
Porton Down SPA	Porton Down SSSI. This SSSI is comprised of 25 units, of which 14.80% are in favourable condition and 85.20% are in unfavourable condition but recovering.	**Qualifying Species:** A133: Stone curlew *Burhinus oedicnemus*	This SPA is identified to be at threat / pressure from: – Air pollution, air-borne pollutants – Changes in biotic conditions In addition to the above, the Site Improvement Plan for Salisbury Plain identifies the SPA to be at threat / pressure from: – Changes in species distribution – air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.
Prescombe Down SAC	Prescombe Down SSSI. This SSSI is comprised of 4 units, of which all (100%) are in favourable condition.	**Qualifying Habitats:** H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) **Qualifying Species:** S1065: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* S1654: Early gentian *Gentianella anglica*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Improved access to site – Air pollution, air-borne pollutants – Changes in biotic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Changes in species distribution	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats

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			– air pollution: impact of atmospheric nitrogen deposition	– The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.
Quants SAC	Quants SSSI This SSSI is comprised of 5 units, of which 36.19% are in favourable condition, and 63.81% are in unfavourable condition but recovering.	**Qualifying Species:** S1065: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Forest and Plantation management & use – Air pollution, air-borne pollutants – Changes in biotic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Changes in species distribution – air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of the habitats of qualifying species – The structure and function of the habitats of qualifying species – The supporting processes on which the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
				which are of particular relevance to the Project.
River Avon SAC	River Avon System SSSI. This SSSI is comprised of 49 units, of which 3.48% are in favourable condition, 8.79% are in favourable condition but recovering, 84.93% are in unfavourable condition with no change and 2.8% are in unfavourable condition and declining.	**Qualifying Habitats:** H3260: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation H7230: Alkaline fens H91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Qualifying Species:** S1095: Sea lamprey *Petromyzon marinus* S1096: Brook lamprey *Lampetra planeri* S1106: Atlantic salmon *Salmo salar* S1163: Bullhead *Cottus gobio* S1016: Demoulin's whorl snail *Vertigo moulinsiana* S1092: White-clawed crayfish *Austropotamobius pallipes* S1355: Otter *Lutra lutra*	This SAC is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Annual and perennial non-timber crops – Forest and plantation management & use – Pollution to groundwater (point sources and diffuse sources) – Human induced changes in hydraulic conditions – Changes in biotic conditions In addition to the above, the Site Improvement Plan for the Avon River and Valley identifies the SPA to be at threat / pressure from: – Physical modification – Siltation; – Water pollution; – Water abstraction; – Changes in species distributions; – Invasive species; – Public access/disturbance; – Hydrological changes; – Inappropriate weed control; – Change in land management; and – Habitat fragmentation	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of

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				which are of particular relevance to the Project.
River Itchen SAC	River Itchen SSSI. This SSSI is comprised of 1 unit, which is in favourable condition (100%)	**Qualifying Habitats:** H3260: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying Species:** S1095: Sea lamprey *Petromyzon marinus* S1096: Brook lamprey *Lampetra planeri* S1099: River lamprey *Lampetra fluviatilis* S1106: Atlantic salmon *Salmo salar* S1163: Bullhead *Cottus gobio* S1016: Desmoulin's whorl snail *Vertigo moulinsiana* S1044: Southern damselfly *Coenagrion mercuriale* S1092: White clawed crayfish *Austropotamobius pallipes* S1355: Otter *Lutra lutra*	This SAC is identified to be at threat / pressure from: – Modification of cultivation practices – Grazing – Forest and plantation management & use – Pollution to groundwater (point sources and diffuse sources) – Human induced changes in hydraulic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Water pollution – Physical modification – Siltation – Overgrazing – Water abstraction – Inappropriate weed control – Hydrological changes – Inappropriate water levels – Changes in land management – Inappropriate cutting/mowing – Invasive species – Undergrazing – Inappropriate ditch management – Inappropriate shrub control – Forestry and woodland management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.

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Salisbury Plain SAC	Salisbury Plain SSSI. This SSSI is comprised of 100 units, of which 45.27% are in favourable condition, 53.33% are in unfavourable condition but recovering, 0.96% is partially destroyed and 0.45% not recorded.	**Qualifying Habitats:** H4030: European dry heaths H5130: Juniperus communis formations on heaths or calcareous grasslands H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) **Qualifying Species:** S1166: Great crested newt *Triturus cristatus* S1065: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* S1654: Early gentian *Gentianella anglica*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – annual and perennial non-timber crops – Improved access to site – Interspecific floral relations – Changes in biotic conditions In addition to the above, the Site Improvement Plan for Salisbury Plain identifies the SPA to be at threat / pressure from: – Changes in species distribution – air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.
Salisbury Plain SPA	Salisbury Plain SSSI. This SSSI is comprised of 100 units, of which 45.27% are in favourable condition, 53.33% are in unfavourable condition but recovering, 0.96% are partially destroyed and 0.45% is not recorded.	**Qualifying Species:** A082: Hen harrier *Circus cyaneus* A099: Eurasian hobby *Falco subbuteo* A113: Common quail *Coturnix coturnix* A133: Stone-curlew *Burhinus oedicnemus*	This SPA is identified to be at threat / pressure from: – modification of cultivation practices – grazing – annual and perennial non-timber crops – Air pollution, air-borne pollutants – Changes in biotic conditions In addition to the above, the Site Improvement Plan for Salisbury Plain	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely

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			identifies the SPA to be at threat / pressure from: – Changes in species distribution – air pollution: impact of atmospheric nitrogen deposition	– The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.
Severn Estuary Ramsar	Severn Estuary SSSI. This SSSI is comprised of 82 units, of which 92.69% are in favourable condition, 0.08% are in unfavourable condition but recovering, 5.54% are in unfavourable condition with no change and 1.69% are in unfavourable condition and declining.	**Ramsar criterion 1** Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. Habitats Directive Annex I features present on the pSAC include: H1110: Sandbanks which are slightly covered by sea water all the time H1130: Estuaries H1140: Mudflats and sandflats not covered by seawater at low tide H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Ramsar criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Ramsar criterion 4** This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla*. It is also of particular importance for migratory birds during spring and autumn. **Ramsar criterion 8**	The information sheet on Ramsar wetlands does not identify any specific threats or vulnerabilities. Factors identified as (past, present or potential) adversely affecting the site's ecological character include: 1. Dredging 2. Erosion 3. Recreational/tourism disturbance (unspecified)	The following conservation measures are being undertaken: – Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR) – Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Other – Management plan in preparation

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		The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon *Salmo salar,* sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A.* fallax, and eel *Anguilla anguilla* use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad *Alosa alosa* and twaite shad *A. fallax* which feed on mysid shrimps in the salt wedge. **Ramsar criterion 5** Assemblages of international importance: Species with peak counts in winter: 70919 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in winter: Tundra swan, *Cygnus columbianus bewickii*, NW Europe 229 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/9- 2002/3) Greater white-fronted goose, *Anser albifrons albifrons*, NW Europe 2076 individuals, representing an average of		

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		35.8% of the GB population (5 year peak mean for 1996/7-2000/01) Common shelduck, *Tadorna tadorna*, NW Europe 3223 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3) Gadwall, *Anas strepera strepera*, NW Europe 241 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9- 2002/3) Dunlin, *Calidris alpina alpina*, W Siberia/W Europe 25082 individuals, representing an average of 1.8% of the population (5 year peak mean 1998/9-2002/3) Common redshank, *Tringa totanus totanus*, 2616 individuals, representing an average of 1% of the population (5 year peak mean 1998/9- 2002/3) Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species regularly supported during the breeding season: Lesser black-backed gull, *Larus fuscus graellsii*, W Europe/Mediterranean/W Africa 4167 apparently occupied nests, representing an average of 2.8% of the breeding population (Seabird 2000 Census) Species with peak counts in spring/autumn: Ringed plover, *Charadrius hiaticula*, Europe/Northwest Africa 740 individuals,		

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
		representing an average of 1% of the population (5 year peak mean 1998/9-2002/3) Species with peak counts in winter: Eurasian teal, *Anas crecca*, NW Europe 4456 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3) Northern pintail, *Anas acuta*, NW Europe 756 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9- 2002/3)		
Severn Estuary SAC	Severn Estuary SSSI. This SSSI is comprised of 82 units, of which 92.69% are in favourable condition, 0.08% are in unfavourable condition but recovering, 5.54% are in unfavourable condition with no change and 1.69% are in unfavourable condition and declining.	**Qualifying Habitats:** H1110: Sandbanks which are slightly covered by sea water all the time H1130: Estuaries H1140: Mudflats and sandflats not covered by seawater at low tide H1170: Reefs H1310: Salicornia and other annuals colonizing mud and sand H1320: Spartina swards (*Spartinion maritimae*) H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) H2110: Embryonic shifting dunes **Qualifying Species:** S1095: Sea lamprey *Petromyzon marinus* S1099: River lamprey *Lampetra fluviatilis* S1102: Allis shad *Alosa alosa* S1103: Twaite shad *Alosa fallax*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – Improved access to site – Other urbanisation, industrial and similar activities – Outdoor sports and leisure activities, recreational activities – Interpretative centres – human induced changes in hydraulic conditions – Changes in abiotic conditions In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Public access/disturbance – Physical modification – Impacts of development – Coastal squeeze – Changes in land management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats – The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			– Changes in species distribution – Water pollution – air pollution: impact of atmospheric nitrogen deposition – marine consents and permits: minerals and waste – fisheries: recreational marine and estuarine – invasive species – marine litter – marine pollution incidents.	
Severn Estuary SPA	Severn Estuary SSSI. This SSSI is comprised of 82 units, of which 92.69% are in favourable condition, 0.08% are in unfavourable condition but recovering, 5.54% are in unfavourable condition with no change and 1.69% are in unfavourable condition and declining.	**Qualifying Species:** A037: *Cygnus columbianus bewickii* A048: *Tadorna tadorna* A051: *Anas strepera* A162: *Tringa totanus* A394: *Anser albifrons albifrons* A672: *Calidris alpina alpina*	This SPA is identified to be at threat / pressure from: – modification of cultivation practices – mowing / cutting of grassland – grazing – Improved access to site – Other urbanisation, industrial and similar activities – Outdoor sports and leisure activities, recreational activities – Interpretative centres – human induced changes in hydraulic conditions – Changes in abiotic conditions In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – Public access/disturbance – Physical modification – Impacts of development – Coastal squeeze – Changes in land management	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			− Changes in species distribution − Water pollution − air pollution: impact of atmospheric nitrogen deposition − marine consents and permits: minerals and waste − fisheries: recreational marine and estuarine − invasive species − marine litter − marine pollution incidents.	
Solent and Dorset Coast SPA	This SPA is not legally underpinned by a SSSI.	**Qualifying Species:** A191 Sandwich tern *Sterna sandvicensis* A193 Common tern *Sterna hirundo* A195 Little tern *Sternula albifrons*	This SPA was designated in January 2020, and has therefore not been included in the Natura 2000 summary site details, published in 2019. However, as this designation is within the Solent, it can be assumed that this SPA faces similar pressures to other designations in the Solent.	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; − The extent and distribution of the habitats of the qualifying features − The structure and function of the habitats of the qualifying features − The supporting processes on which the habitats of the qualifying features rely − The population of each of the qualifying features, and, − The distribution of the qualifying features within the site
Solent & Southampton Water Ramsar	River Test SSSI. This SSSI is comprised of 91 units, of which 17.91% are in	**Ramsar criterion 1** The site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual	Major factors identified as (past, present or potential) adversely affecting the site's ecological character include: 1. Erosion	The following conservation measures are being undertaken: − Site/ Area of Special Scientific Interest (SSSI/ASSI) − National Nature Reserve (NNR)

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
	favourable condition, 37.53% are in unfavourable condition but recovering, 43.52% are in unfavourable condition with no change, and 1.03% are in unfavourable condition and declining.	strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs. **Ramsar criterion 2** The site supports an important assemblage of rare plants and invertebrates. At least 33 British Red Data Book invertebrates and at least eight British Red Data Book plants are represented on site. **Ramsar criterion 5** Assemblages of international importance: Species with peak counts in winter: 51343 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: Ringed plover, *Charadrius hiaticula*, Europe/Northwest Africa 397 individuals, representing an average of 1.2% of the GB population (5 year peak mean 1998/9- 2002/3) Species with peak counts in winter:		– Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Special Area of Conservation (SAC) – Management plan in preparation

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
		Dark-bellied brent goose, *Branta bernicla bernicla*, 6456 individuals, representing an average of 3% of the population (5 year peak mean 1998/9- 2002/3) Eurasian teal, *Anas crecca*, NW Europe 5514 individuals, representing an average of 1.3% of the population (5 year peak mean 1998/9-2002/3) Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1240 individuals, representing an average of 3.5% of the population (5 year peak mean 1998/9-2002/3)		
Solent & Southampton Water SPA	River Test SSSI. This SSSI is comprised of 91 units, of which 17.91% are in favourable condition, 37.53% are in unfavourable condition but recovering, 43.52% are in unfavourable condition with no change, and 1.03% are in unfavourable condition and declining.	**Qualifying Species:** A052: Eurasian teal *Anas crecca* A137: Ringed plover *Charadrius hiaticula* A176: Mediterranean gull *Larus melanocephalus* A191: Sandwich tern *Sterna sandvicensis* A192: Roseate tern *Sterna dougallii* A193: Common tern *Sterna hirundo* A195: Little tern *Sterna albifrons* A616: Black-tailed godwit *Limosa limosa islandica* A675: Dark-bellied brent goose *Branta bernicla bernicla*	This SPA is identified to be at threat / pressure from: – Modification of cultivation practices – Mowing / cutting of grassland – Grazing – Forest and plantation management & use – Improved access to site – Fishing and harvesting aquatic resources – Outdoor sports and leisure activities, recreational activities – Pollution to groundwater (point sources and diffuse sources) – Changes in abiotic conditions – Changes in biotic conditions In addition to the above, the Site Improvement Plan for the Solent	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			identifies the SPA to be at threat / pressure from: – Public access/disturbance – Coastal squeeze – Fisheries: commercial, marine and estuarine – Water pollution – Changes in species distributions – Climate change – Changes to site conditions – Invasive species – Direct land take from development – Biological resource use – Change in land management – Inappropriate pest control – Air pollution: impact of atmospheric nitrogen deposition – Hydrological changes – Direct impact from 3rd party – Extraction: non-living resources – other	
Solent Maritime SAC	River Test SSSI. This SSSI is comprised of 91 units, of which 17.91% are in favourable condition, 37.53% are in unfavourable condition but recovering, 43.52% are in unfavourable condition with no change, and 1.03% are in unfavourable	**Qualifying Habitats:** H1110: Sandbanks which are slightly covered by sea water all the time H1130: Estuaries H1140: Mudflats and sandflats not covered by seawater at low tide H1150: Coastal lagoons H1210: Annual vegetation of drift lines H1220: Perennial vegetation of stony banks H1310: Salicornia and other annuals colonizing mud and sand	This SAC is identified to be at threat / pressure from: – Modification of cultivation practices – Mowing / cutting of grassland – Grazing – Forest and plantation management & use – Improved access to site – Fishing and harvesting aquatic resources – Outdoor sports and leisure activities, recreational activities	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats and habitats of qualifying species – The structure and function (including typical species) of qualifying natural habitats

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
	condition and declining.	H1320: Spartina swards (*Spartinion maritimae*) H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) H2120: Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") H2130: Fixed coastal dunes with herbaceous vegetation ("grey dunes") **Qualifying Species:** S1016: Desmoulin's whorl snail *Vertigo moulinsiana* S1355: Otter *Lutra lutra* S1365: Common seal *Phoca vitulina*	– Pollution to groundwater (point sources and diffuse sources) – Changes in abiotic conditions – Changes in biotic conditions In addition to the above, the Site Improvement Plan for the Solent identifies the SPA to be at threat / pressure from: – Public access/disturbance – Coastal squeeze – Fisheries: commercial, marine and estuarine – Water pollution – Changes in species distributions – Climate change – Changes to site conditions – Invasive species – Direct land take from development – Biological resource use – Change in land management – Inappropriate pest control – Air pollution: impact of atmospheric nitrogen deposition – Hydrological changes – Direct impact from 3rd party – Extraction: non-living resources – other	– The structure and function of the habitats of qualifying species – The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely – The populations of qualifying species, and, – The distribution of qualifying species within the site.
Somerset Levels & Moors Ramsar	Curry and Hay Moors SSSI. This SSSI is comprised of 24 units, of which	**Ramsar criterion 2** Supports 17 species of British Red Data Book invertebrates. **Ramsar criterion 5**	No factors have been reported.	The following conservation measures are being undertaken: – Site/ Area of Special Scientific Interest (SSSI/ASSI) – National Nature Reserve (NNR)

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
	1.74% are in favourable condition, and 98.26% are in unfavourable condition and declining.	Assemblages of international importance: Species with peak counts in winter: 97155 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in winter: Tundra swan, *Cygnus columbianus bewickii*, NW Europe 112 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9- 2002/3) Eurasian teal, *Anas crecca*, NW Europe 21231 individuals, representing an average of 5.3% of the population (5 year peak mean 1998/9-2002/3) Northern lapwing, *Vanellus vanellus*, Europe - breeding 36580 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3) Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species with peak counts in winter: Mute swan, *Cygnus olor*, Britain 842 individuals, representing an average of 2.2% of the population (5 year peak mean 1998/9- 2002/3) Eurasian wigeon, *Anas penelope*, NW Europe 25759 individuals, representing		– Special Protection Area (SPA) – Land owned by a non-governmental organisation for nature conservation – Management agreement – Site management statement/plan implemented – Other

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
		an average of 1.7% of the population (5 year peak mean 1998/9-2002/3) Northern pintail, *Anas acuta*, NW Europe 927 individuals, representing an average of 1.5% of the population (5 year peak mean 1998/9- 2002/3) Northern shoveler, *Anas clypeata*, NW & C Europe 1094 individuals, representing an average of 2.7% of the population (5 year peak mean 1998/9-2002/3)		
Somerset Levels & Moors SPA	Curry and Hay Moors SSSI. This SSSI is comprised of 24 units, of which 1.74% are in favourable condition, and 98.26% are in unfavourable condition and declining.	**Qualifying Species:** A037: Tundra swan *Cygnus columbianus bewickii* A052: Eurasian teal *Anas crecca* A140: European golden plover *Pluvialis apricaria* A142: Northern lapwing *Vanellus vanellus*	This SPA is identified to be at threat / pressure from: – Cultivation – modification of cultivation practices – mowing / cutting of grassland – grazing – Forest and Plantation management & use – Improved access to site – Interpretative centres – human induced changes in hydraulic conditions In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – drainage – inappropriate water levels – maintain and upgrade water management structures – change in land management – agricultural management practices – peat extraction – public access/disturbance	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features – The structure and function of the habitats of the qualifying features – The supporting processes on which the habitats of the qualifying features rely – The population of each of the qualifying features, and, – The distribution of the qualifying features within the site. Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			– offsite habitat availability/management	Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
South Dartmoor Woods SAC	South Dartmoor SSSI This SSSI is comprised of 14 units, of which 4.48% are in favourable condition, 69.34% are in unfavourable condition but recovering, 22.35% are in unfavourable condition with no change and 3.83% are in unfavourable condition and declining.	**Qualifying Habitats:** H4030: European dry heaths H9180: *Tilio-Acerion* forests of slopes, screes and ravines H91A0: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles H91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Qualifying Species:** S1163: Bullhead *Cottus gobio* S1303: Lesser horseshoe bat *Rhinolophus hipposideros* S1355: Otter *Lutra lutra*	This SAC is identified to be at threat / pressure from: – modification of cultivation practices – grazing – annual and perennial non-timber crops – Forest and Plantation management & use – grazing in forests/ woodland – Improved access to site – Air pollution, air-borne pollutants In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – air pollution: impact of atmospheric nitrogen deposition	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which qualifying natural habitats rely Natural England have also provided Supplementary Advice for this SAC. This identifies a number of attributes associated with each qualifying habitat / species and targets relating specifically to these. Of note, the Supplementary Advice provides targets relating to hydrology and / or water quality, both of which are of particular relevance to the Project.
Studland to Portland SAC	No SSSI's underpin this SAC.	**Qualifying Habitats:** H1170: Reefs	This SAC is identified to be at threat / pressure from:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			– Fishing and harvesting aquatic resources – Other human intrusions and disturbances In addition to the above, the Site Improvement Plan identifies the SAC to be at threat / pressure from: – Fisheries: commercial marine and estuarine	site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; – The extent and distribution of qualifying natural habitats – The structure and function (including typical species) of qualifying natural habitats, and – The supporting processes on which the qualifying natural habitats rely
Tamar Estuaries Complex SPA	Tamar-Tavy Estuary SSSI This SSSI comprises 13 units of which 96.97% are in favourable condition, with 3.03% in unfavourable, but recovering condition.	**Qualifying Species:** A026 Little egret *Egretta garzetta* (non-breeding) A132 Pied avocet *Recurvirostra avosetta* (non-breeding)	Tamar Estuaries Complex SPA is identified to be at threat / pressure from: – E02: Industrial or commercial areas; – E06: Other urbanization, industrial and similar activities; – G01: Outdoor sports and leisure activities, recreational activities; – H02: Pollution to groundwater (point sources and diffuse sources); – M01: Changes in abiotic conditions; – A02: Modification of Cultivation practices; – A04: Grazing; and – B02: Forest and plantation management and use. In addition to the above, the Site Improvement Plan identifies the SPA to be at threat / pressure from: – Coastal squeeze;	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; – The extent and distribution of the habitats of the qualifying features; – The structure and function of the habitats of the qualifying features; – The supporting processes on which the habitats of the qualifying features rely; – The population of each of the qualifying features; and The distribution of the qualifying features within the site.

European Site and Designation	Closest Associated SSSI and SSSI Condition	Qualifying Features / Criterions	Threats / Pressures (SAC/SPA) or Factors Adversely Affecting the Site's Ecological Character (Ramsar)	Conservation Objectives (SAC/SPA) or Measures Taken to Address Adverse Factors (Ramsar)
			– Inappropriate weirs, dams and other structures; – Planning permission in general; – Water pollution; – Public access / disturbance; – Invasive species; – Direct land take from development; – Fisheries: Commercial marine and estuarine; and – Air pollution: impact of atmospheric nitrogen deposition.	

Appendix B Individual Informal Screening Tables

B.1.1 **Tables B1** – **B25** overleaf provide the individual informal screening assessments for each of the Components and Sub-Components along with rationale with reference to the relevant threats and pressures.

B.1 Component 1: Poole Effluent Re-use (Components 1a – 1f)

Table B1: Component 1a: Poole STW

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1a Works: Poole STW currently discharges into Holes Bay, Poole Harbour; The Project will have capacity to treat between 8 and 30 million litres / day (MLD) as effluent re-use. This will be diverted into new raw tanks (rather than being discharged to Holes Bay) and treated off-site. As such, works associated with Component 1a will include a new raw tank and HL pumps only, which will be located within the existing STW curtilage Proposed 30 MLD effluent-reuse yield from Poole STW is based on initial analysis of historical resource availability during dry periods up to 1:500 year events. It is acknowledged this is less that maximum current output from Poole STW and further resource may therefore be available. Further analysis will be undertaken at Gate 2 to refine the effluent-reuse deployable output (DO).			
Poole Harbour SPA	910	Of note, Poole Harbour SPA is vulnerable to changes in discharges, water and air pollution, and other human intrusions and disturbances. There is a minor risk of construction phase indirect effects given proximity of works at Component 1a to the SPA and the connectivity between Component 1a (the STW) and SPA, however these are highly unlikely to be significant. Whilst direct effects on Poole Harbour SPA are not anticipated once the Project is operational, Component 1a will require the treatment of between 8 and 30 MLD as effluent re-use. This will be diverted into new raw tanks (rather than being discharged into Holes Bay). The current daily discharge from Poole STW to Poole Harbour is 167,000m^3 which is considered to have a negligible impact on the flow and water level at Poole Harbour (Ricardo, 2021). Therefore, whilst there will be a reduction of between 8 and 30 MLD of treated effluent into Poole Harbour SPA as a result of the Project once operational, such that a change in discharge (albeit that it may lead to a betterment in conditions) may occur, this.is highly unlikely to be significant.	1 (Precautionary)
Poole Harbour Ramsar	940	Whilst specific threats / pressures have not been identified in relation to Poole Harbour Ramsar, it is anticipated that the threats / pressures identified above in relation to Poole Harbour SPA equally apply to Poole Harbour Ramsar. Justification is therefore as per Poole Harbour SPA above.	1 (Precautionary)
Dorset Heaths SAC	1,480	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Dorset Heathlands Ramsar	1,480	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	5,180	Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC is located immediately adjacent to Poole Harbour SPA and Ramsar and as such, is hydrologically linked to Component 1a, albeit indirectly. Given the significant distance between Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC and Component 1a however, and the quantum of water separating the two (via Poole Harbour), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1a, (which might otherwise effect Poole Harbour SPA and Ramsar), would result in adverse effects on Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC (i.e., any effects would be negligible or not significant).	0
Solent and Dorset Coast SPA	6,940	Justification as per Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC above.	0
Isle of Portland to Studland Cliffs SAC	11,260	Justification as per Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC above.	0
Studland to Portland SAC	12,050	Justification as per Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC above.	0
Avon Valley SPA	13,740	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley Ramsar	13,740	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
River Avon SAC	14,180	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Table B2: Component 1b: Poole STW to River Stour

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1b Works: Water is piped from the STW to the River Stour via new WRC at Newton, between the STW and the River Stour; Treated effluent goes from the STW to Newton WRC where it is 'extra treated' to make it as close to River Stour water as possible prior to discharge into the river **(Note: 'extra-treatment' of water is considered mitigation and as such, cannot be included for consideration at the Screening Stage (see Section 2))**. For all transfer routes, works comprise the installation of 600mm pipes (except where otherwise identified), to include a 50m working corridor.			
Dorset Heathlands SPA	0	Component 1b passes through Dorset Heathlands SPA and as such, there will be a direct impact on land within a European Site.	10
Dorset Heaths SAC	0	Component 1b passes through Dorset Heaths SAC and as such, there will be a direct impact on land within a European Site.	10
Dorset Heathlands Ramsar	10	Component 1b passes within 10m of Dorset Heathlands Ramsar. Given that there is a 50m working corridor, there will be a direct impact on land within a European Site.	10
Poole Harbour SPA	910	Of note, Poole Harbour SPA is vulnerable to changes in discharges, water and air pollution and other human intrusions and disturbances. There is a minor risk of construction phase indirect effects given proximity of works at the southern end of Component 1b to the SPA and connectivity between the southern end of Component 1b (the STW) and SPA, however these are highly unlikely to be significant. No direct or indirect effects on Poole Harbour SPA are anticipated once operational given that treated effluent will be pumped northwards from the existing STW to the River Stour (i.e., away from Poole Harbour). Change in discharge at Poole Harbour SPA has been considered in relation to Component 1a above.	1 (Precautionary during Construction)
Poole Harbour Ramsar	930	Whilst specific threats / pressures have not been identified in relation to Poole Harbour Ramsar, it is anticipated that the threats / pressures identified above in relation to Poole Harbour SPA equally apply to Poole Harbour Ramsar. Justification is therefore as per Poole Harbour SPA above.	1 (Precautionary during Construction)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	5,090	Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC is located immediately adjacent to Poole Harbour SPA and Ramsar and Solent and Dorset Coast SPA and as such, is hydrologically linked to Component 1b, albeit indirectly. Given the significant distance between Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC and Component 1b however, and the quantum of water separating the two (via Poole Harbour and the River Stour, Christchurch Harbour SSSI and Solent and Dorset Coast SPA), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1b, (and which might otherwise effect Poole Harbour SPA and Ramsar or Solent and Dorset Coast SPA), would result in adverse effects on Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC (i.e., any effects would be negligible or not significant).	0
Solent and Dorset Coast SPA	6,930	Whilst the River Stour (i.e., the northern end of Component 1b) is not itself designated as a European Site, it discharges to Christchurch Harbour SSSI and the Solent and Dorset Coast SPA. Whilst it is acknowledged that the effluent entering the River Stour will be ‘extra treated’ at Newton WRC to make it as close to River Stour water as possible, this is considered ‘mitigation’ and as such, cannot be relied upon at the Screening Stage of HRA. In the absence of mitigation therefore, there is a risk that indirect effects on Solent and Dorset Coast SPA associated with changes in water quality / quantity could arise as a result of Component 1b of the Project, once operational.	5
Isle of Portland to Studland Cliffs SAC	11,260	Justification as per Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC above.	0
Studland to Portland SAC	12,050	Justification as per Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC above.	0
Avon Valley Ramsar	13,410	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley SPA	13,410	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
River Avon SAC	13,830	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Solent Maritime SAC	15,000+	Of note, Solent Maritime SAC is vulnerable to water pollution / pollution to groundwater (point sources and diffuse sources), changes in biotic conditions, changes to site conditions, air pollution / impact of atmospheric nitrogen deposition and hydrological changes. Given the distance between the Component 1b and the Solent Maritime SAC, and the quantum of water separating the two (via Poole Harbour and the River Stour, Christchurch Harbour SSSI and Solent and Dorset Coast SPA), adverse effects on Solent Maritime SAC are considered highly unlikely. That said, given that any water leaving the mouth of the River Stour is subject to easterly winds, there remains a minor risk of indirect effects arising as a result of long-term changes in nutrient loading, such that Likely Significant Effects cannot be entirely ruled out.	1 (Precautionary)

Table B3: Component 1c: River Stour Section

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1c Works: As noted in relation to Component 1b, treated effluent will be 'extra treated' prior to discharge in to the River Stour **(Note: the 'extra-treatment' of water is considered mitigation and as such, cannot be included for consideration at the Screening Stage (see Section 2).** Extra-treated water is carried within the River Stour. No works required to the River Stour itself.			
Dorset Heathlands Ramsar	990	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Dorset Heaths SAC	990	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Dorset Heathlands SPA	1,080	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Avon Valley Ramsar	5,170	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Avon Valley SPA	5,170	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Solent and Dorset Coast SPA	5,550	Whilst the River Stour is not itself designated as a European Site, it discharges to Christchurch Harbour SSSI and the Solent and Dorset Coast SPA. Whilst it is acknowledged that the effluent travelling within the River Stour will be 'extra treated' at Newton WRC to make it as close to River Stour water as possible, this is considered mitigation and as such, cannot be relied upon at the Screening Stage of HRA. In the absence of mitigation therefore, there is a risk that indirect effects on Solent and Dorset Coast SPA associated with changes in water quality / quantity could arise as a result of Component 1c of the Project, once operational.	5

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
River Avon SAC	5,610	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Poole Harbour SPA	6,150	Poole Harbour SPA is located immediately adjacent to Solent and Dorset Coast SPA and as such, is hydrologically linked to Component 1c, albeit indirectly. Given the significant distance between Poole Harbour SPA and Component 1c however, and the quantum of water separating the two (via Christchurch Harbour SSSI and Solent and Dorset Coast SPA), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1c, (and which might otherwise effect Solent and Dorset Coast SPA), would result in adverse effects on Poole Harbour SPA (i.e., any effects would be negligible or not significant).	0
Poole Harbour Ramsar	6,170	Justification as per Poole Harbour SPA above.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	8,770	Justification as per Poole Harbour SPA above.	0
The New Forest SAC	9,280	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
New Forest Ramsar	10,330	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
New Forest SPA	10,330	No works are required within Component 1c and as such, no direct or indirect effects are anticipated.	0
Studland to Portland SAC	13,890	Justification as per Poole Harbour SPA above.	0
Isle of Portland to Studland Cliffs SAC	14,200	Justification as per Poole Harbour SPA above.	0
Solent Maritime SAC	15,000+	Of note, Solent Maritime SAC is vulnerable to water pollution / pollution to groundwater (point sources and diffuse sources), changes in biotic conditions, changes to site conditions, air pollution / impact of atmospheric nitrogen deposition and hydrological changes. Given the distance between the Component 1c and the Solent Maritime SAC, and the quantum of water	1 **(Precautionary)**

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
		separating the two (via Poole Harbour and the River Stour, Christchurch Harbour SSSI and Solent and Dorset Coast SPA), adverse effects on Solent Maritime SAC are considered highly unlikely. That said, given that any water leaving the mouth of the River Stour is subject to easterly winds, there remains a minor risk of indirect effects arising as a result of long-term changes in nutrient loading, such that Likely Significant Effects cannot be entirely ruled out.	

Table B4: Component 1d: River Stour Abstraction (Note: Same location as Component 1e and 1f)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1d Works: Abstraction of between 8 and 30 MLD from the River Stour.			
Dorset Heathlands Ramsar	1,740	Whilst Dorset Heathlands Ramsar is anticipated to be an adequate distance and sufficiently isolated from works to avoid direct or indirect effects, the details of the abstraction point are not yet known, such that construction effects (i.e., effects arising as a result of the construction of the abstraction facility) cannot be entirely ruled out.	1 (Precautionary during Construction)
Dorset Heaths SAC	1,740	Justification as per Dorset Heathlands Ramsar above.	1 (Precautionary during Construction)
Avon Valley Ramsar	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley SPA	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Solent and Dorset Coast SPA	5,670	Whilst the River Stour is not itself designated as a European Site, it discharges to Christchurch Harbour SSSI and the Solent and Dorset Coast SPA. Abstraction from the River Stour will comprise between 8 and 30 MLD to provide sufficient water for the Project. Whilst full vulnerabilities are not yet available for Solent and Dorset Coast SPA, it is reasonable to assume that, of relevance to Component 1d, it would be vulnerable to changes in hydraulic condition, inappropriate weirs, dams and other structures and pollution, which could arise as a result of Component 1d of the Project, once operational.	5
River Avon SAC	5,670	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Poole Harbour Ramsar	8,110	Poole Harbour Ramsar is located immediately adjacent to Solent and Dorset Coast SPA and as such, is hydrologically linked to Component 1d, albeit	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
		indirectly. Given the significant distance between Poole Harbour Ramsar and Component 1d however, and the quantum of water separating the two (via Christchurch Harbour SSSI and Solent and Dorset Coast SPA), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1d, (and which might otherwise effect Solent and Dorset Coast SPA), would result in adverse effects on Poole Harbour Ramsar (i.e., any effects would be negligible or not significant).	
Poole Harbour SPA	8,110	Justification as per Poole Harbour Ramsar above.	0
The New Forest SAC	9,350	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest Ramsar	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest SPA	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	11,020	Justification as per Poole Harbour Ramsar above.	0
Studland to Portland SAC	13,940	Justification as per Poole Harbour Ramsar above.	0
Isle of Portland to Studland Cliffs SAC	14,250	Justification as per Poole Harbour Ramsar above.	0

Table B5: Component 1e: River Stour Bankside Storage (Note: Same location as Component 1d and 1f)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1e Works: Abstracted water is to be stored in bankside storage to comprise a pond or tank, adjacent to the abstraction site (Component 1d). Considered likely to be minor, localised works.			
Dorset Heathlands Ramsar	1,740	Whilst Dorset Heathlands Ramsar is anticipated to be an adequate distance and sufficiently isolated from works to avoid direct or indirect effects, the details of the bankside storage are not yet known, such that construction effects (i.e., effects arising as a result of the construction of the storage facility) cannot be entirely ruled out.	1 (Precautionary during Construction)
Dorset Heaths SAC	1,740	Justification as per Dorset Heathlands Ramsar above.	1 (Precautionary during Construction)
Avon Valley Ramsar	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley SPA	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Solent and Dorset Coast SPA	5,670	Whilst the River Stour is not itself designated as a European Site, it discharges to Christchurch Harbour SSSI and the Solent and Dorset Coast SPA. There is a minor risk of construction phase indirect effects given proximity of works to the River Stour and connectivity between the River Stour and Solent and Dorset Coast SPA, however these are highly unlikely to be significant.	1 (Precautionary during Construction)
River Avon SAC	5,670	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Poole Harbour Ramsar	8,110	Poole Harbour Ramsar is located immediately adjacent to Solent and Dorset Coast SPA and as such, is hydrologically linked to Component 1e, albeit indirectly. Given the significant distance between Poole Harbour Ramsar and Component 1e however, and the quantum of water separating the two (via	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
		Christchurch Harbour SSSI and Solent and Dorset Coast SPA), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1e, (and which might otherwise effect Solent and Dorset Coast SPA), would result in adverse effects on Poole Harbour Ramsar (i.e., any effects would be negligible or not significant).	
Poole Harbour SPA	8,110	Justification as per Poole Harbour Ramsar above.	0
The New Forest SAC	9,350	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest Ramsar	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest SPA	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	11,020	Justification as per Poole Harbour Ramsar above.	0
Studland to Portland SAC	13,940	Justification as per Poole Harbour Ramsar above.	0
Isle of Portland to Studland Cliffs SAC	14,250	Justification as per Poole Harbour Ramsar above.	0

Table B6: Component 1f: River Stour Pre-Treatment Works (Note: Same location as Component 1d and 1e)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 1f Works: The outlet from the bankside storage (Component 1e) will be subject to another treatment process prior to onwards transmission (Component 4b.1). Considered likely to be minor, localised works.			
Dorset Heathlands Ramsar	1,740	Whilst Dorset Heathlands Ramsar is anticipated to be an adequate distance and sufficiently isolated from works to avoid direct or indirect effects, the details of the pre-treatment works are not yet known, such that the construction effects (i.e., effects arising as a result of the construction of the treatment facility) cannot be entirely ruled out.	1 (Precautionary during Construction)
Dorset Heaths SAC	1,740	Justification as per Dorset Heathlands Ramsar above.	1 (Precautionary during Construction)
Avon Valley Ramsar	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley SPA	5,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Solent and Dorset Coast SPA	5,670	Whilst the River Stour itself is not designated as a European Site, it discharges to Christchurch Harbour SSSI and the Solent and Dorset Coast SPA. Minor risk of construction phase indirect effects given proximity of works to the River Stour and connectivity between the River Stour and Solent and Dorset Coast SPA, however highly unlikely to be significant.	1 (Precautionary during Construction)
River Avon SAC	5,670	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Poole Harbour Ramsar	8,110	Poole Harbour Ramsar is located immediately adjacent to Solent and Dorset Coast SPA and as such, is hydrologically linked to Component 1f, albeit indirectly. Given the significant distance between Poole Harbour Ramsar and Component 1f however, and the quantum of water separating the two (via	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
		Christchurch Harbour SSSI and Solent and Dorset Coast SPA), it is considered highly unlikely that any adverse effects that might arise as a result of Component 1f, (and which might otherwise effect Solent and Dorset Coast SPA), would result in adverse effects on Poole Harbour Ramsar (i.e., any effects would be negligible or not significant).	
Poole Harbour SPA	8,110	Justification as per Poole Harbour Ramsar above.	0
The New Forest SAC	9,350	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest Ramsar	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest SPA	10,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	11,020	Justification as per Poole Harbour Ramsar above.	0
Studland to Portland SAC	13,940	Justification as per Poole Harbour Ramsar above.	0
Isle of Portland to Studland Cliffs SAC	14,250	Justification as per Poole Harbour Ramsar above.	0

B.2 Component 2: Roadford Pumped Storage (Components 2a – 2e)

Table B7: Component 2a: Abstraction from River Tamar at Gatherley Intake

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 2a Works: Abstraction of 125MLD fixed volume to provide sufficient water to Roadford Reservoir with 30MLD surplus for the Project. No works required.			
Plymouth Sound & Estuaries SAC	14,410	Whilst the River Tamar is not itself designated as a European Site, it discharges into Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA. Of note, Plymouth Sound & Estuaries SAC is vulnerable to human induced changes in hydraulic conditions, inappropriate weirs, dams and other structures, changes in abiotic conditions and pollution to ground water (point sources and diffuse sources). There is a minor risk of construction phase indirect effects given proximity of works at Component 2a to the River Tamar (i.e., within the River Tamar), which indirectly links to Plymouth South & Estuaries SAC, however these are highly unlikely to be significant. Whilst direct effects on Plymouth Sound & Estuaries SAC are not anticipated once the Project is operational, Component 2a will require the abstraction of 125MLD from the River Tamar to provide sufficient water to Roadford Reservoir with 30MLD surplus for the Project. As such, there will be a significant change in hydraulic conditions downstream of the abstraction point as a result of the Project once operational, such that indirect effects on Plymouth South & Estuaries SAC may occur. It is important to note that these may include indirect effects on the fish species allis shad, a migratory species, which matures in the sea and migrates to freshwater to spawn, with the River Tamar the only known spawning site for this species in the UK.	5
Tamar Estuaries Complex SPA	15,000+	Similar vulnerabilities are identified in relation to the Tamar Estuaries Complex SPA. Justification is therefore as per Plymouth Sound & Estuaries SAC above.	5
Dartmoor SAC	15,000+	Whilst the River Tamar itself is not designated as a European Site, together with the River Lyd, it provides connectivity between Dartmoor SAC and the coast. Of note, Dartmoor SAC is vulnerable to pollution to groundwater (point sources and diffuse sources), air pollution / air-borne pollutants / impact of atmospheric	5

		nitrogen and human induced changes in hydraulic conditions / hydrological changes. Given the direction of flow of the River Tamar (i.e. away from the Dartmoor SAC), and the intervening distance between Component 2a and Dartmoor SAC, no direct or indirect effects on Dartmoor SAC are anticipated as a result of the construction of the Project. Whilst direct effects on Dartmoor SAC are not anticipated once the Project is operational, Component 2a will require the abstraction of 125MLD from the River Tamar to provide sufficient water to Roadford Reservoir with 30MLD surplus for the Project. As such, there will be a significant change in hydraulic conditions downstream of the abstraction point as a result of the Project once operational. Together with the River Lyd, the River Tamar provides a potential migratory route for Atlantic salmon, a qualifying species for Dartmoor SAC, such that indirect effects on this species as a result of a reduction in flow may occur.	

Table B8: Component 2b: Gatherley to Roadford (Lifton North route, formerly known as 2020 Option 2)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 2b Works: Lifton North route, formerly known as 2020 Option 2; Works require installation of 1,200mm diameter pipe to support 125 MLD transfer to include 50m working corridor along transfer route.			
Culm Grasslands SAC	10,880	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dartmoor SAC	10,290	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Plymouth Sound & Estuaries SAC	14,270	Whilst the River Tamar itself is not designated as a European Site, it discharges into Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA. Abstraction from the River Tamar (and implications for Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA) is considered in relation to Component 2a above.	0
Tamar Estuaries Complex SPA	15,000+	Justification as per Plymouth Sound & Estuaries SAC above.	0

Table B9: Component 2c: Roadford Lake

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 2c Works: No works required to Roadford Lake as the lake is known to have surplus capacity in winter months owing to poor catchment characteristics.			
Dartmoor SAC	10,620	No works are required within Component 2c and as such, no direct or indirect effects are anticipated.	0
Culm Grasslands SAC	10,890	No works are required within Component 2c and as such, no direct or indirect effects are anticipated.	0

Table B10: Component 2d: Roadford Lake to Northcombe WTW

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 2d Works: Capacity in existing pipe (900mm) will be used and as such, no works required.			
Culm Grasslands SAC	4,830	No works are required within Component 2d and as such, no direct or indirect effects are anticipated.	0
Dartmoor SAC	7,930	No works are required within Component 2d and as such, no direct or indirect effects are anticipated.	0

Table B11: Component 2e: Northcombe WTW

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 2d Works: Works will comprise a significant upgrade to the treatment works with additional pumps and units to divert the required 30MLD for onward transmission.			
Culm Grasslands SAC	4,830	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dartmoor SAC	8,870	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

B.3 Component 3: Transmission System to Wessex Water (Components 3a - 3i)

Table B12: Component 3a: Northcombe to Prewley

European Site	Proximity (m)	Rationale with Reference Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3a Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route. It is possible that additional small intermediate pumping stations may also be required along the transfer routes within Complete Component 3. The potential for additional LSE as a result of pumping stations will be considered further at next Gate, once details are understood.			
Dartmoor SAC	460	Of note, Dartmoor SAC is vulnerable to pollution to groundwater, air pollution and human induced changes in hydraulic conditions. There is a minor risk of construction phase indirect effects given proximity of works and nature of interim habitat (moorland with fords), however these are highly unlikely to be significant. No direct or indirect effects on Dartmoor SAC are anticipated once operational given that water will be contained within pipes and pumped from an existing facility (pumping station).	1 (Precautionary during Construction)
Culm Grasslands SAC	4,600	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Table B13: Component 3b: Prewley to Parsonage

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3b Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route; Parsonage is an existing small service reservoir where the additional 30 MLD will be added to the existing storage; No further works required as capacity within the reservoir.			
Dartmoor SAC	480	Of note, Dartmoor SAC is vulnerable to pollution to groundwater, air pollution and human induced changes in hydraulic conditions. There is a minor risk of construction phase indirect effects given proximity of works and nature of interim habitat (moorland with fords), however these are highly unlikely to be significant. No direct or indirect effects on Dartmoor SAC are anticipated once operational given that water will be contained within pipes and pumped from an existing facility (pumping station).	1 (Precautionary during Construction)
South Dartmoor Woods SAC	7,760	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Culm Grasslands SAC	9,580	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exe Estuary Ramsar	14,710	Whilst Component 3b crosses the River Yeo, which joins the River Creedy and ultimately the River Exe, given the significant distance between this location and Exe Estuary SPA and Ramsar and the quantum of water separating the two 9cia the River Creedy and River Exe), it is considered highly unlikely that any adverse effects that might arise as a result of Component 3b would result in adverse effects on Exe Estuary SPA and Ramsar (i.e., any effects would be negligible or not significant).	0
Exe Estuary SPA	14,710	Justification as per Exe Estuary Ramsar above.	0

Table B14: Component 3c: Parsonage to Pynes

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3c Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route; Pynes is an existing small service reservoir where the additional 30 MLD will be added to the existing storage; No further works required as capacity within the reservoir.			
Exe Estuary Ramsar	7,100	Of note, Exe Estuary SPA and Ramsar is vulnerable to changes in biotic and abiotic conditions. There is a minor risk of construction phase indirect effects given proximity of works to the River Exe, which ultimately reaches the Exe Estuary SPA and Ramsar, however these are highly unlikely to be significant. No direct or indirect effects on Exe Estuary SPA and Ramsar are anticipated once operational given that water will be contained within pipes and pumped to an existing facility (reservoir).	1 (Precautionary during Construction)
Exe Estuary SPA	7,100	Justification as per Exe Estuary Ramsar above.	1 (Precautionary)
South Dartmoor Woods SAC	12,070	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
East Devon Pebblebed Heaths SAC	14,470	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
East Devon Heaths SPA	14,470	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Table B15: Component 3d: River Exe: Allers to Pynes

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3d Works: This is not a section of the transfer route but is relevant as the Exe between Allers and Pynes will have 30 MLD less as a result of the Project as water will be abstracted earlier (Component 3e), such that the water course may be affected.			
Exe Estuary Ramsar	6,660	Whilst the River Exe itself is not designated as a European Site, it discharges into Exe Estuary SPA and Ramsar. Abstraction from the River Exe (and implications for Exe Estuary SPA and Ramsar) is considered in relation to Component 3e below.	0
Exe Estuary SPA	6,660	Justification as per Exe Estuary Ramsar above.	0
Culm Grasslands SAC	9,740	No works are required within Component 3d and as such, no direct or indirect effects are anticipated.	0
South Dartmoor Woods SAC	11,680	No works are required within Component 3d and as such, no direct or indirect effects are anticipated.	0
East Devon Heaths SPA	12,650	No works are required within Component 3d and as such, no direct or indirect effects are anticipated.	0
East Devon Pebblebed Heaths SAC	12,620	No works are required within Component 3d and as such, no direct or indirect effects are anticipated.	0
Exmoor Heaths SAC	12,900	No works are required within Component 3d and as such, no direct or indirect effects are anticipated.	0
Exmoor & Quantock Oakwoods SAC	13,120	No works are required within Component 3d and as such, no direct or indirect effects are anticipated. NB note lies within barbastelle bat buffer zone for this Site but nature of component unlikely to result in LSE.	0

Table B16: Component 3e: River Exe Abstraction at Bolham Weir

European Site	Proximity (m)	Rationale with Reference to Impact Risk Zone, Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3e Works: Abstraction point is very close to Allers, abstracting 30 MLD upstream of the Allers to Pynes section.			
Culm Grasslands SAC	9,710	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor Heaths SAC	12,890	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor & Quantock Oakwoods	13,100	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects (note Component falls within Zone C for Barbastelle but as this component relates to abstraction point, potential LSE are considered unlikely).	0
Exe Estuary Ramsar	15,000+	Whilst the River Exe itself is not designated as a European Site, it discharges into Exe Estuary SPA and Ramsar. Whilst no specific threats / pressures were identified in relation to Exe Estuary Ramsar, Exe Estuary SPA (which covers largely the same footprint and supports similar qualifying species) is vulnerable to changes in biotic and abiotic conditions and change in land management. There is a minor risk of construction phase indirect effects given the proximity of works at Component 3e to the River Exe (i.e., within the River Exe), which indirectly links to Exe Estuary Ramsar, however these are highly unlikely to be significant. Whilst direct effects on Exe Estuary Ramsar are not anticipated once the Project is operational, Component 3e will require the abstraction of 30MLD from the River Exe to provide sufficient water for the Project. As such, there will potentially be significant change in hydrological conditions downstream of the abstraction point as a result of the Project once operational, such that indirect effects on Exe Estuary Ramsar may occur.	5
Exe Estuary SPA	15,000+	Justification as per Exe Estuary Ramsar above.	5

Table B17: Component 3f: River Exe (Abstraction) to Allers

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3f Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route.			
Culm Grasslands SAC	9,820	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor Heaths SAC	12,940	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor & Quantock Oakwoods SAC	13,180	Whilst no direct effects on Exmoor and Quantock SAC are anticipated, the Component falls within the identified buffer Zone C for barbastelle bats of the Exmoor and Quantock Oakwoods SAC. Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Exe Estuary Ramsar	15,000+	Whilst the River Exe itself is not designated as a European Site, it discharges into Exe Estuary SPA and Ramsar. Abstraction from the River Exe (and implications for Exe Estuary SPA and Ramsar) is considered in relation to Component 3e above.	0
Exe Estuary SPA	15,000+	Justification as per Exe Estuary Ramsar above.	0

Table B18: Component 3g: Allers to Woodgate

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3g Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route.			
Quants SAC	8,060	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Holme Moor & Clean Moor SAC	10,470	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Culm Grasslands SAC	12,540	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor Heaths SAC	12,730	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor & Quantock Oakwoods SAC	14,570	Whilst no direct effects on Exmoor and Quantock SAC are anticipated, the Component falls within the identified buffer Zone C for barbastelle bats of the Exmoor and Quantock Oakwoods SAC (15.5km). Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1

Table B19: Component 3h: Woodgate to Kingston St Mary

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3h Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route; Works will also include the installation of new storage tanks / ponds at Kingston St. Mary as there is insufficient capacity within the reservoir.			
Hestercombe House SAC	1,580	Whilst designated on account of lesser horseshoe bats, Hestercombe House SAC is identified to be vulnerable to human induced changes in hydraulic conditions and planning permission in general. Whilst no direct or indirect effects on Hestercombe House SAC are anticipated, the Component falls within the bat consultation zone for Hestercombe House SAC. Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Quants SAC	4,010	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Holme Moor & Clean Moor SAC	7,200	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor & Quantock Oakwoods SAC	10,570	Whilst no direct effects on Exmoor and Quantock SAC are anticipated, the Component falls within the identified buffer Zone C for barbastelle bats of the Exmoor and Quantock Oakwoods SAC (15.5km). Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Somerset Levels & Moors Ramsar	11,660	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Somerset Levels & Moors SPA	11,660	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Severn Estuary Ramsar	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Severn Estuary SAC	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Severn Estuary SPA	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Table B20: Component 3i: Kingston St Mary to Summerslade

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 3i Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route; Works will also include the installation of new storage tanks / ponds at Summerslade as there is insufficient capacity within the reservoir.			
Hestercombe House SAC	430	Whilst designated on account of lesser horseshoe bats, Hestercombe House SAC is identified to be vulnerable to human induced changes in hydraulic conditions and planning permission in general. Whilst no direct or indirect effects on Hestercombe House SAC are anticipated, the Component falls within the bat consultation zone for Hestercombe House SAC. Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Somerset Levels & Moors Ramsar	870	Whilst designated on account of bird and invertebrate species, Somerset Levels & Moors SPA and Ramsar is identified to be vulnerable from human induced changes in hydraulic conditions / drainage / inappropriate water levels / changes to water management structures. Whilst no direct or indirect effects on Somerset Levels & Moors SPA and Ramsar are anticipate, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land), adverse effects cannot be entirely ruled out.	1
Somerset Levels & Moors SPA	870	Justification as per Somerset Levels & Moors Ramsar above.	1
River Avon SAC	3,400	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SAC	7,650	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SPA	7,650	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Chilmark Quarries SAC	8,390	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Exmoor & Quantock Oakwoods SAC	10,560	Whilst no direct effects on Exmoor and Quantock SAC are anticipated, the Component falls within the identified buffer Zone C for barbastelle bats of the Exmoor and Quantock Oakwoods SAC (15.5km). Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Bracket's Coppice SAC	11,340	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Quants SAC	11,370	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Severn Estuary Ramsar	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Severn Estuary SAC	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Severn Estuary SPA	11,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Holme Moor & Clean Moor SAC	13,540	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Holnest SAC	13,600	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Mendip Woodlands SAC	13,630	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Fontmell & Melbury Downs SAC	14,740	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

B.4 Component 4: Transmission System to Southern Water (Components 4a - 4b)

Table B21: Component 4a: Summerslade to Testwood – Sub-Component

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 4a Works: Partially utilises WCN route corridor sections 2e, 2f, 3a, 4b, 4e Installation of 600mm diameter pipes to include 50m working corridor along transfer route.			
River Avon SAC	0	Component 4a crosses the River Avon SAC and as such, there will be a direct impact on land within a European Site.	10
The New Forest SAC	80	Component 4a passes within 80m of New Forest SAC. Given that there is a 50m working corridor, there will be direct / indirect impact on land immediately adjacent to a European Site.	10
Solent & Southampton Water Ramsar	360	Of note, Solent & Southampton Water SPA and Ramsar is vulnerable to water pollution, air pollution, changes in biotic and abiotic conditions, and hydrological changes. There is a minor risk of construction phase indirect effects given proximity of works and nature of interim habitat (which includes the River Test and various ditch / stream connections), however these are highly unlikely to be significant. No direct or indirect effects on Solent & Southampton Water SPA and Ramsar are anticipated once operational given that water will be contained within pipes and retained within existing facilities at Testwood WTW prior to use. Further consideration in relation to Testwood WTW is made in relation to Component 5 below.	1 (Precautionary during Construction)
Solent & Southampton Water SPA	360	Justification as per Solent & Southampton Water Ramsar above.	1 (Precautionary during Construction)
Solent Maritime SAC	1,040	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest Ramsar	1,810	Precautionarily included as intrinsically linked with The New Forest SAC although interaction score reduced when considering the intervening distance and the discrete nature of the works.	1 (Precautionary)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
New Forest SPA	1,810	Precautionarily included as intrinsically linked with The New Forest SAC although interaction score reduced when considering the intervening distance and the discrete nature of the works.	1 (Precautionary)
Solent and Dorset Coast SPA	1,930	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Porton Down SPA	3,740	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SAC	3,740	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SPA	4,630	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Mottisfont Bats SAC	5,360	Whilst no direct or indirect effects on Mottisfont Bats SAC are anticipated, the Component falls within the 7.5km buffer zone identified for Mottisfont Bats SAC (the zone used by bats from the SAC). Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Chilmark Quarries SAC	6,260	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Emer Bog SAC	6,730	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Great Yews SAC	7,690	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
River Itchen SAC	8,460	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Prescombe Down SAC	11,350	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley Ramsar	14,680	Whilst not designated as a European Site, Component 4a crosses the River Avon, which ultimately discharges to the Solent and Dorset Coast SPA through a section of land designated as Avon Valley Ramsar / SPA. Of note, Avon	1

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
		Valley SPA and Ramsar are vulnerable to pollution, siltation, human induced changes in hydraulic conditions, changes in biotic conditions, water abstraction, invasive species change in land management and habitat fragmentation. There is a minor risk of construction phase indirect effects given proximity of works to the River Avon, which ultimately reaches the Avon Valley SPA and Ramsar, however these are highly unlikely to be significant. No direct or indirect effects on Avon Valley SPA and Ramsar are anticipated once operational given that water will be contained within pipes and pumped to an existing facility (Testwood WTW).	(Precautionary during Construction)
Avon Valley SPA	14,680	Justification as per Avon Valley Ramsar above.	1 (Precautionary during Construction)

Table B22: Component 4b: River Stour Pre-Treatment to Testwood – Sub-Component 4b.1: River Stour to Redlynch WBS / Storage

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 4b.1 Works: Partially utilises WCN route corridor sections 3a, 4b, 4e Installation of 600mm diameter pipes to include 50m working corridor along transfer route.			
River Avon SAC	0	Component 4b.1 crosses the River Avon SAC and as such, there will be a direct impact on land within a European Site.	10
Dorset Heathlands Ramsar	10	Component 4b.1 passes immediately adjacent to Dorset Heaths SPA, SAC and Ramsar. Given that there is a 50m working corridor, there will be a direct impact on land within a European Site.	10
Dorset Heathlands SPA	10	Justification as per Dorset Heathlands Ramsar above.	10
Dorset Heaths SAC	10	Justification as per Dorset Heathlands Ramsar above.	10
Avon Valley SPA	30	Component 4b.1 passes immediately adjacent to Avon Valley SPA and within 300m of River Avon Ramsar (which comprises much the same footprint). Given that there is a 50m working corridor, there will be direct impact on land within a European Site.	10
Avon Valley Ramsar	260	Justification as per Avon Valley SPA above.	10
New Forest Ramsar	1,440	Of note, The New Forest SAC, SPA and Ramsar is vulnerable to human induced changes in hydraulic conditions / drainage, air pollution and water pollution. There is a minor risk of construction phase indirect effects given proximity of works and nature of interim habitat (which includes the River Avon and various ditch / stream connections), however these are highly unlikely to be significant. No direct or indirect effects on the New Forest are anticipated once operational given that water will be contained within pipes and retained within existing facilities at Testwood WTW prior to use. Further consideration in relation to Testwood WTW is made in relation to Component 5 below.	1 (Precautionary during Construction)
New Forest SPA	1,440	Justification as per New Forest Ramsar above.	1 (Precautionary during Construction)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
The New Forest SAC	1,440	Justification as per New Forest Ramsar above.	1 (Precautionary during Construction)
Great Yews SAC	5,230	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Solent and Dorset Coast SPA	5,330	Whilst not designated as a European Site, Component 4b crosses the River Avon, which ultimately discharges to the Solent and Dorset Coast SPA through a section of land designated as Avon Valley Ramsar / SPA. There is a minor risk of construction phase indirect effects given proximity of works to the River Avon, which ultimately reaches the Solent and Dorset Coast SPA, however these are highly unlikely to be significant. No direct or indirect effects on Solent and Dorset Coast SPA are anticipated once operational given that water will be contained within pipes and pumped to an existing facility (Testwood WTW).	1 (Precautionary during Construction)
Poole Harbour Ramsar	8,140	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Poole Harbour SPA	8,140	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC	11,030	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Mottisfont Bats SAC	11,890	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Porton Down SPA	12,580	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SAC	12,580	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Studland to Portland SAC	13,900	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Isle of Portland to Studland Cliffs SAC	14,220	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

Table B23: Component 4b: River Stour Pre-Treatment to Testwood – Sub-Component 4b.2: Redlynch to Testwood

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 4b.2 Works: Installation of 600mm diameter pipes to include 50m working corridor along transfer route.			
The New Forest SAC	80	Component 4b.2 passes within 80m of New Forest SAC. Given that there is a 50m working corridor, there will be direct / indirect impact on land immediately adjacent to a European Site.	10
Solent & Southampton Water Ramsar	690	Of note, Solent & Southampton Water SPA and Ramsar is vulnerable to water pollution, air pollution, changes in biotic and abiotic conditions, and hydrological changes. There is a minor risk of construction phase indirect effects given proximity of works and nature of interim habitat (which includes the River Test and various ditch / stream connections), however these are highly unlikely to be significant. No direct or indirect effects on Solent & Southampton Water SPA and Ramsar are anticipated once operational given that water will be contained within pipes and retained within existing facilities at Testwood WTW prior to use. Further consideration in relation to Testwood WTW is made in relation to Component 5 below.	1 (Precautionary during Construction)
Solent & Southampton Water SPA	690	Justification as per Solent & Southampton Water Ramsar above.	1 (Precautionary during Construction)
Solent Maritime SAC	1,410	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
River Avon SAC	1,710	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
New Forest Ramsar	1,810	Precautionarily included as intrinsically linked with The New Forest SAC although interaction score reduced when considering the intervening distance and the discrete nature of the works.	1 (Precautionary)
New Forest SPA	1,810	Precautionarily included as intrinsically linked with The New Forest SAC although interaction score reduced when considering the intervening distance and the discrete nature of the works.	1 (Precautionary)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Solent and Dorset Coast SPA	2,300	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Mottisfont Bats SAC	5,360	Whilst no direct or indirect effects on Mottisfont Bats SAC are anticipated, the Component falls within the 7.5km buffer zone identified for Mottisfont Bats SAC (the zone used by bats from the SAC). Therefore, given the proximity of the works, the identified vulnerabilities and the mobile nature of the qualifying species (which may use suitable habitat affected by the Project as functionally linked land/sustenance zones), adverse effects cannot be ruled out.	1
Emer Bog SAC	6,730	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Great Yews SAC	7,480	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
River Itchen SAC	8,720	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Porton Down SPA	10,320	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Salisbury Plain SAC	10,320	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley Ramsar	10,410	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Avon Valley SPA	10,410	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heathlands Ramsar	13,140	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heathlands SPA	13,140	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0
Dorset Heaths SAC	13,140	Adequate distance and sufficiently isolated from works to avoid direct or indirect effects.	0

B.5 Component 5: Southern Water Reception Points (Components 5a - 5c)

Table B23: Component 5a: Testwood WTW (Note: Same location as Component 5c)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 5a Works: WTW and water storage facilities located at Testwood in Hampshire; Water to be treated then stored in reservoir (Testwood Lakes (Small)) or within storage tanks, all within the same curtilage; No works required at this stage.			
Solent & Southampton Water Ramsar	430	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
Solent & Southampton Water SPA	430	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
Solent Maritime SAC	1,130	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
Solent & Dorset Coast SPA	2,020	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
The New Forest SAC	3,240	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
New Forest Ramsar	4,820	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
New Forest SPA	4,820	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
Emer Bog SAC	6,990	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
River Itchen SAC	8,520	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0

Mottisfont Bats SAC	12,060	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0
River Avon SAC	12,150	No works are required within Component 5a and as such, no direct or indirect effects are anticipated.	0

Table B24: Component 5b: Testwood Lakes (Small)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 5b Works: WTW and water storage facilities located at Testwood in Hampshire; Water to be treated then stored in reservoir (Testwood Lakes (Small)) or within storage tanks, all within the same curtilage; No works required at this stage.			
Solent & Southampton Water Ramsar	1,090	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
New Forest SPA	1,090	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
Solent & Southampton Water SPA	1,090	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
Solent Maritime SAC	1,770	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
The New Forest SAC	2,630	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
Solent and Dorset Coast SPA	2,660	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
New Forest Ramsar	4,700	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
Emer Bog SAC	7,070	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
River Itchen SAC	9,120	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0

River Avon SAC	11,600	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0
Mottisfont Bats SAC	11,610	No works are required within Component 5b and as such, no direct or indirect effects are anticipated.	0

Table B25: Component 5c: Testwood Potable Storage Tanks (Note: Same location as Component 5a)

European Site	Proximity (m)	Rationale with Reference to Threats and Vulnerabilities and Conservation Objectives	Interaction Score
Summary of Component 5c Works: WTW and water storage facilities located at Testwood in Hampshire; Water to be treated then stored in reservoir (Testwood Lakes (Small)) or within storage tanks, all within the same curtilage; No works required at this stage.			
Solent & Southampton Water Ramsar	430	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
Solent & Southampton Water SPA	430	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
Solent Maritime SAC	1,130	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
Solent & Dorset Coast SPA	2,020	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
The New Forest SAC	3,240	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
New Forest Ramsar	4,820	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
New Forest SPA	4,820	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
Emer Bog SAC	6,990	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
River Itchen SAC	8,520	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0

Mottisfont Bats SAC	12,060	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0
River Avon SAC	12,150	No works are required within Component 5c and as such, no direct or indirect effects are anticipated.	0

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West Country South – Strategic Resource Options

Annex 3: Environmental Assessment

Appendix 3.3: WFD

Report for Stantec on behalf of Wessex Water

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Ricardo Confidential

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Roadford Lake, Devon.
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1	28/04/2021	Draft for client review	[redacted]	[redacted]	[redacted]	[redacted]
2	30/04/2021	Consistency review of Environmental Annexe technical appendices			[redacted]	
3	05/07/2021	Minor updates in response to EA & NE (late) review comments	[redacted]	[redacted]	[redacted]	[redacted]

Contents

Tables

Figures

Separate Annexes (Excel workbooks)

Filename	Content
ACWG_WFD No Det_Framework Asssessment_Spreadsheet_WCS1_v2	Completed ACWG WFD compliance worksheet for Poole Effluent Re-Use
ACWG_WFD No Det_Framework Asssessment_Spreadsheet_WCS2	Completed ACWG WFD compliance worksheet for Roadford Pumped Storage
ACWG_WFD No Det_Framework Asssessment_Spreadsheet_WCS3	Completed ACWG WFD compliance worksheet for Transmission System

1 Introduction

1.1 Background

This Water Framework Directive (WFD) Report forms a technical appendix of Annexe 3: Environmental Assessment of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of WFD compliance risks arising from the two schemes being progressed through the WCS SROs at Gate 1.

Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally schemes which will be appraised concurrently by RAPID. This WFD Report therefore provides a single assessment which considers compliance risks associated with both schemes.

1.2 Context

Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination[1] in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

1. Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
2. Potential water source - Roadford pumped storage scheme (WCS2)
3. Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within Technical Annexes 1.2 – Options Appraisal Report (including WCS1-3 environmental review technical notes) and 1.3 – Concept Design Report respectively.

A proportionate level of environmental assessment needs to be carried out at component and scheme level to underpin the collation of robust Gate 1 submissions for the WCS SROs. In October 2020, the group of Water Companies involved in developing SROs (known as the All Company Working Group -

[1] Ofwat (2019), PR19 Final Determinations, Strategic regional water resource solutions appendix

ACWG), published guidance[2] for environmental assessment methods for SROs which is aligned to the Water Resources Planning Guideline (WRPG)[3] to increase the consistency of environmental assessment and the evaluation of impacts on environmental water quality in particular.

The ACWG guidelines indicate that the process requires Water Companies to provide the following information related to each SRO at the stage outlined (see Figure 1).

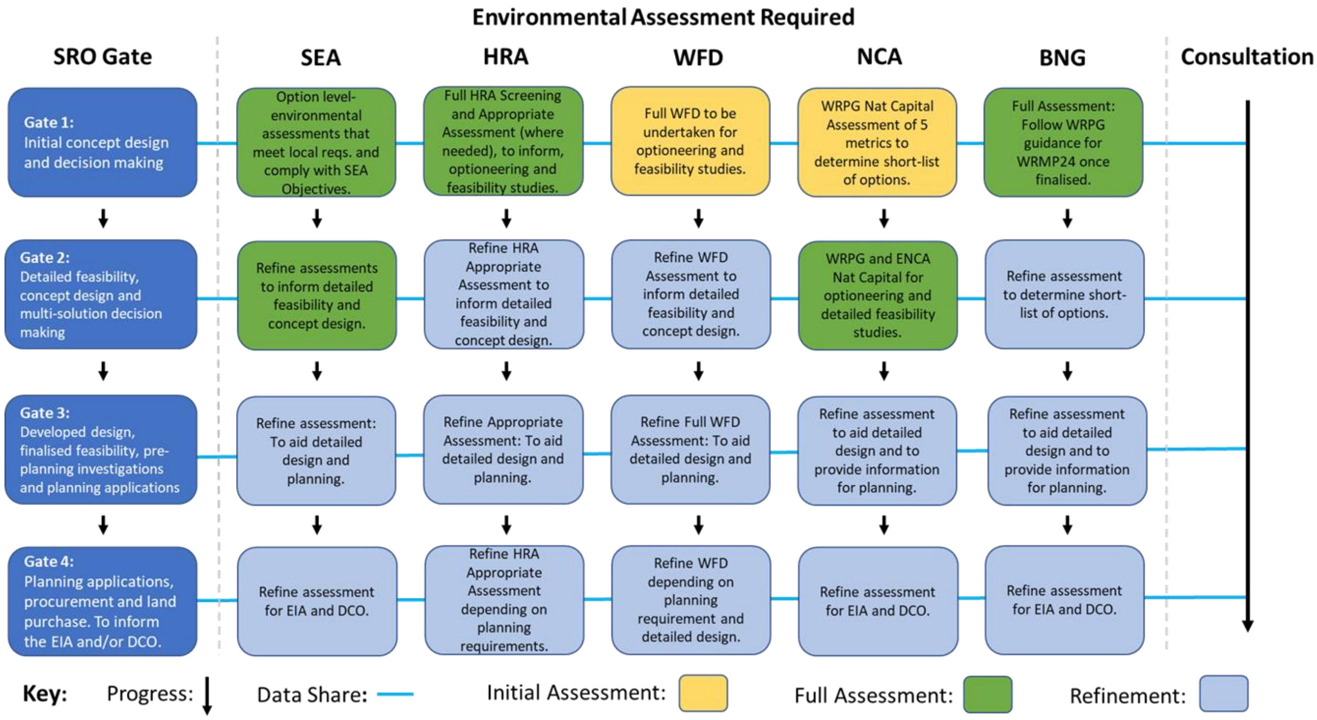

Figure 1 Environmental Assessment Integration with SRO Gates

This report sets out the Water Framework Directive Regulations[4] (WFD) Compliance Assessment for WCS at Gate-1. The Water Framework Directive[5] is an EU Directive which, as of 31/12/2020, is no longer applicable to the United Kingdom. Therefore, the principle legal basis is the national legislation which currently mirrors the EU Directive. The Water Framework Directive has been translated into UK legislation as the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 in England and Wales. From this point forward “WFD” refers to the legislation applicable to England and Wales, not the EU Directive.

1.3 Structure of this report

The report is divided into the following sections:

- Section 1: This introduction
- Section 2: Scheme Overview
- Section 3: Methodology adopted for the WFD Regulations compliance assessment
- Section 4: Component 1 - Poole Effluent Re-Use
- Section 5: Component 2 - Roadford Pumped Storage
- Section 6 Component 3 - Transmission System to Wessex
- Section 7: Components 4 & 5 - Transfer to Southern Water

[2] Mott MacDonald Limited (2020). All Companies Working Group WRMP environmental assessment guidance and applicability with SROs. Published October 2020
[3] Ofwat, NRW & EA (2021), Water Resources Planning Guideline – v9 for Publishing February 2021
[4] Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017 No. 407
[5] European Union (2000) Directive 2000/60/EC of the European Parliament and of the Council

- Section 8: Conclusions and Recommendations to inform WFD Gate 2 assessment

2 Overview of West Country SROs

2.1 Summary

As noted in Section 1, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

1. Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
2. Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
3. Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO Concept Design Components and Schemes

Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

1. Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 ML/D effluent[6] from Poole Sewage Treatment Works (STW) via River Stour:
    a. Poole STW infrastructure (pumps and tanks)
    b. Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at new WRC plant)
    c. River Stour section (in-river)
    d. River Stour abstraction (including eel screen)[7]
    e. River Stour bankside storage
    f. River Stour Pre Treatment Works (for onwards transmission)
2. Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 ML/D for onwards transmission:
    a. Abstraction from River Tamar at Gatherley intake (125 ML/D winter months only)
    b. Gatherley to Roadford Lake including outlet (Lifton North route)
    c. Roadford Lake (no major changes to existing reservoir proposed)
    d. Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)
    e. Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)
3. Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)
    a. Northcombe to Prewley

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[6] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). Technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.

[7] Section 3.2.3 of **Annex 2 – Concept Design Report** provides a schematic diagram and outline layout showing the approximate area of Components 1d – f.

   b. Prewley to Parsonage
   c. Parsonage to Pynes WTW
   d. River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)
   e. River Exe abstraction (new) at Bolham Weir
   f. River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)
   g. Allers to Woodgate
   h. Woodgate to Kingston St Mary
   i. Kingston St Mary to Summerslade
4. Component 4: Transmission System to SRN (components 4a - 4b)
   a. Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)
   b. River Stour Pre Treatment (Component 1f) to Testwood
      i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage
      ii. Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)
5. Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)
   a. Testwood WTW
   b. Testwood Lakes (small)
   c. Testwood potable storage tanks

Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

1. River Tamar to Testwood Transfer
   a. River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
   b. River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
2. Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

Further details regarding each scheme are provided in Annex 1.2 – Concept Design Reports.

The primary levels of assessment are at component and scheme levels as defined above. For the purpose of this initial WFD compliance assessment, each component of the two schemes has been assessed. Resultant overall risks for the two schemes and the overarching WCS SROs have also been identified.

3 Methodology

3.1 Methodology for Gate 1

3.1.1 Overall approach

The ACWG guidelines set out an assessment approach and accompanying reporting spreadsheet for undertaking the constraint test of WFD Regulations compliance that is required for SRO. The ACWG guidelines identify three WFD objectives for assessing WFD constraints. These are established from Regulation 13 of the WFD Regulations as follows:

1. To prevent deterioration[8] of any WFD element of any water body, in line with Regulation 13(2)a and 13(5)a
2. To prevent the introduction of impediments to the attainment of 'Good' WFD status or potential for any water body. It is accepted that for some water bodies achievement of Good status or potential is currently technically unfeasible or disproportionately costly. Where this is the case, the test is applied to the currently agreed objectives for that water body rather than against Good status/potential, in line with Regulation 13(2)b and 13(5)c.
3. To ensure that the legally binding planned programme of water body measures in the second cycle of River Basin Management Planning (RBMP2) to protect and enhance the status of water bodies are not compromised.

Following the ACWG guidelines, all concept design components selected (through screening) for inclusion within the two schemes being progressed through the WCS SROs at Gate 1 been assessed using the Level 1 basic screening to identify potentially affected WFD water bodies and possible impacts based on activities. Using relevant EA guidance[9] most construction activities have been screened out at Level 1 as these would not lead to WFD non-compliance.

Level 2 is a detailed screening for impact on each status element and the RBMP2 programme of measures. For each WFD water body, the ACWG reporting spreadsheet sets out the published RBMP2 (2015) status of each WFD status element. This is used to assess elements included in status classification, not supporting elements. This provides the baseline for no deterioration and therefore supports the assessment of WFD Objective 1. This information also informs the assessment of WFD Objective 2 – for status elements already achieving Good status or their published RBMP3 target Objective 2 does not require testing. The spreadsheet also identifies the published Reasons for Not Achieving Good status assessments undertaken by the EA. The spreadsheet will be used to record the published RBMP2 programme of measures for the water body for the assessment of WFD Objective 3.

For construction and operation activity types, such as "new or increased surface water abstraction", the ACWG guideline has established a checklist of potential impact types such as "changes in flow velocity". This has been used to inform the change in pressure on status elements. The Reasons for Not Achieving Good status assessment has been used to guide the understanding of existing pressures on the WFD status element in that water body. In the assessment we document each action's potential impact type on WFD status elements and complete the impact score for each status element using the -2 (very beneficial) to +3 (high adverse impact) ACWG guideline's scale. Compliance with WFD Objectives has been reported for each WFD status element and RBMP2 measure. Assessments have been undertaken proportionate to Gate-1, noting the level of confidence in the assessment and the level of design certainty.

The two high-level components of the schemes being progressed through the WCS SROs at Gate 1 which have the potential to generate WFD compliance risks (due to location and proposed characteristics) are Component 1 – Poole Effluent Re-Use and Component 2 – Roadford Pumped Storage. The Level 1 basic screening for these components is summarised in Section 4, with the Level 2 assessment summarised in Section 5.

[8] As defined in Section 1.3
[9] Environment Agency Operational Instruction OI 488_10_SD01 WFD compliance assessment for new physical modifications

3.1.2 Specific commentary on completion of the ACWG template

The ACWG template has been completed once for each scheme being progressed through the WCS SROs at Gate 2. Each of the accompanying Excel workbooks is specific to one scheme. The WFD compliance assessment of each grouping includes the Level 1 screening, the selection of Level 2 activities and the Level 2 assessment. The summary worksheets are auto-generated in the template for consistency of summaries across SROs. In each case the assessment is of all the elements in the group together, rather than an element-based assessment. This enables a WFD compliance assessment for each scheme being progressed through the WCS SROs at Gate 1.

3.1.3 Level 1 WFD screening

The ACWG approach lists activities relevant to river regulation releases as “Low volume discharge of water with a quality element of the same/of a lower WFD status as the receiving water body”. In assessment we identify effects mostly associated with flow changes as “the same WFD status”, in acknowledgement either: that where the flow discharged is of water originating locally; or that it has been appropriately treated prior to discharge with high confidence in design. In assessment we identify effects associated with flow and/or quality changes as “a lower WFD status” where there is not, at Gate-1, high confidence in the design of the treatment prior to discharge. WCS1 does not include any activities relevant to the consideration of WFD groundwater bodies.

For each of the WCS SRO grouping, the ACWG template Level 1 screening comprises the following worksheets completed by Ricardo:

> “1. List relevant waterbodies” – these are the waterbodies in the study area as set out in the conceptualisation below
>
> “2. Level 1 activities” – completed for construction activities and operational activities as set out below

A third worksheet “3. Level 1 summary” is auto-generated by the template to summarise those water bodies to be carried forward to the level 2 assessment.

As the ACWG template does not have specific sections for documenting the reasoning behind the selection of water bodies or activities, relevant description is set out below.

3.1.4 Level 2 WFD assessment

Within the ACWG template, the WFD assessment has been documented as follows:

- Assessment has been undertaken against published RBMP2 (2015) status, RBMP2 mitigation measures, and RBMP3 published status targets. The embedded data in the ACWG template also includes status in other years, these are not applicable and have not been assessed against.
- The ACWG template includes the objective “Assists attainment of water body objectives”. That objectives is outside the ACWG guidelines and has not been used in the assessment of ST SRO groupings
- For WFD status elements, in the upper section of the worksheet, the relevant WFD objectives that have been assessed against are “Deterioration between status classes” (Objective 1) and “Impediments to GES/GEP” (Objective 2).
- Where RBMP2 (2015) reported status is High or Good, Objective 2 is not applicable and has not been assessed against.
- Where RBMP2 (2015) reported status is at the RBMP3 target status, and that is noted as lower than High or Good, Objective 2 is not applicable and has not been assessed against.
- For RBMP2 mitigation measures, in the lower section of the worksheet, the relevant WFD objective that has been assessed against is “Compromise WB objectives” (Objective 3).
- The relevant WFD status elements for assessment of Objective 1 and Objective 2 in river

water bodies[10] are those in the Water Framework Directive (WFD) Directions[11] , as listed in **Error! Reference source not found.**. It is noted that the ACWG template includes hydro-morphological supporting elements and these are not applicable and have not been assessed against.

- The ACWG template includes data from the EA "Reasons for Not Achieving Good" [status] database. These are not applicable to Objectives 1, 2, or 3 and have not been assessed.
- For proportionality of assessment, the ACWG template "potential impacts of asset" have been collated for each "activity" with one consolidated assessment undertaken for each WFD status element.

The 2015 Directions note the reporting of additional substances from 2018. These are not status elements in RBMP2 and do not currently have a formal status. Although an interim status position has been documented by the EA for 2019, it is not considered appropriate at this time to include these substances in a WFD compliance assessment. It is noted that the gated process will continue beyond RBMP3 publication, at which point these additional substances will have a formal status and a target status for 2027 from which to update the WFD compliance assessment.

Table 1 Relevant WFD status elements from which to assess compliance in river water bodies

Ecological status			
Biological status elements	Fish Invertebrates Macrophytes & phytobenthos combined		
Physio-chemical	Water temperature pH Dissolved oxygen Ammonia Reactive phosphorus (orthophosphate)		
Specific pollutants	2,4-dichlorophenol 2,4-dichlorophenoxyacetic acid 3,4 dichloroaniline Arsenic Benzyl butyl phthalate Carbendazim Chlorothalonil Chromium (III) (VI) Chlorine	Copper Cyanide Cypermethrin Diazinon Dimethoate Glyphosate Iron Linuron Manganese	Mecoprop Methiocarb Pendimethalin Permethrin Phenol Tetrachloroethane Toluene Triclosan Zinc
Chemical status			
Priority Substances, Priority Hazardous Substances and Other pollutants contributing to chemical status	Alachlor Anthracene Atrazine Benzene Benzo(a)-pyrene (BaP) Benzo(b)-fluor-anthene Benzo(k)-fluor-anthene Benzo(g,h,i)-perylene Brominated diphenylether Cadmium and its compounds Carbon tetrachloride Chlorfenvinphos C10-13 chloroalkanes Chlorpyrifos Cyclodiene pesticides isodrin DDT total Para-para-DDT 1,2-dichloro-ethane Dichloro-methane Di(2-ethylhexyl)-phthalate (DEHP) Diuron Endosulphan	Fluoranthene Hexachloro-benzene Hexachloro-butadiene Hexachloro-cyclohexane Indeno(1,2,3-cd)-pyrene Isoproturon Lead and its compounds Mercury and its compounds Naphthalene Nickel and its compounds Nonylphenol Octylphenol Pentachloro-benzene Pentachloro-phenol Simazine Tetrachloro-ethylene Tributyltin compounds Trichloro-benzenes Trichloro-ethylene Tricholoro-methane Trifluralin	

For each of the WCS SRO groupings, the ACWG template Level 2 assessment comprises the

[10] It is noted that only river water bodies have been passed forward to the Level 2 WFD assessment of WCS1 SRO.
[11] Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

following worksheets completed by Ricardo:

> "*4. Assign Level 2 WB Impacts*" – these are the specific activities to be assessed per water body. For consistency, these have been selected as those reported in worksheet "2. Level 1 activities" and set out in Section 4 above.

> "*5. Level 2 assessment template*" – a copy of this template has been set out for each of the water bodies carried forward to the Level 2 assessment and these are renamed as the water body ID code.

A third worksheet "6. Level 2 summary" is auto-generated by the template to summarise those water bodies carried through to level 2 assessments.

Using the information presented in the spreadsheets, a narrative description of the WFD compliance assessment for each grouping is provided below. In particular, the narrative provides information on the confidence in the assessment, based on confidence in the data and the design certainty. Where the assessment reports the potential for WFD objective non-compliance, additional mitigation actions that may reduce this potential and lead to WFD compliance is indicated in the narrative summary.

Using the information presented in the spreadsheets, a narrative description of the WFD compliance assessment for each grouping is provided below. In particular, the narrative provides information on the confidence in the assessment, based on confidence in the data and the design certainty. Where the assessment reports the potential for WFD objective non-compliance, additional mitigation actions that may reduce this potential and lead to WFD compliance is indicated in the narrative summary.

4 Component 1 (Poole Effluent Re-Use)

4.1 Scheme Overview

This option is considered in order to support abstraction from the River Stour. The option proposes a 30 MLD transfer of treated effluent from Poole STW North, via a new pipeline and dedicated Water Recycling Centre (providing tertiary treatment), to a new discharge point on the River Stour. The additional flow would then be transferred via the river to an abstraction point around 18 km downstream at the existing abstraction point for the Holdenhurst WTW. New bankside storage and pre-treatment is also proposed.

The water will then be transferred from bankside storage to Testwood Lakes via a new pipeline, which forms Component 4b – Stour to Testwood of the WCS SRO schemes. Testwood Lakes will be used as storage prior to treatment for supply at Testwood WTW. Figure 1 shows the proposed route of the new pipeline from Poole STW and the new discharge point, along with the existing abstraction point.

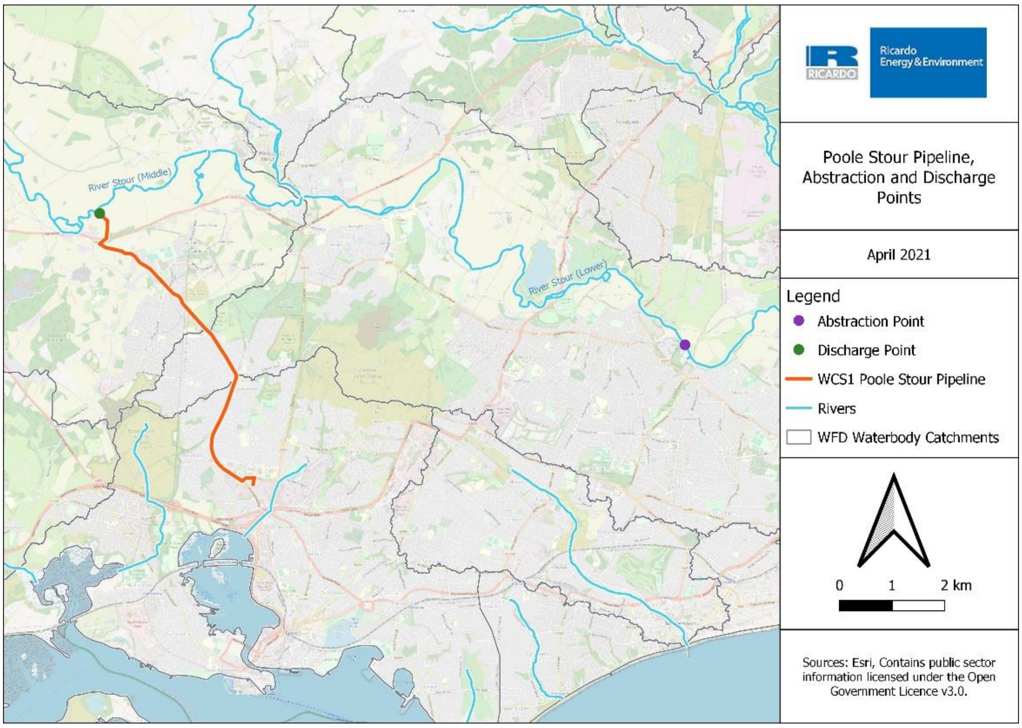

Figure 2 Map showing the location of the proposed Poole pipeline, discharge and abstraction points

Two WFD waterbodies (WBs) are identified as potentially being impacted:

- Stour (Middle d/s of Pimperne Brook) (WB ID: GB108043016052)
- Stour (Lower) (WB ID: GB10804311040).

4.2 Environmental Baseline

4.2.1 Water Quality

This section sets out the baseline water quality of the relevant waterbodies.

The following Environment Agency water quality monitoring points were considered as part of the water quality baseline and WFD assessment:

- River Stour At Spetisbury (SW-50340205)
- Stour Sturm Marshall (SW-C0417000)
- River Stour At Eye Bridge Nr Cowgrove (SW-50340121)
- River Stour At Canford (SW-50370404)
- River Stour At Longham (SW-50370369)

- River Stour At Throop (SW-50370272)
- Stour At Conifer Close (SW-50370220)
- River Stour At Iford Bridge (SW-50370169)

Stour Middle (GB108043016052)

Stour Middle includes 3 water quality monitoring locations:

- River Stour At Spetisbury (SW-50340205)
- River Stour at Marnhull (SW-C0417000)
- River Stour At Eye Bridge Nr Cowgrove (SW-50340121)

Analysis of long-term monitoring data identified the average pH recorded at the sites listed above was 7.99 and the maximum temperature recorded was 20.2°C suggesting both are within the respective standards for Good WFD Status.

The first site used for this assessment, the River Stour at Sepisbury (SW-50340205) has been used in conjunction with flow statistics from the River Stour at Throop Gauging Station to inform the water quality baseline.

Total ammonia concentrations, in River Stour at Spetisbury (SW-50340205), see Figure 3 below, were all consistent with 'Good' WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site with ammonia peaks seen in spring.

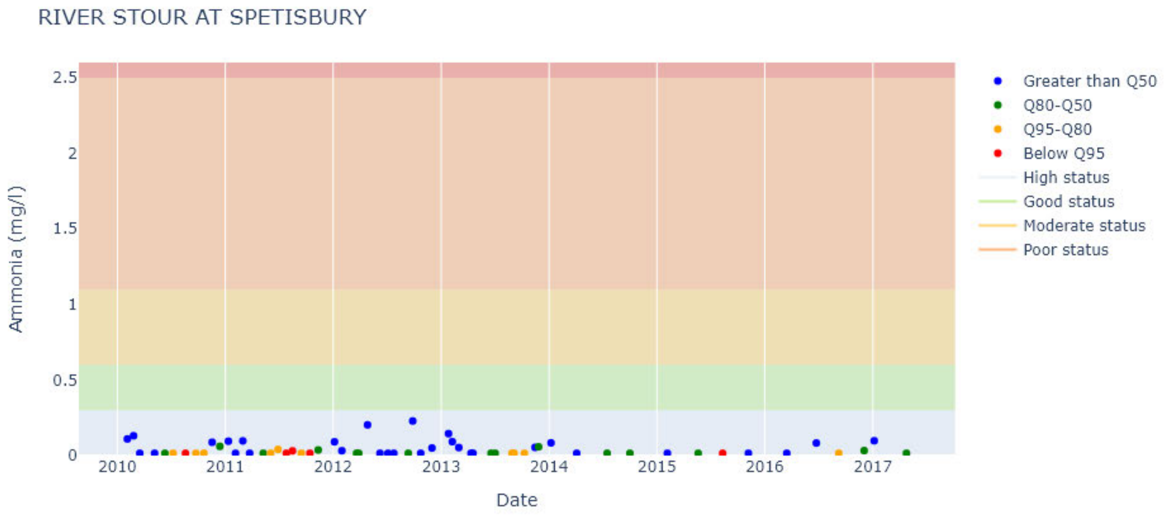

Figure 3: Total ammonia in River Stour At Spetisbury (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour At Spetisbury (SW-50340205), see Figure 4 below, were consistent with the 'Good' WFD status for fish and invertebrates (dissolved oxygen saturation of 75%). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. Annual seasonality is apparent at this site.

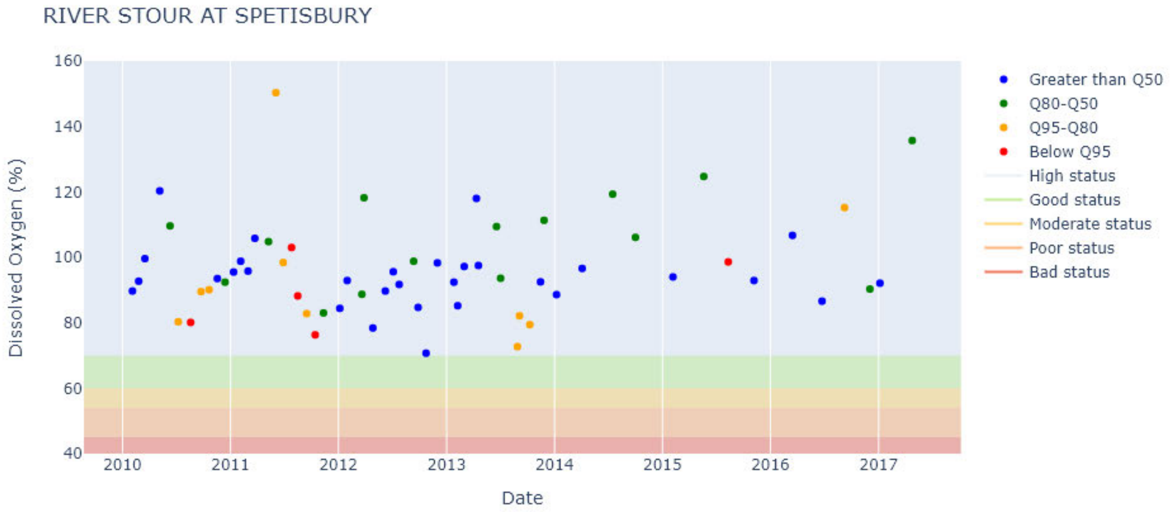

Figure 4: Dissolved oxygen saturation in River Stour At Spetisbury (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in the River Stour At Spetisbury (SW-50340205), see Figure 5 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.088 mg/l). Orthophosphate concentrations show some sensitivity to river flows at this site, with higher concentrations often seen at lower flows. Weak seasonality is apparent at this site with orthophosphate peaks seen in winter.

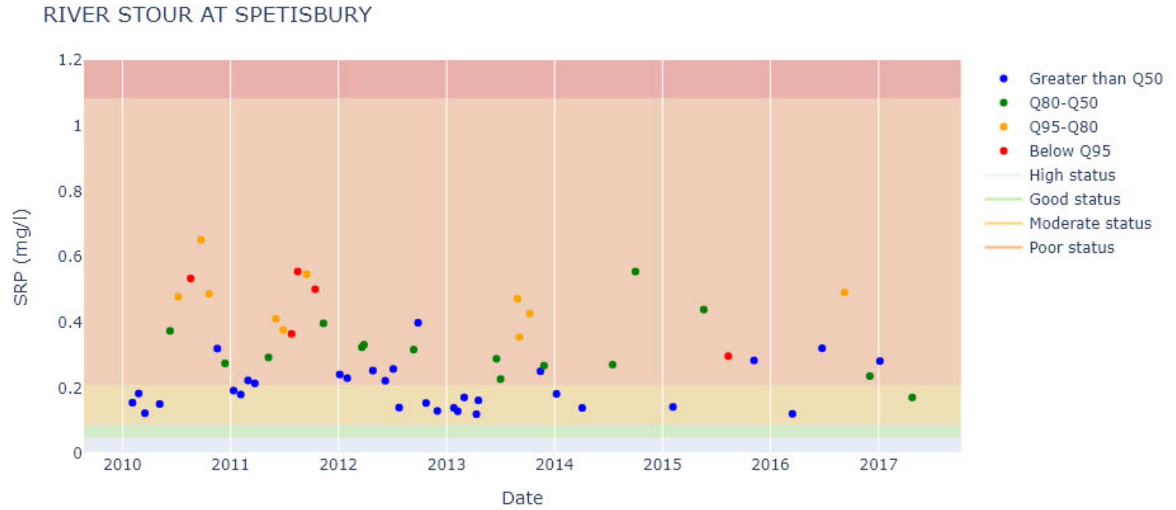

Figure 5: Orthophosphate in River Stour At Spetisbury (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Ammonia concentrations at the second site in the reach, the River Stour at Marnhull (SW-50370369), see Figure 6 below, were consistent with ‘Good’ WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Mild seasonality is apparent at this site with ammonia peaks in spring.

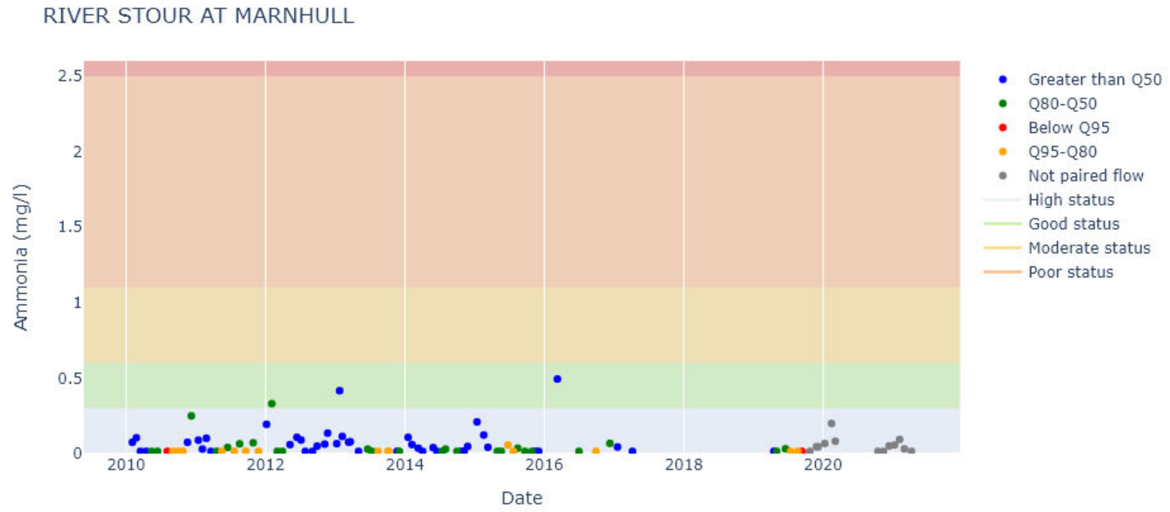

Figure 6: Total ammonia in River Stour at Marnhull (SW-C0417000), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour at Marnhull (SW-C0417000), see Figure 7 below, were consistent with the 'Good' WFD status for fish and invertebrates (dissolved oxygen saturation of 75%). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

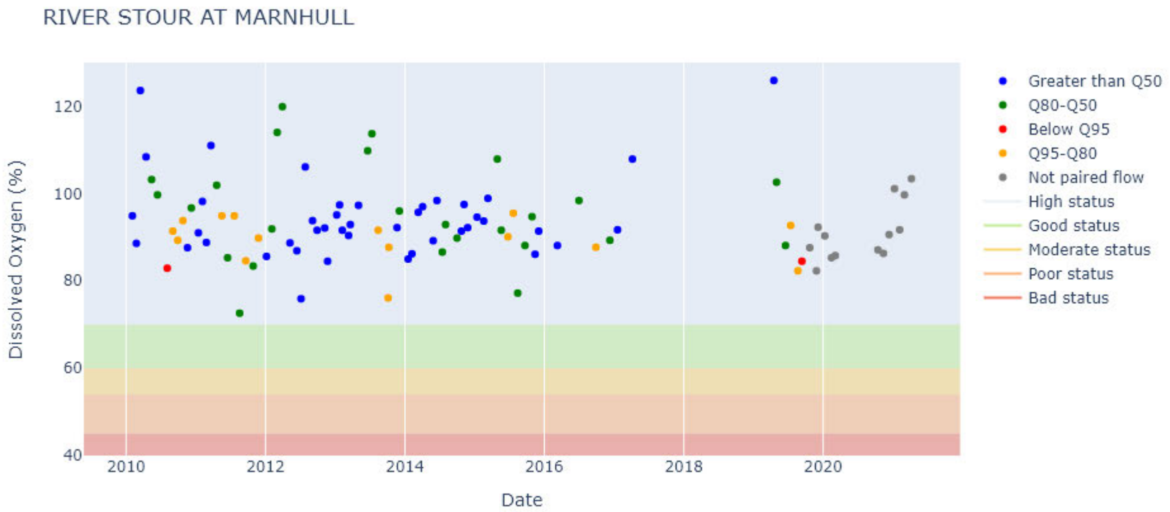

Figure 7: Dissolved oxygen saturation in River Stour at Marnhull (SW-C0417000), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in the River Stour at Marnhull (SW-C0417000), see Figure 8 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.079 mg/l) with all results below 'Good' WFD status. Orthophosphate concentrations do appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

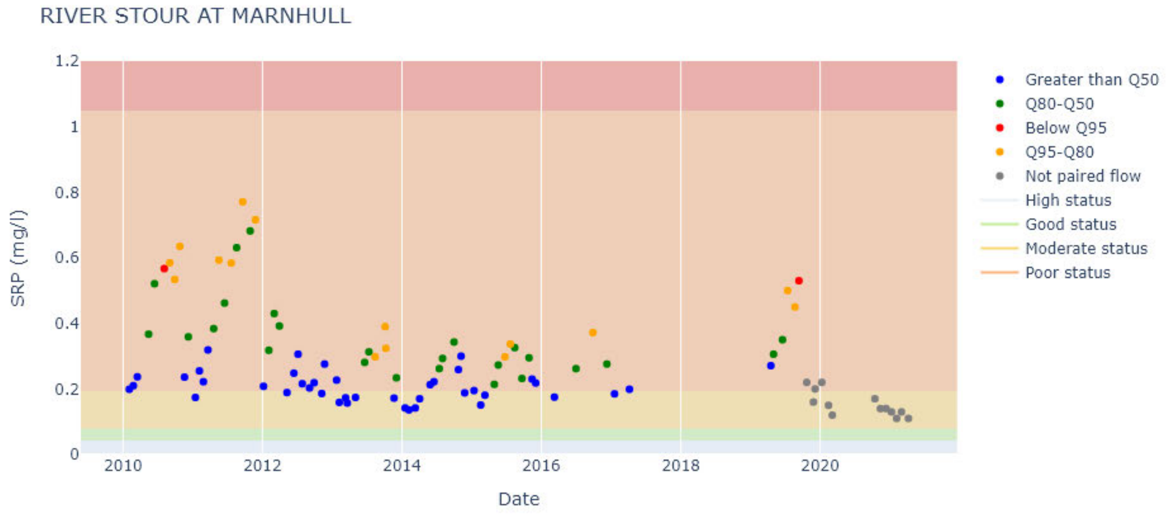

Figure 8: Orthophosphate in River Stour at Marnhull (SW-C0417000), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

The third site in the reach the River Stour At Eye Bridge Nr Cowgrove (SW-50340121), see Figure 129 below, were consistent with 'Good' WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Weak seasonality is apparent at this site with ammonia peaks in winter.

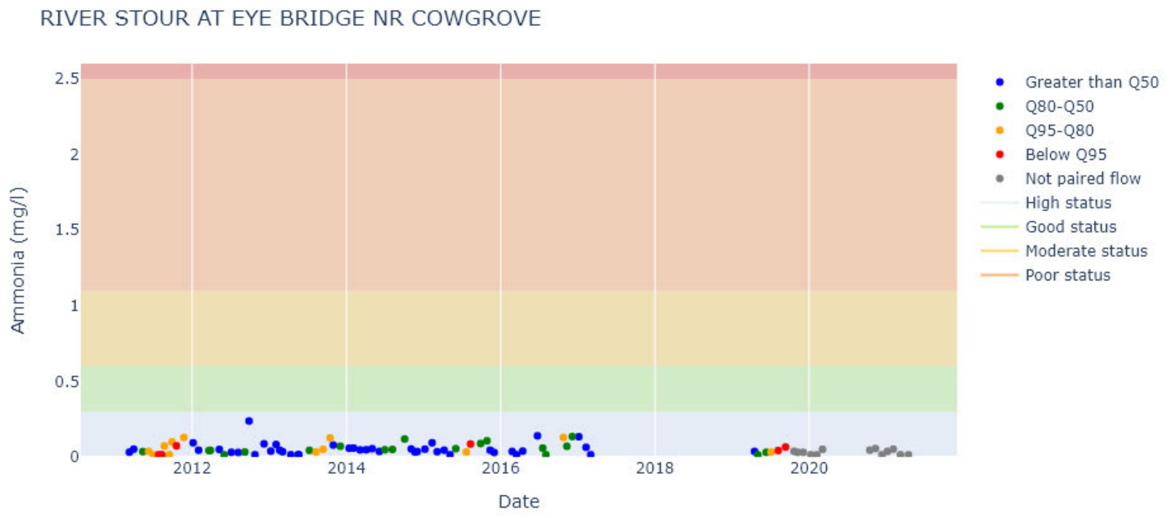

Figure 9: Total ammonia in River Stour at Eye Bridge near Cowgrove, incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour At Eye Bridge Nr Cowgrove (SW-50340121), see Figure 10 below, were consistent with the 'Good' WFD status for fish and invertebrates (dissolved oxygen saturation of 75%). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

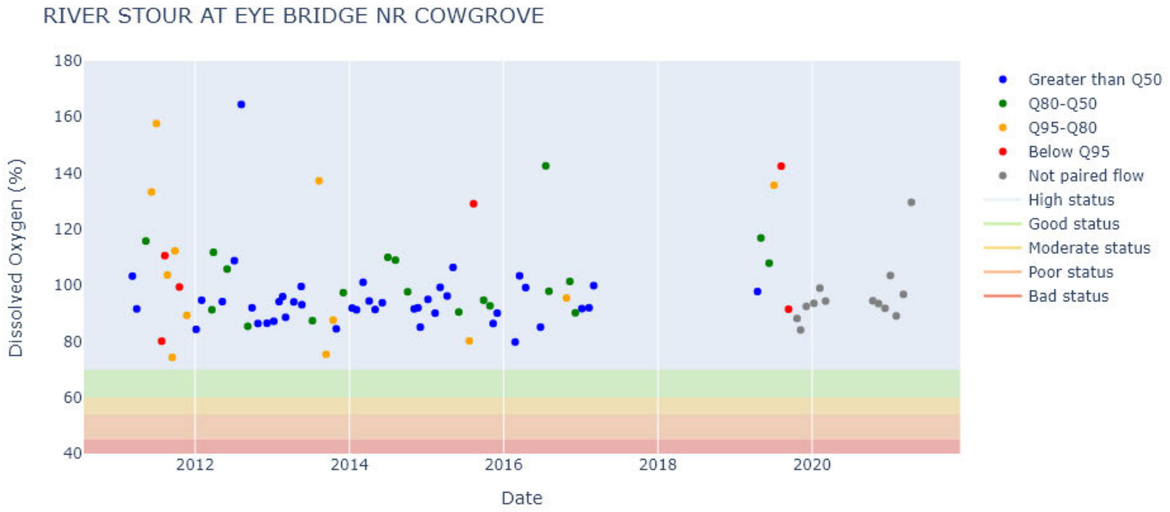

Figure 10: Dissolved oxygen saturation in River Stour At Eye Bridge Nr Cowgrove (SW-50340121), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Stour At Eye Bridge Nr Cowgrove (SW-50340121), see Figure 11 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.091 mg/l) with most results below 'Good' WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site. Strong seasonality is apparent at this site.

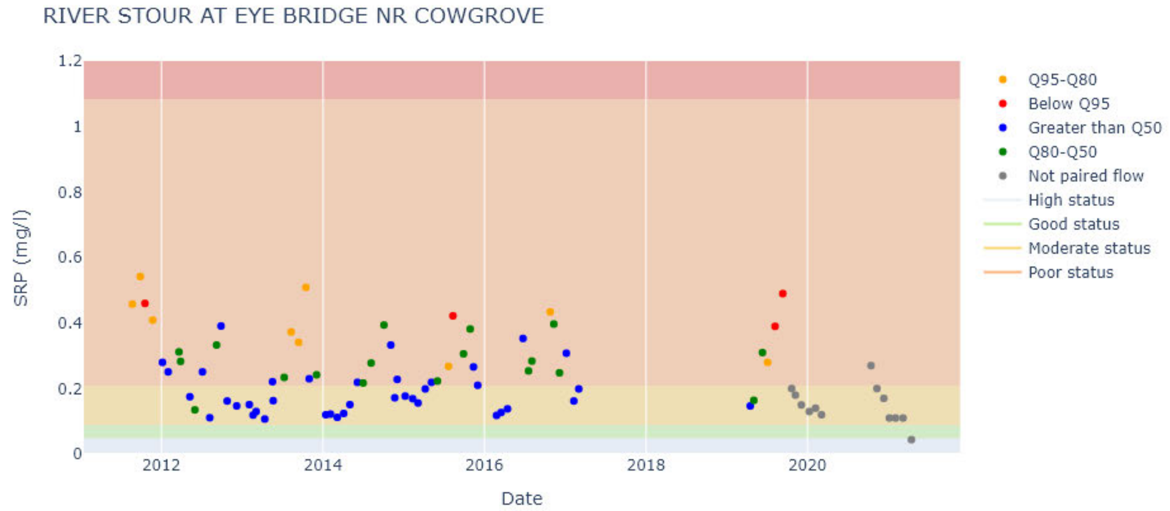

Figure 11: Orthophosphate in River Stour At Eye Bridge Nr Cowgrove (SW-50340121), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Stour Lower (GB108043011040)

The Stour (Lower) includes 5 water quality monitoring points

- River Stour At Longham (SW-50370369)
- River Stour At Redhill D/S Kinson STW (SW-50370311)
- River Stour At Throop (SW-50370272)
- Stour At Conifer Close (SW-50370220)
- River Stour At Iford Bridge (SW-50370169)

Analysis of long-term monitoring data identified the average pH recorded at the sites listed above was 7.23 and the maximum temperature recorded was 22.8°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in the River Stour at Longham (SW-50370369) see Figure 12 below, were consistent with ‘Good’ WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Mild seasonality is apparent at this site.

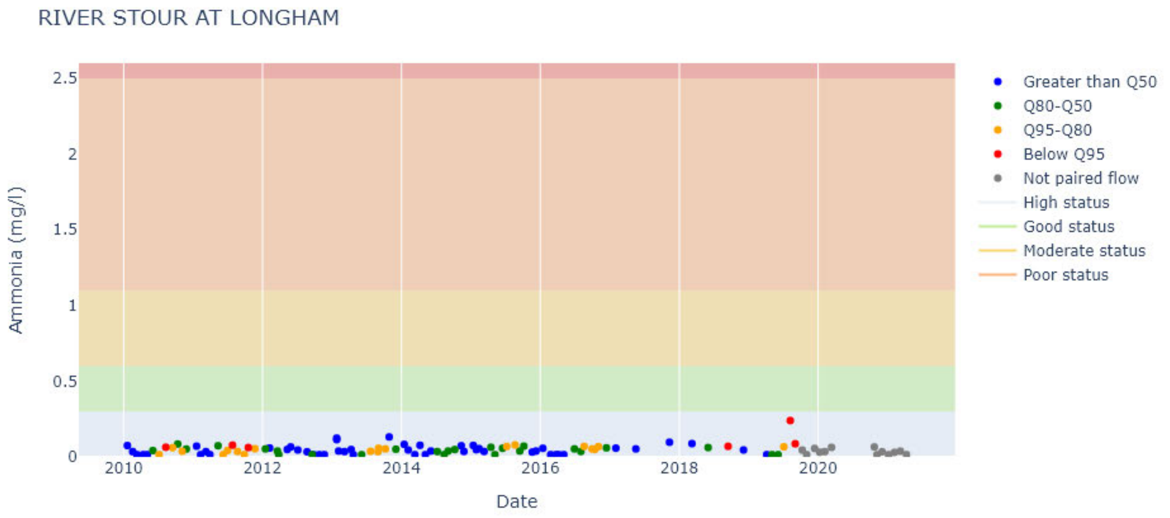

Figure 12: Total ammonia in River Stour at Longham (SW-50370369), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour at Longham (SW-50370369), see Figure 13 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (60% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

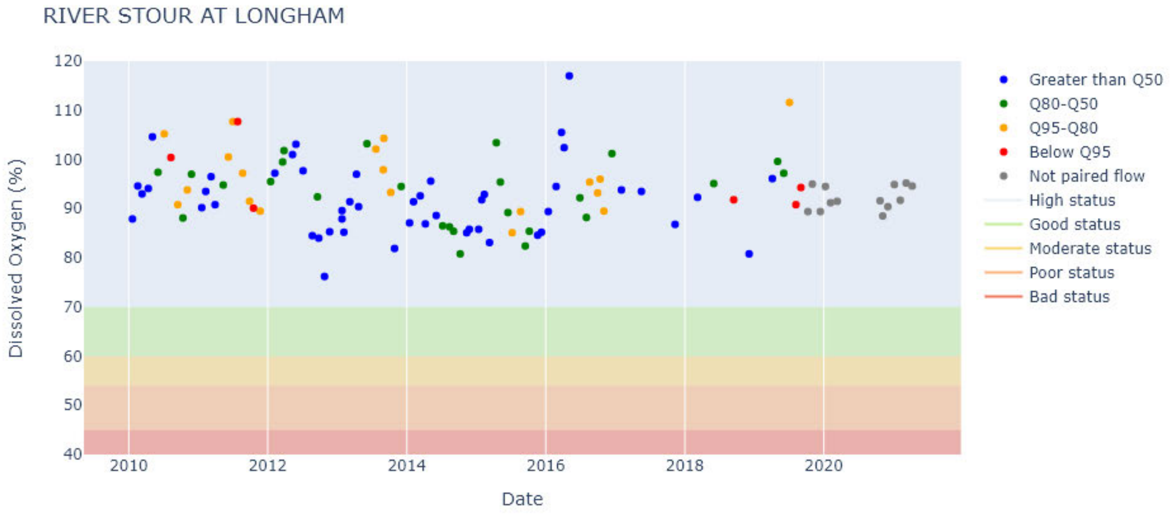

Figure 13: Dissolved oxygen saturation in River Stour at Longham (SW-50370369), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Stour at Longham (SW-50370369), see Figure 14 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.093 mg/l) with most results above 'Good' WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site, increasing with flow. Seasonality is apparent at this site.

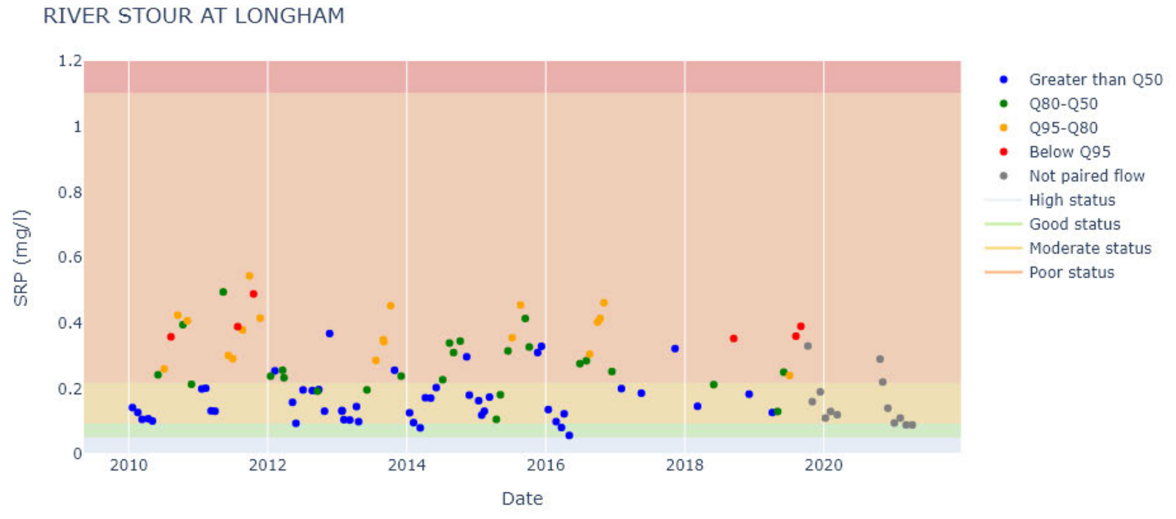

Figure 14: Orthophosphate in River Stour at Longham (SW-50370369), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

At the second sampling location, River Stour at Throop (SW-50370272), total ammonia concentrations, see Figure 15 below, were consistent with 'Good' WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Mild seasonality is apparent at this site.

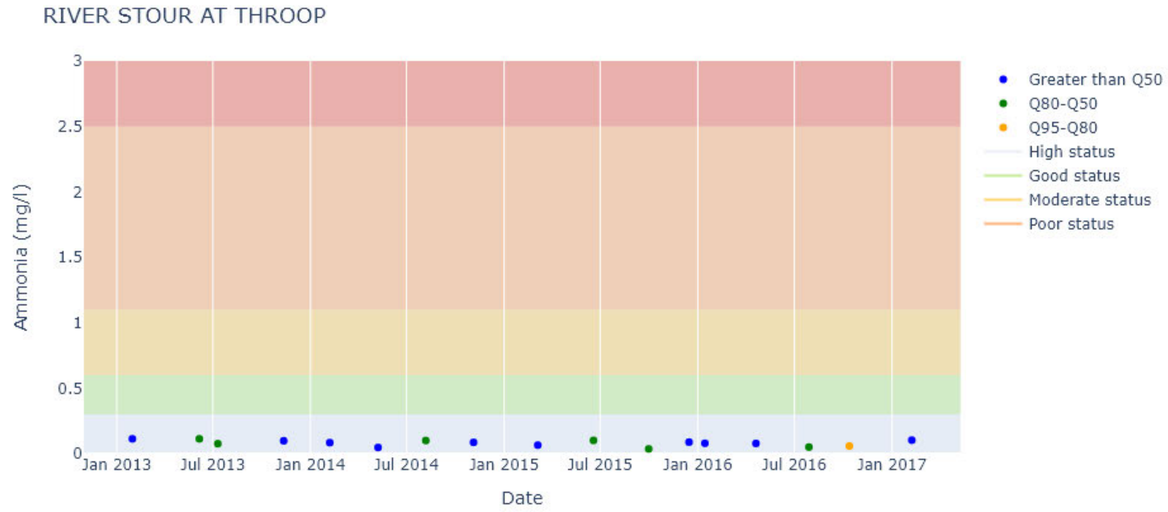

Figure 15: Total ammonia in River Stour at Throop (SW-50370272), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour at Throop (SW-50370272), see Figure 16 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (60% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

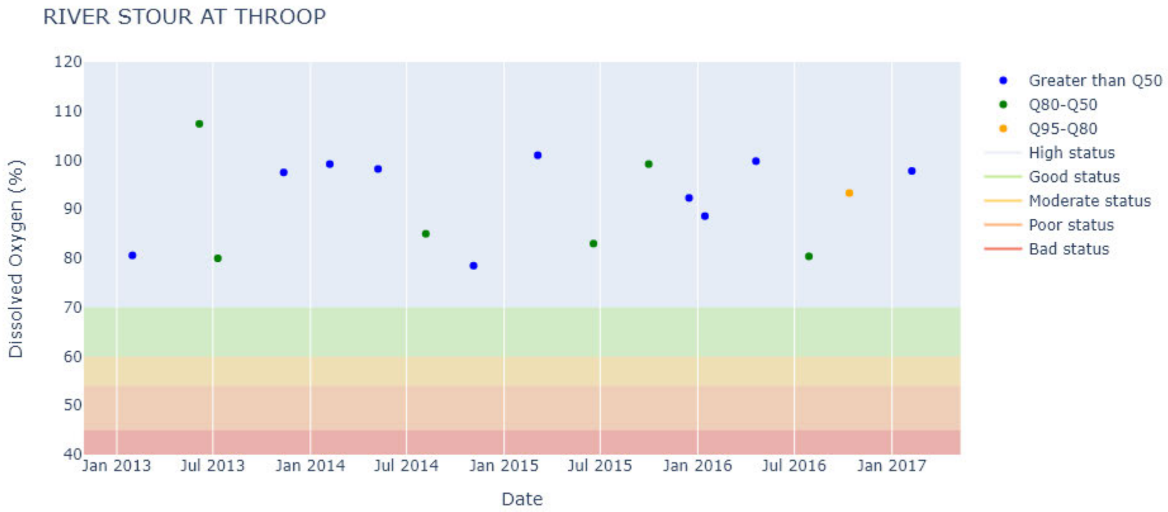

Figure 16: Dissolved oxygen saturation in River Stour at Throop (SW-50370272), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Stour at Throop (SW-50370272), see Figure 17 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.093 mg/l) with all results above ‘Good’ WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site, increasing with flow. Seasonality is apparent at this site.

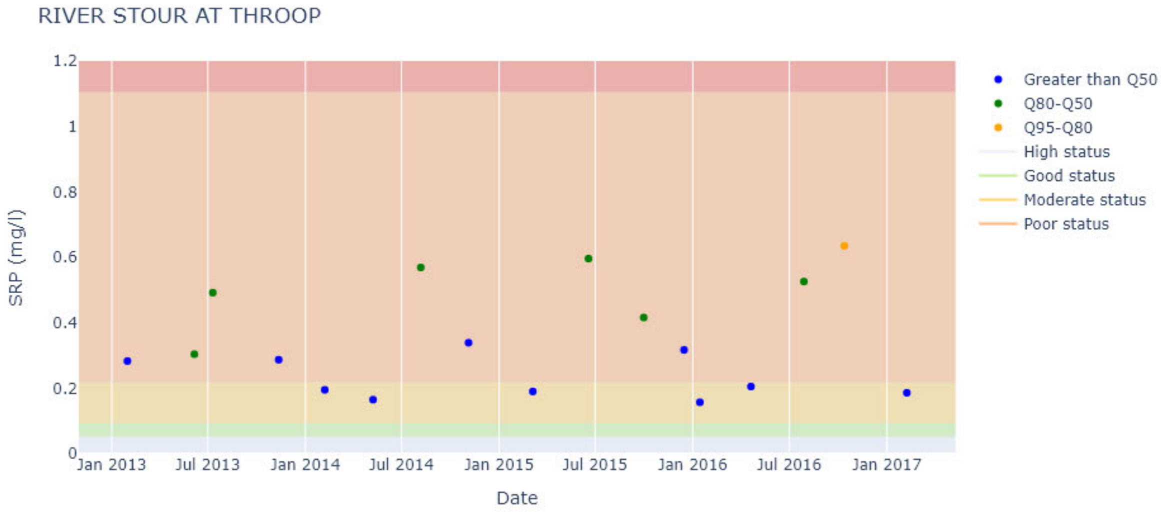

Figure 17: Orthophosphate in River Stour at Throop (SW-50370272), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

At the third sampling location, River Stour at Conifer close (SW-50370220), total ammonia concentrations, see Figure 18 below, were mostly with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l) with three values below this standard. Ammonia concentrations at this site do not appear to be sensitive to river flows. Moderate seasonality is apparent at this site with ammonia peaks seen in spring.

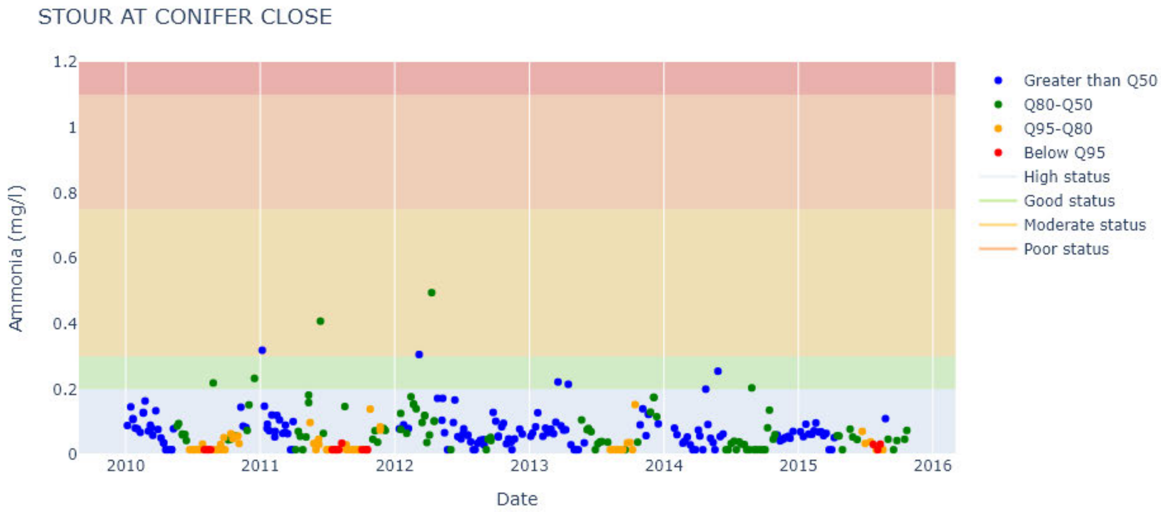

Figure 18: Total ammonia in River Stour at Conifer close (SW-50370220),, incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Stour at Conifer close (SW-50370220), see Figure 19 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

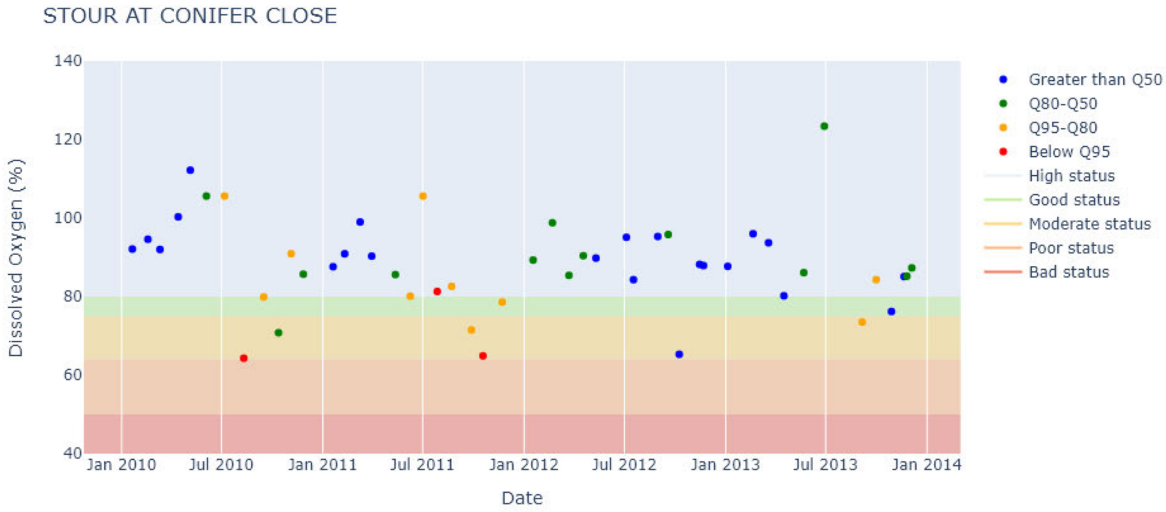

Figure 19: Dissolved oxygen saturation in River Stour at Conifer close (SW-50370220), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Stour at Conifer close (SW-50370220), see Figure 20 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.093 mg/l) with most results above 'Good' WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site, increasing with reduced flow. Seasonality is apparent at this site with orthophosphate peaks in late summer.

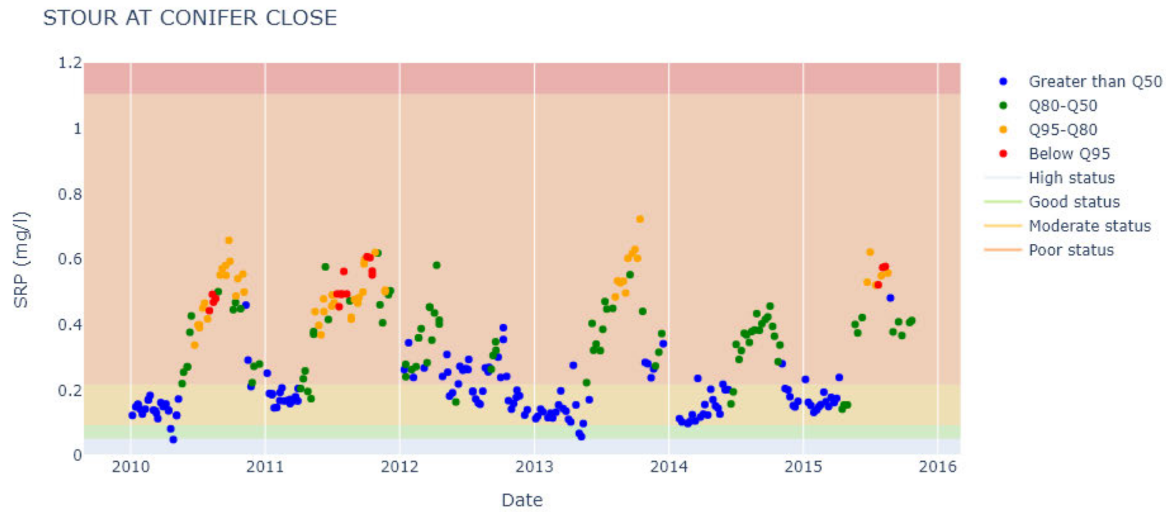

Figure 20: Orthophosphate in River Stour at Conifer close (SW-50370220), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

At the third sampling location, River Stour At Iford Bridge (SW-50370169) total ammonia concentrations, see Figure 21 below, were mostly with 'Good' WFD status for fish and invertebrates (0.3 mg/l) with three values below this standard. Ammonia concentrations at this site do not appear to be sensitive to river flows. Moderate seasonality is apparent at this site with ammonia peaks in spring.

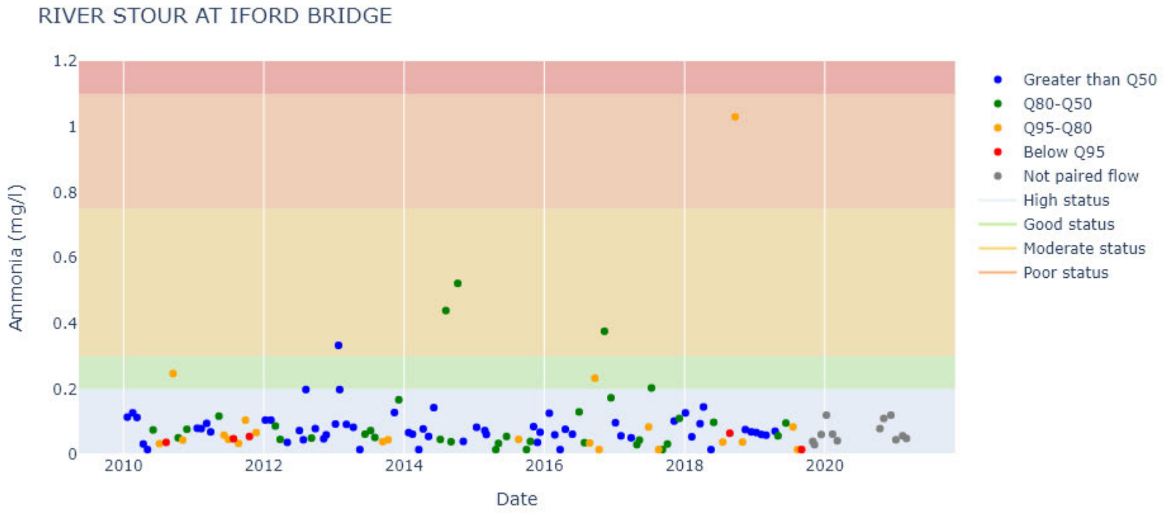

Figure 21: Total ammonia in River Stour At Iford Bridge (SW-50370169) incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Stour At Iford Bridge (SW-50370169), see Figure 22 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

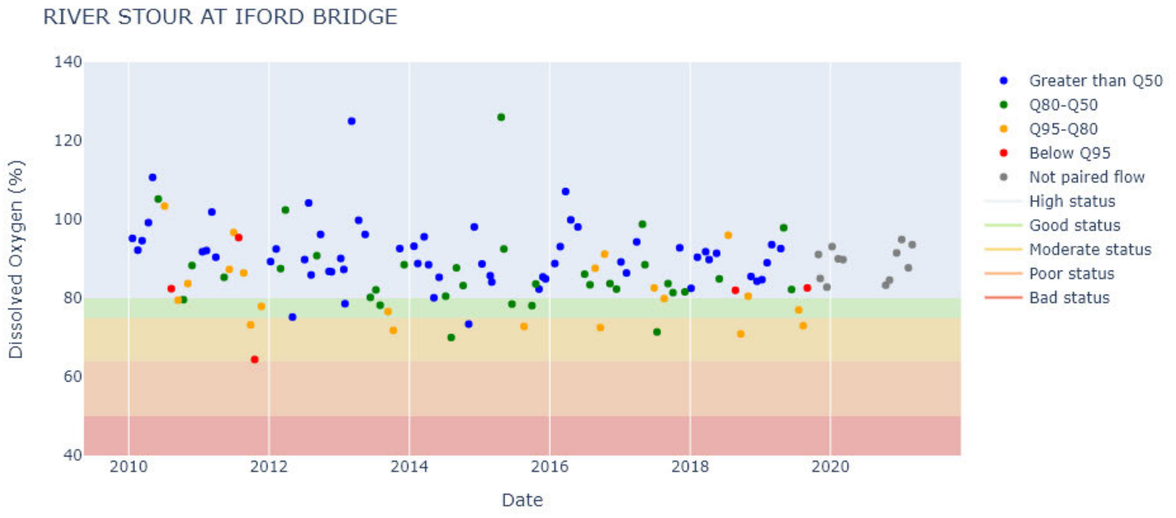

Figure 22: Dissolved oxygen saturation in River Stour At Iford Bridge (SW-50370169), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Stour At Iford Bridge (SW-50370169), see Figure 23 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.09 mg/l) with all results below ‘Good’ WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site, increasing with flow. Seasonality is apparent at this site.

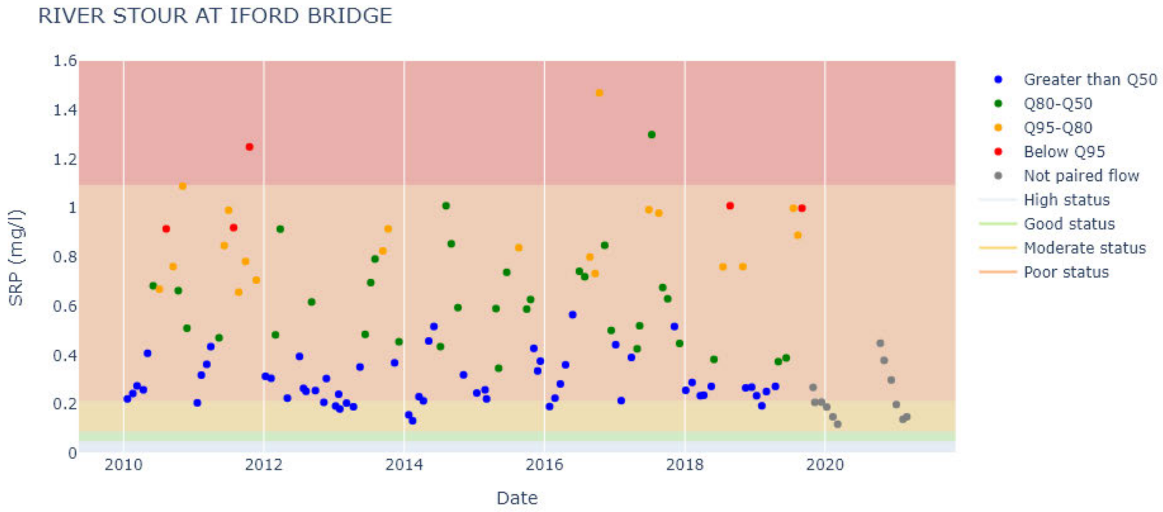

Figure 23: Orthophosphate in River Stour At Iford Bridge (SW-50370169), incorporating appropriate WFD status bands

Regarding the WFD status for the watercourse receiving the discharge (Stour Middle), the overall 2015 status is Bad with particular physico-chemical WFD elements of concern. Specifically, phosphate which is at WFD status Poor. Other status key indicator elements such as dissolved oxygen and ammonia are at a High status (Table 2).

Amongst the Reasons for Not Achieving Good status (RNAGS) highlighted by the Environment Agency are point source pollution caused by continuous sewage discharge, impacting on the phosphate levels and subsequent classification. This will be a key consideration in the WFD assessment.

Table 2 WFD status for GB108043016052 (Stour Middle) and RNAGs

	Classification	2015	2019
	Overall	Bad	Poor
	Ecological (Chemical)	Good	Fail
	Ecological	Bad	Poor

	WFD status element	2015	2019
Physio-chemical	Temperature	High	High
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Poor	Poor
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Poor
	Fish	Bad	Moderate
	Invertebrates	High	High

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**

Reasons for not achieving good status and reasons for deterioration		
Point source	Sewage discharge (continuous)	Phosphate
Diffuse source	Poor nutrient management	Phosphate
Point source	Sewage discharge (continuous)	Macrophytes and Phytobenthos Combined
Diffuse source	Poor nutrient management	Macrophytes and Phytobenthos Combined
Suspect data	Not applicable	Fish

Regarding the WFD status for the watercourse downstream of that receiving the discharge (Stour Lower), the overall 2015 status is Moderate with particular physico-chemical WFD elements of concern. Specifically, phosphate which is at WFD status Poor. Other status key indicator elements such as dissolved oxygen and ammonia are at Good and High status respectively (Table 3).

Amongst the Reasons for Not Achieving Good status (RNAGS) highlighted by the Environment Agency are point source pollution caused by continuous sewage discharge, impacting on the phosphate levels and subsequent classification. This will be a key consideration in the WFD assessment.

Table 3 WFD status for GB108043011040 (Stour Lower) and RNAGs

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Moderate
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	Good	Good
	pH	High	High
	Dissolved oxygen	Good	Good
	Ammonia	High	High
	Phosphate	Poor	Poor
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Moderate
	Fish	High	Good
	Invertebrates	Good	High

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**
Point source	Sewage discharge (continuous)	Phosphate
Diffuse source	Poor nutrient management	Phosphate
Point source	Sewage discharge (continuous)	Macrophytes and Phytobenthos Combined
Diffuse source	Poor nutrient management	Macrophytes and Phytobenthos Combined

4.2.2 Hydrology

Within the reach of the River Stour that Component 1 – Poole Effluent Re-Use will discharge into, there are two flow gauges than can be used to develop an understanding of the impact on the hydrology of the Stour. These gauges are:

- Allen at Walford Mill – ID: 43018. This gauge is at the downstream end of the Allen, which is a major tributary of the Stour in the potentially impacted reach and forms the downstream boundary of the Stour (Middle d/s Pimperne Brook) waterbody.
- Stour at Throop – ID: 43007. This gauge is on the Stour slightly downstream of the abstraction point where the reuse effluent will be abstracted for onwards transfer.

As Component 1 will only be discharging during drought periods, the hydrology baseline is focussed on low flows at the Stour and Allen gauges. Low flows are generally considered to be represented by flows < Q95 on the flow duration curve for a glow gauge. Each gauge has a long record, with observations from the 1970s to present and records that are > 99% complete, which indicates that flow statistics derived for these gauges will be reliable. Table 4 and Table 5 show the annual and summer (June to September) flows at each gauge. For the Stour at Throop gauge, the discharge is also shown as a percentage of the flow at each Q statistic, highlighting the likely deviation from natural low flows that is likely to occur.

Table 4: Low flow Q statistics for the Allen at Walford Mill flow gauge. Q statistics are shown for annual and summer (June to September) flows.

Q statistic	Annual flow (m^3/s)	Summer flow (m^3/s)
Q95	0.37	0.23
Q97	0.3	0.18
Q99	0.09	0.15

Table 5: Low flow statistics for the Stour at Throop flow gauge. Q statistics are shown for annual and summer (June to September) flows. Component 1 discharge rate (30 MLD or 0.35 m^3/s) is shown as a percentage of both annual and summer flows.

Q statistic	Annual flow (m^3/s)	Summer flow (m^3/s)	WCS1 discharge as % of annual flow	WCS1 discharge as % of summer flow
Q95	2.3	1.9	15.1	18.3
Q97	2	1.8	17.4	19.3
Q99	0.8	0.5	43.4	69.4

As the Stour at Throop gauge is downstream of the abstraction point, the WCS1 discharge as a percentage of different Q statistic flows (Table 6) will represent an underestimate of the potential increase in flow in the Stour caused by WCS1 in the reach between the discharge and abstraction point. This underestimate can be partially accounted for by subtracting the Allen at Walford Mill flow from the Stour at Throop flow for a given flow statistic, resulting in an estimate of the residual flow in the Stour upstream of the Allen confluence, which covers a section of impacted reach that is likely to see the greatest relative change in flow due to WCS1 discharge (Table 6). It is recognised that this approach does not account for inflows from sewage treatment works and small tributaries, but it does provide some additional context for the likely increase in flow in the Stour upstream of the abstraction point. Further assessment of the potential hydrological impacts will be required to address the uncertainties with using a non-naturalised flow series from flow gauges in a sub-optimal location.

Table 6: Residual flow in the Stour following subtraction of the flow from the Allen at Walford Mill from the flow at the Stour at Throop Gauge. Component 1 discharge rate (30 MLD or 0.35 m^3/s) is shown as a percentage of both annual and summer flows.

Q statistic	Annual flow (m^3/s)	Summer flow (m^3/s)	WCS1 discharge as % of annual flow	WCS1 discharge as % of summer flow
Q95	1.93	1.67	18.0	20.8
Q97	1.7	1.62	20.4	21.4
Q99	0.71	0.35	48.9	99.2

At Gate 1 the proposed 30 ML/D effluent-reuse yield from Poole STW is based on initial analysis of historical resource availability during dry periods (up to 1:500 year events). It is acknowledged this is less than maximum current output from Poole STW and further resource may therefore be available. A suite of technical environmental studies and further analysis will be undertaken at Gate 2 to refine the effluent-reuse DO.

4.3 Hydrogeology

Potential hydrogeological impacts associated with Component 1 are limited to the interactions of the new pipeline from Poole WRC to the Stour with groundwater. It is recognised that in some river reaches there can be interactions of river flow with superficial aquifers, however these interactions tend to be spatially limited and are unlikely to be active in the most of the impacted reach of the Stour as it has a clay geology which limits connectivity between a river and any superficial aquifer.

The new pipeline route may interact with three WFD groundwater waterbodies:

- Lower Frome and Piddle (WB ID: GB40802G805600)
- Lower Dorset Stour and Lower Hampshire Avon (WB ID: GB40802G805800)
- Reading Beds (WB ID: GB40802G805900)

Impacts to these groundwater waterbodies could arise during construction and operation of the pipeline.

4.4 Summary of Component 1 (Poole Effluent Re-Use) Level 1 WFD Assessment

4.4.1 Water bodies and activities passed forward from Level 1 as requiring further consideration

The Level 1 assessment screens the waterbodies against possible activities that are likely to take place as part of the proposed option. For this Gate 1 assessment, two WFD river water bodies passed forward from Level 1 screening based on medium and high impact scores. For GB108043016052 (Stour Middle) which is the waterbody receiving the direct discharge, these were related to discharge activities. For GB10804311040 (Stour Lower) the next downstream waterbody, these were related to discharge activities and licence (abstraction) activities (Table 7).

Table 7 Water bodies and activities passed forward from Level 1 as requiring further consideration in relation to Component 1 – Poole Effluent Re-Use (as part of Poole – Testwood WCS scheme)

Water body	ACWG listed activity
Stour (Middle d/s Pimperne Brook) (GB108043016052)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body
Stour (Lower) (GB10804311040)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body
Stour (Lower) (GB10804311040)	New or increased surface water abstraction

4.5 Summary of Component 1 (Poole Effluent Re-Use) Level 2 WFD Assessment

4.5.1 Potential non-compliance with WFD objectives in the River Stour (Middle)

In the Stour (Middle) water body, there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Poor physico-chemical status for phosphate, and the objective of Moderate for this WFD status objective by 2021.

Table 8 WFD compliance assessment summary for Component 1 – Poole Effluent Re-Use for Stour (Middle) water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Stour (Middle d/s Pimperne Brook) (GB108043016052)	No – impediments to GES/GEP	• Physico-chemical quality element - Phosphate

The assessment identified that due to the elevated levels of phosphate in the new discharge combined with the lack of dilution potential in the Stour when the scheme will be active, there is potential for WCS1 to create impediments to the Stour achieving Good status without appropriate mitigation. Considering appropriate mitigation to address this concern, such as additional treatment at Poole STW to reduce the level of phosphate in the effluent to be discharged to the Stour, the scheme is likely to be compliant post-mitigation. There is reasonable certainty in this assessment as the phosphate concentrations in Poole effluent and status for phosphate in the Stour are both known.

4.5.2 Potential non-compliance with WFD objectives in the River Stour (Lower)

In the Stour (Lower) water body there is potential for the introduction of impediments to target status. This is related to the existing Poor physico-chemical status for phosphate, and the objective of Moderate for this WFD status objective by 2021.

Table 9 WFD compliance assessment summary for Component 1 – Poole Effluent Re-Use for Stour (Lower) water body

Water body	WFD compliant against assessed WFD objectives	Potential non compliant issue
Stour (Lower) (GB10804311040)	No – impediments to GES/GEP	• Physico-chemical quality element - Phosphate

The assessment identified that there is potential for adverse effects to phosphate given poor source water quality and existing poor water quality in the Stour at the point of discharge. As this water body is downstream of the Stour (Middle) water body which directly receives the discharge, it can be reasonably considered that any appropriate mitigation taken in the upstream water body to reduce phosphate loading will have a subsequent impact on the Stour (Lower). The Stour (Lower) waterbody also receives inflows that will provide additional dilution and thus lower the risk posed by discharge, especially with treatment in place to mitigate the increased phosphate loading.

The Level 2 assessment identified that there was no likely effect from the new or increased surface water abstraction.

4.5.3 Impacts to groundwater waterbodies

There is currently insufficient information on the design, construction and operation plans for the new pipeline required within Component 1 (Poole STW to River Stour) and thus it is not possible to make an informed judgement on the risks to WFD compliance that may result from this new infrastructure. However, it is noted that impacts from construction can be readily mitigated using best practice construction techniques. Any operational risks related to dewatering activities will require further assessment for WFD compliance as the scheme progresses, with appropriate mitigation put in place if required.

5 Component 2 (Roadford Pumped Storage)

5.1 Scheme Overview

This option is considered in order to support abstraction from Roadford Reservoir. The option proposes an abstraction of 125 Ml/d freshwater from the River Tamar, via new abstraction location and pipeline, to a discharge point on Roadford Lake to enhance reservoir recharge and provide additional storage through maintenance of higher water volumes during winter for subsequent usage by Southern Water in times of drought. The abstraction would be taken via the existing Gatherley intake on the River Tamar.

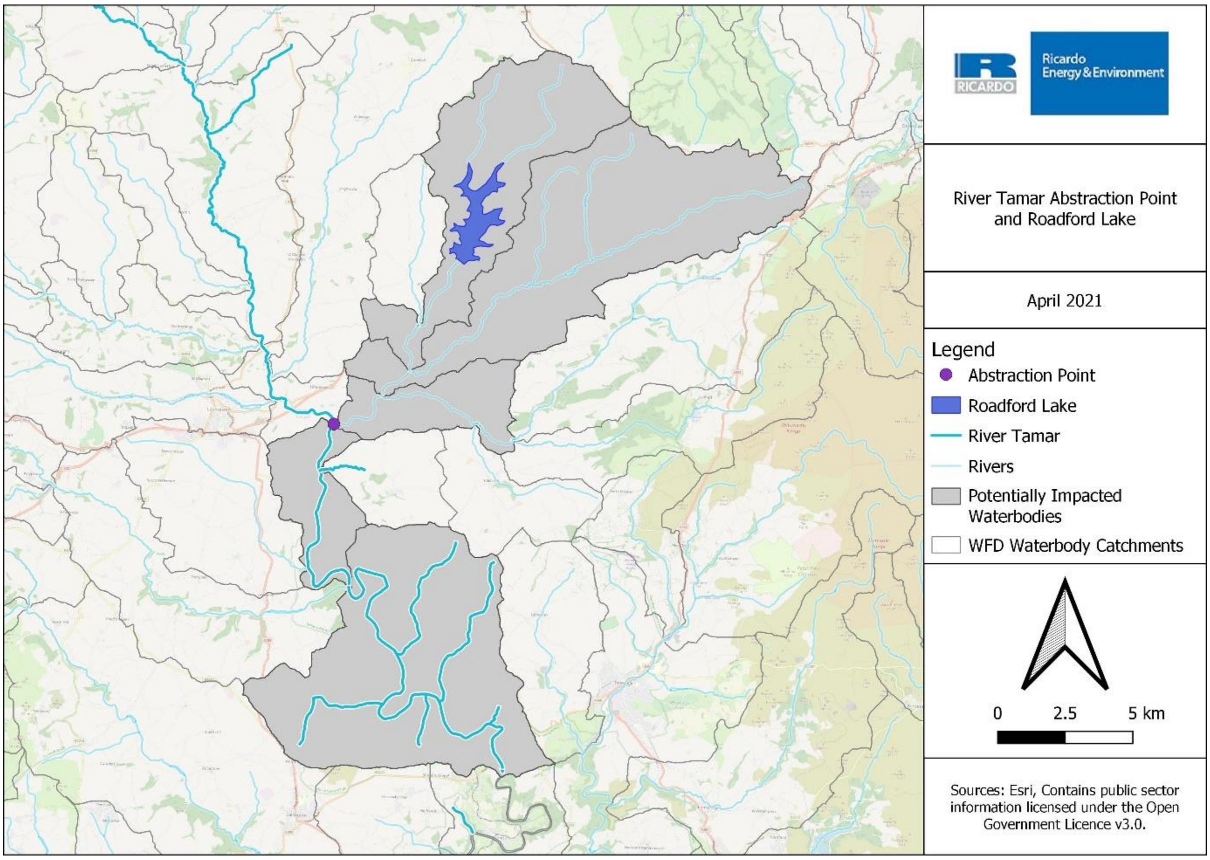

Figure 24 Map showing the location of the proposed Tamar abstraction and Roadford Reservoir

Six WFD waterbodies (WBs) are identified as potentially being impacted by Component 2: Roadford Pumped Storage

- Wolf (GB108047008020)
- Thrushel (GB108047008010)
- Lower River Lyd (GB108047007731)
- Tamar (River Lyd to River Inny) (GB108047007910)
- Lower River Tamar (GB108047007860)
- Roadford Lake (GB30847000)

The Tamar (River Ottery to River Lyd) (GB108047007940) waterbody has been considered as part of the water quality baseline as an indication of quality upstream of the abstraction point but is not considered an impacted waterbody within the context of this scheme.

5.2 Environmental Baseline

5.2.1 Water Quality

This section sets out the baseline water quality of the waterbodies listed above.

Within the above waterbodies the following Environment Agency monitoring locations have been used to inform the water quality baseline.

Tamar (River Ottery to River Lyd): GB108047007940

The Tamar (River Ottery to River Lyd) has two water quality monitoring locations:

- River Tamar U/S St Leonards STW (SW-81290128)
- River Tamar at Polson Bridge (SW-81290111)

The first water quality monitoring site in the waterbody is the River Tamar U/S St Leonards STW (SW-81290128). Flow statistics from the River Tamar at Polson Bridge Gauging Station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at this site was 7.52 and the maximum temperature recorded at this site was 19.5°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in River Tamar U/S St Leonards STW (SW-81290128) see Figure 24 below, were all consistent with 'Good' WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site, with ammonia concentrations peaking in winter.

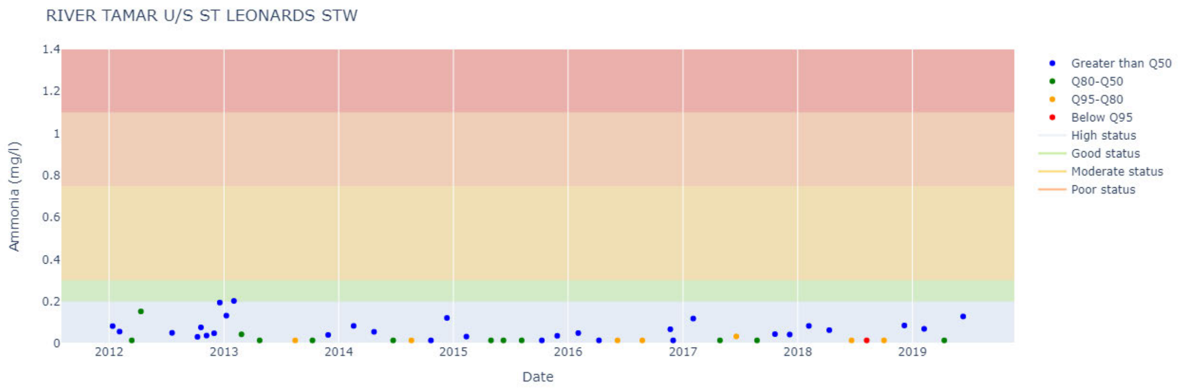

Figure 25: Total ammonia in River Tamar (U/S St Leonards STW), incorporating appropriate WFD status bands (flow statistic information derived from the River Tamar at Polson Bridge Gauging Station).

Dissolved oxygen saturation measurements River Tamar U/S St Leonards STW (SW-81290128), see Figure 26 below, were consistent with the 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

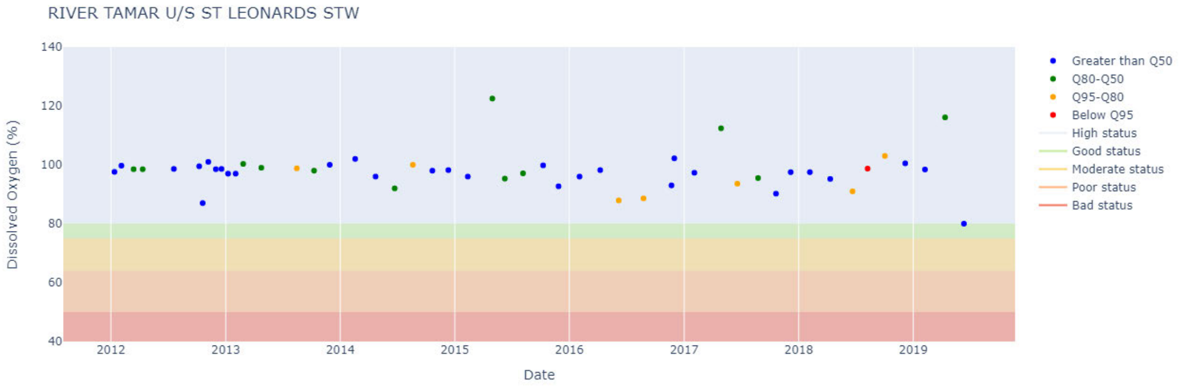

Figure 26: Dissolved oxygen saturation in River Tamar (U/S St Leonards STW), incorporating appropriate WFD status bands

Orthophosphate concentrations at the River Tamar U/S St Leonards STW (SW-81290128) site, see Figure 27 below, were mostly consistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.045 mg/l) with 26% of results below ‘Good’ WFD status. Orthophosphate concentrations do not appear to be sensitive to river flows at this site. Weak seasonality is apparent at this site, with peaks in orthophosphate generally seen in winter.

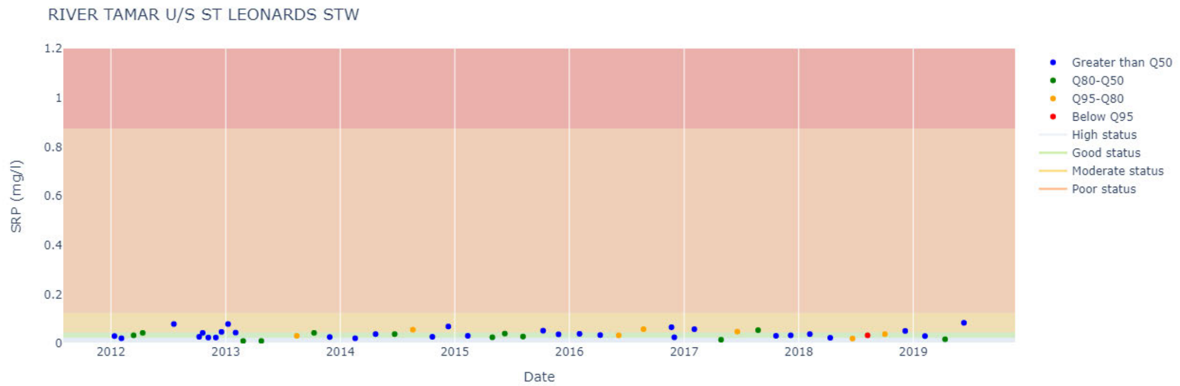

Figure 27: Orthophosphate in River Tamar (U/S St Leonards STW), incorporating appropriate WFD status bands

The second water quality monitoring point in the waterbody is the River Tamar at Polson Bridge (SW-81290111). Flow statistics from the River Tamar at Polson Bridge Gauging station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at this site was 7.54 and the maximum temperature recorded at this site was 21.9°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in River Tamar at Polson Bridge (SW-81290111) see Figure 28 below, were mostly consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l), with 1.5% of the results below ‘Good’ WFD status. Ammonia concentrations at this site do not appear to be sensitive to river flows. Weak seasonality is apparent at this site, with higher concentrations occurring mainly in winter months.

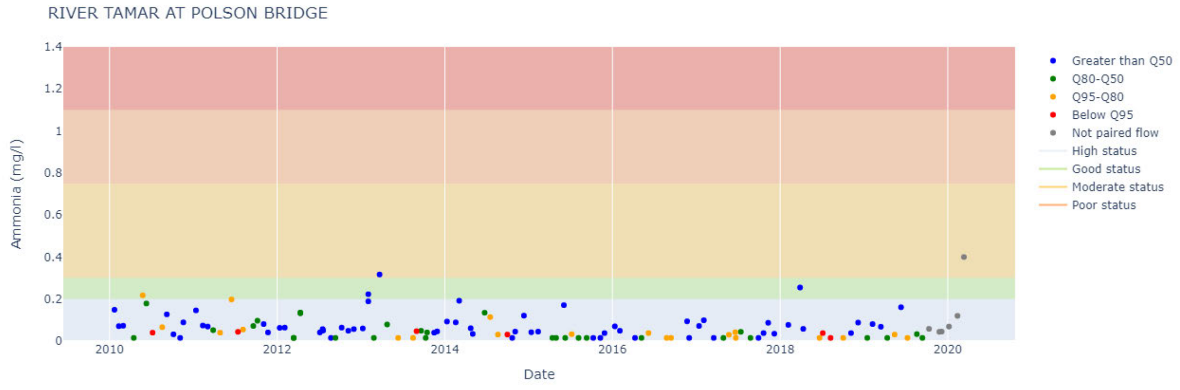

Figure 28: Total ammonia in River Tamar (at Polson Bridge), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Tamar at Polson Bridge (SW-81290111), see Figure 29 below, were consistent with the 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

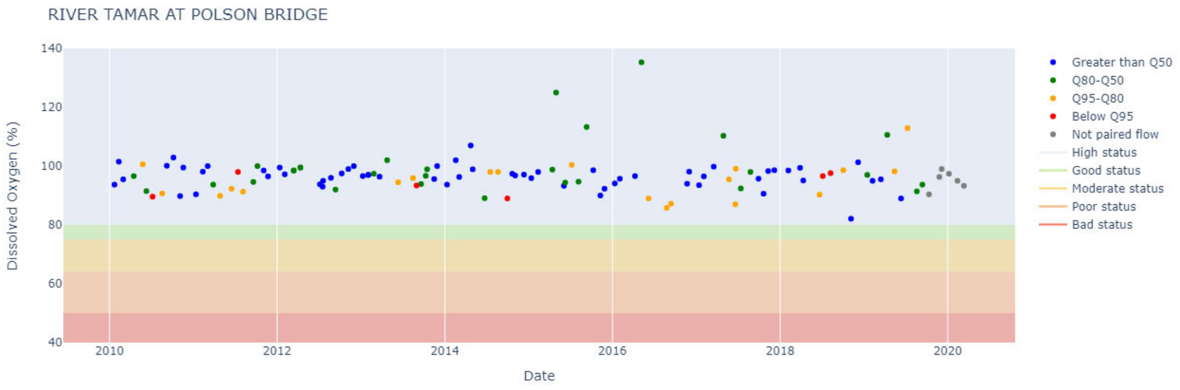

Figure 29: Dissolved oxygen saturation in River Tamar (at Polson Bridge), incorporating appropriate WFD status bands (flow statistic information derived from the River Tamar at Polson Bridge Gauging Station).

Orthophosphate concentrations in River Tamar at Polson Bridge (SW-81290111), see Figure 30 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.045 mg/l) most results below 'Good' WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site, showing an inverse relationship with flow. Seasonality is apparent at this site, with peaks in orthophosphate in summer, which is consistent with the inverse relationship between orthophosphate and flow at this site.

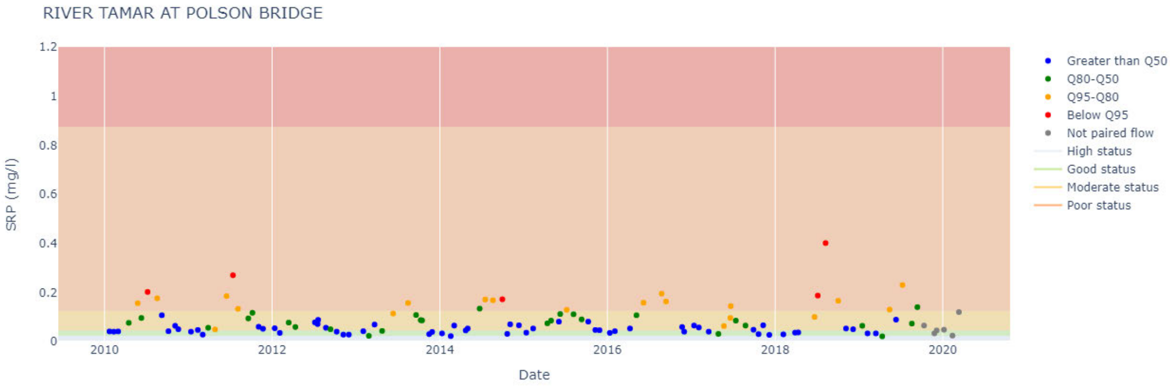

Figure 30: Orthophosphate in River Tamar (at Polson Bridge), incorporating appropriate WFD status bands

Tamar (River Lyd to River Inny): GB108047007910

The Tamar (River Lyd to River Inny) has one water quality monitoring location:

- River Tamar at Greystone Bridge (SW-81250277)

The first water quality monitoring point from this waterbody, the River Tamar at Greystone Bridge (SW-81250277) has been used. Flow statistics from the River Tamar at Polson Bridge Gauging station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at this site was 7.67 and the maximum temperature recorded at this site was 18.5°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in River Tamar at Greystone Bridge (SW-81250277) see Figure 31 below, were consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. No seasonality is apparent at this site.

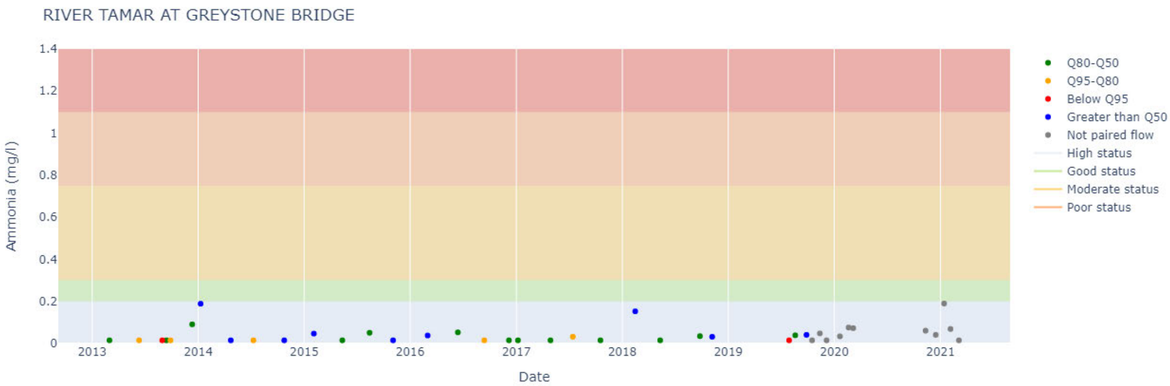

Figure 31: Total ammonia in River Tamar (at Greystone Bridge), incorporating appropriate WFD status bands (flow statistic information derived from the River Tamar at Polson Bridge Gauging Station).

Dissolved oxygen saturation measurements at River Tamar at Greystone Bridge (SW-81250277), see Figure 32 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (75% dissolved oxygen saturation which is the threshold for Good status). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

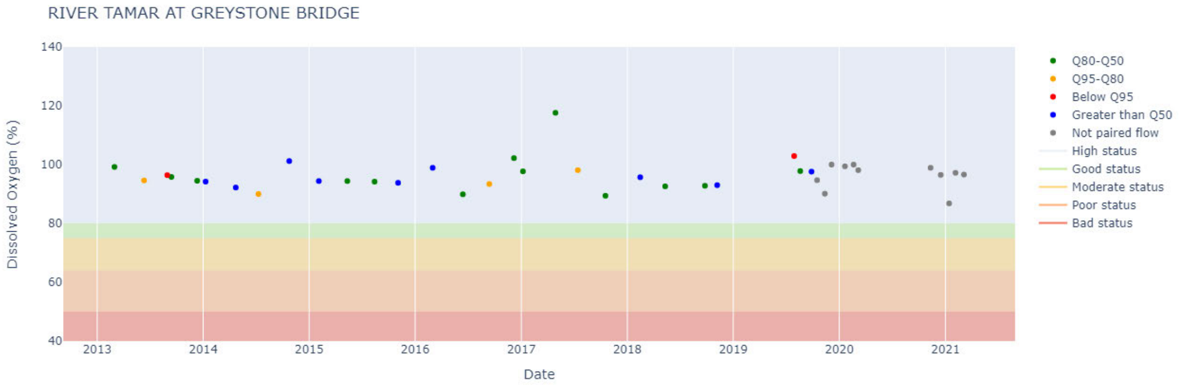

Figure 32: Dissolved oxygen saturation in River Tamar (at Greystone Bridge), incorporating appropriate WFD status bands (flow statistic information derived from the River Tamar at Polson Bridge Gauging Station).

Orthophosphate concentrations in the River Tamar at Greystone Bridge (SW-81250277), see Figure 33 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.045 mg/l) with 37% of results below ‘Good’ WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site. Weak seasonality is apparent at this site, peaks in orthophosphate tending to occur in summer.

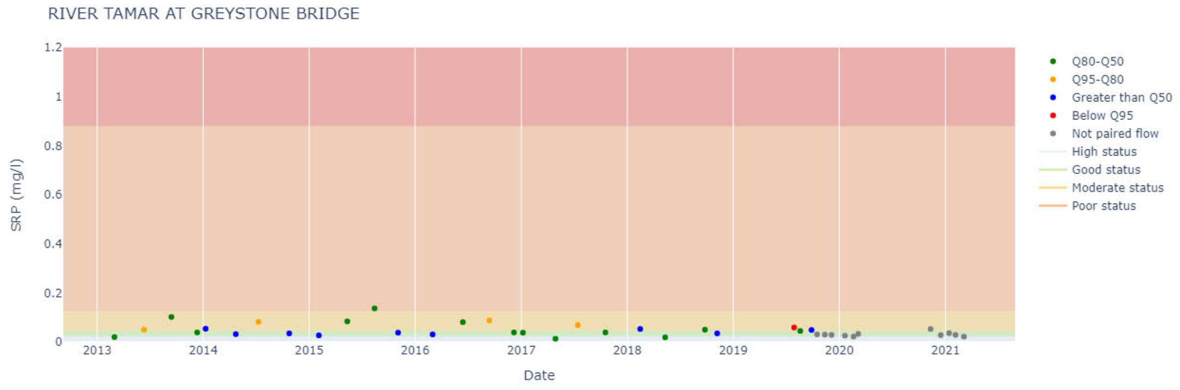

Figure 33: Orthophosphate in River Tamar (at Greystone Bridge), incorporating appropriate WFD status bands

Lower River Tamar: (GB108047007860)

The Lower River Tamar has 3 water quality monitoring location:

- River Tamar at Horsebridge (SW-81250239)
- River Tamar at Gunnislake Gauging Station (SW-81250174)
- River Tamar at Gunnislake Bridge (SW-81250144)

Water quality data from the first monitoring point on the River Tamar at Horsebridge (SW-81250239) has been used. Flow statistics from the River Tamar at Gunnislake Gauging station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at the above sites was 7.68 and the maximum temperature recorded was 17°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in the River Tamar at Horsebridge (SW-81250239) see Figure 34 below, were consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. No seasonality is apparent at this site.

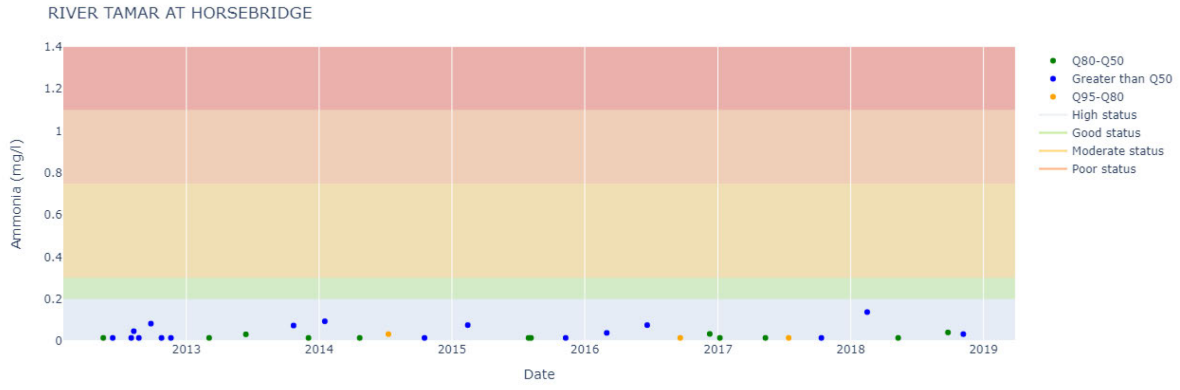

Figure 34: Total ammonia in River Tamar (at Horsebridge), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements in the River Tamar at Horsebridge (SW-81250239), see Figure 35 below, were consistent with 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

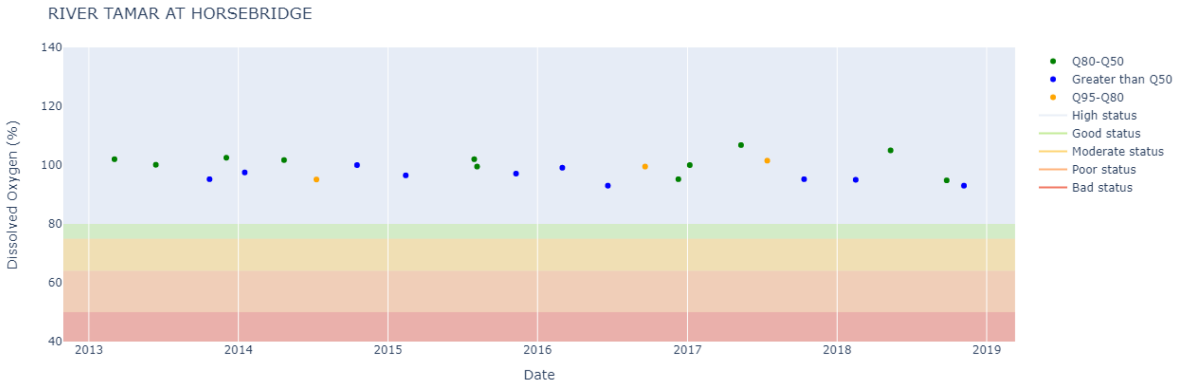

Figure 35: Dissolved oxygen saturation in River Tamar (at Horseridge), incorporating appropriate WFD status bands

Orthophosphate concentrations in the River Tamar at Horsebridge (SW-81250239), see Figure 36 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.049 mg/l) with 38% of results below 'Good' WFD status. Orthophosphate concentrations do not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

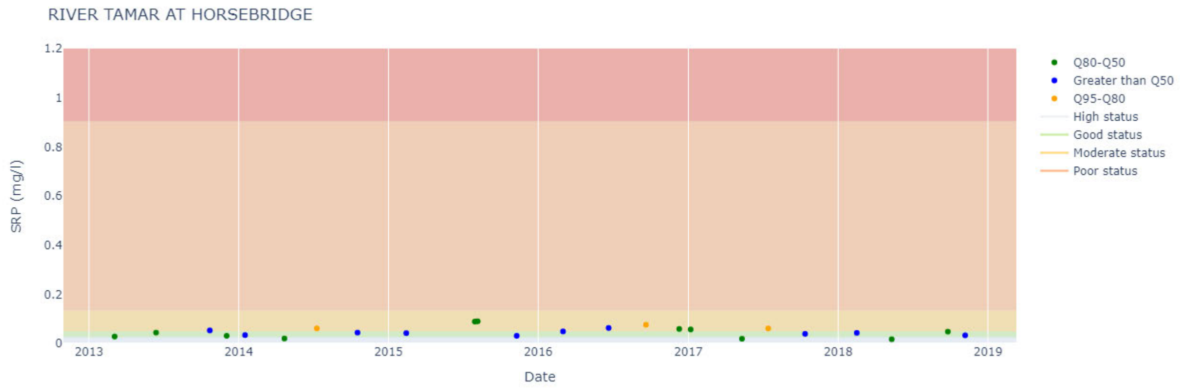

Figure 36: Orthophosphate in River Tamar (at Horsebridge), incorporating appropriate WFD status bands

Water quality monitoring from the second monitoring location on the River Tamar at Gunnislake Bridge (SW-81250144) has been used. Flow statistics from the River Tamar at Gunnislake Gauging station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at this site was 7.67 and the maximum temperature recorded at this site was 19°C suggesting both are within the respective standards for Good WFD Status.

Total ammonia concentrations, in River Tamar at Gunnislake Gauging Station (SW-81250174), see Figure 37 below, were consistent with 'Good' WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Data are too sparse to make comments on potential seasonality at this monitoring location.

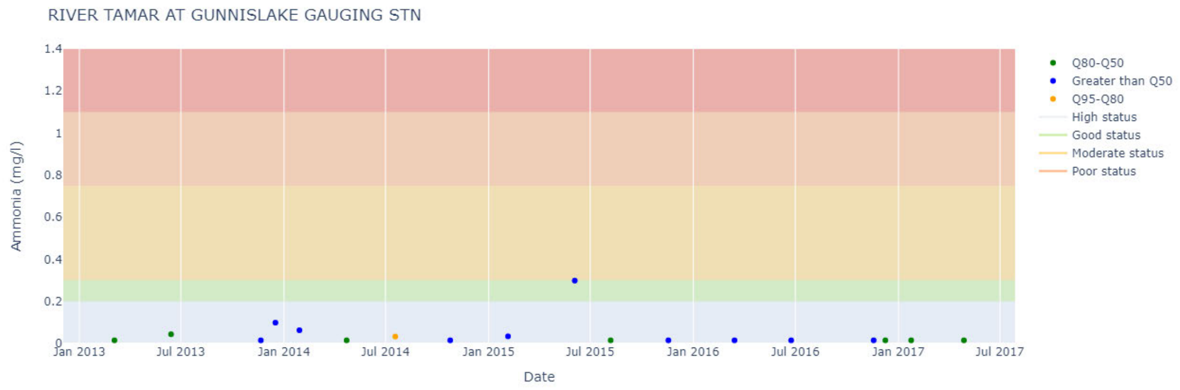

Figure 37: Total ammonia in River Tamar (at Gunnislake Gauging Station), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Tamar at Gunnislake Gauging Station (SW-81250174), see Figure 38 below, were consistent with the 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site; however, this assessment is limited by sparse available data.

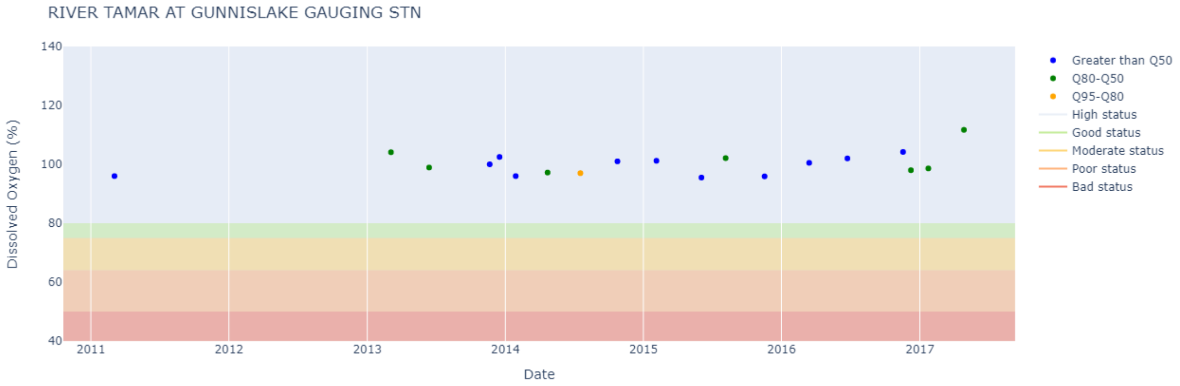

Figure 38: Dissolved oxygen saturation in River Tamar (at Gunnislake Gauging Station), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Tamar at Gunnislake Gauging Station (SW-81250174), see Figure 39 below, were inconsistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.048 mg/l) with 39% of results below 'Good' WFD status. Orthophosphate concentrations do not appear to be sensitive to river flows at this site. Data are too sparse to make comments on potential seasonality at this monitoring location.

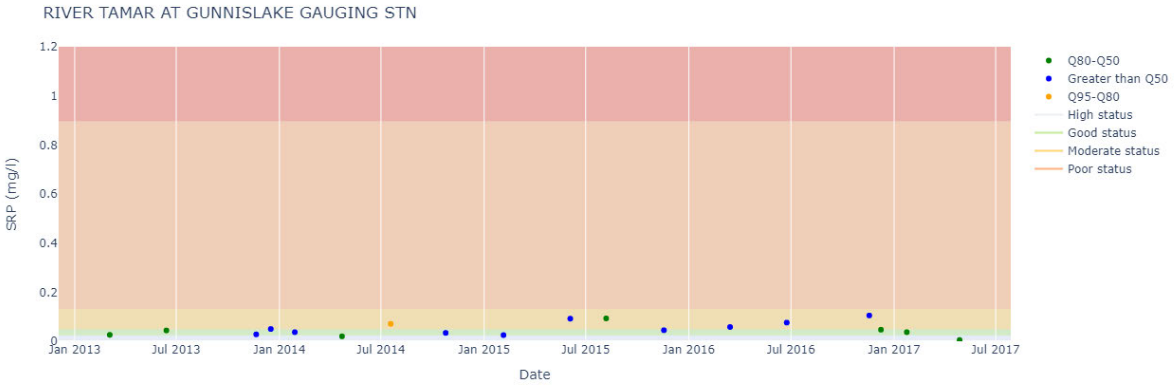

Figure 39: Orthophosphate in River Tamar (at Gunnislake Gauging Station), incorporating appropriate WFD status bands

Water quality monitoring from the third monitoring location on the River Tamar at Gunnislake Bridge (SW-81250144) has been used. Flow statistics from the River Tamar at Gunnislake Gauging station were used to inform the magnitude of flow on the day of sampling.

Analysis of long-term monitoring data identified the average pH recorded at this site was 7.61 and the maximum temperature recorded at this site was 21.4°C suggesting both are within the respective standards for Good WFD Status.

Ammonia concentrations, in River Tamar at Gunnislake Bridge (SW-81250144), see Figure 40 below, were mostly consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l), with 0.8% of the results below ‘Good’ WFD status. Ammonia concentrations at this site do not appear to be sensitive to river flows. Weak seasonality is apparent at this site, with ammonia peaks generally seen in winter.

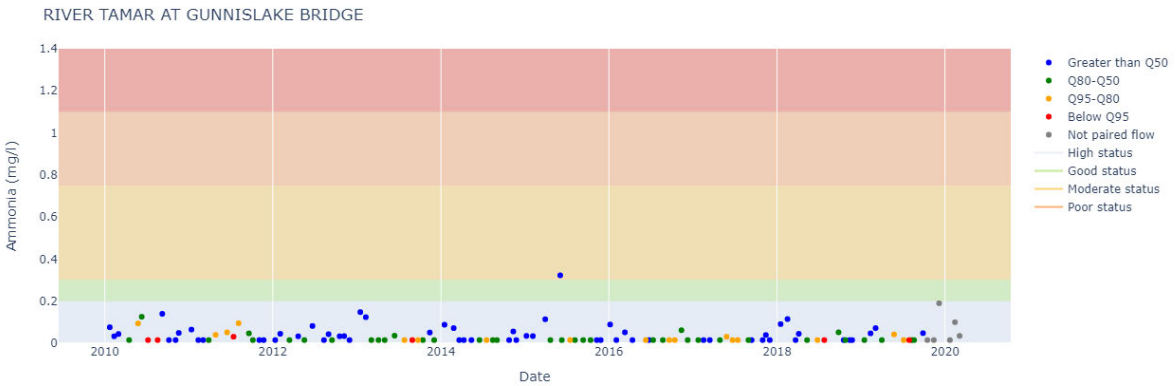

Figure 40: Total ammonia in River Tamar (at Gunnislake Bridge), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements for River Tamar at Gunnislake Bridge (SW-81250144), see Figure 41 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. A weak seasonal pattern appears to develop at this site from 2016 onwards, with peaks coinciding with late spring/early summer.

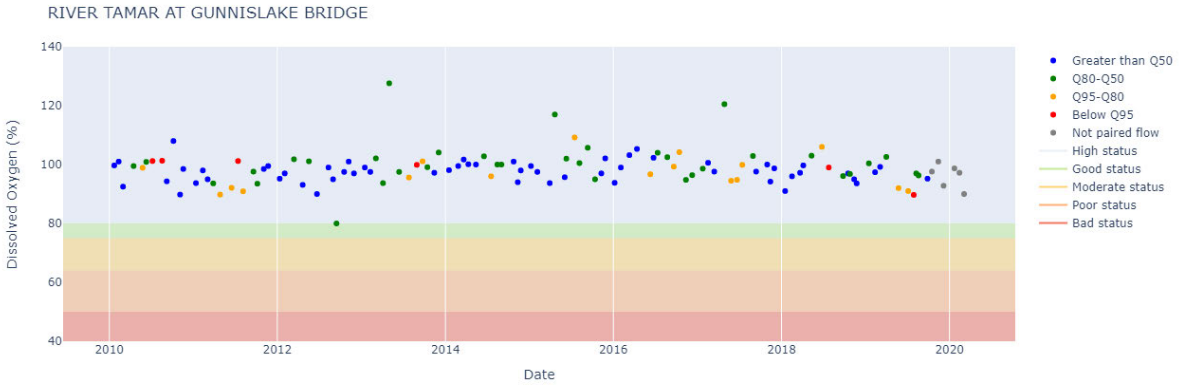

Figure 41: Dissolved oxygen saturation in River Tamar (at Gunnislake Bridge), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Tamar at Gunnislake Bridge (SW-81250144), see Figure 42 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.048 mg/l) with 34% of results below ‘Good’ WFD status. Orthophosphate concentrations appear to be somewhat sensitive to river flows at this site, with higher concentrations tending to coincide with lower flows. This pattern is emphasised by seasonality in the peaks in orthophosphate at this site, which often occur in summer.

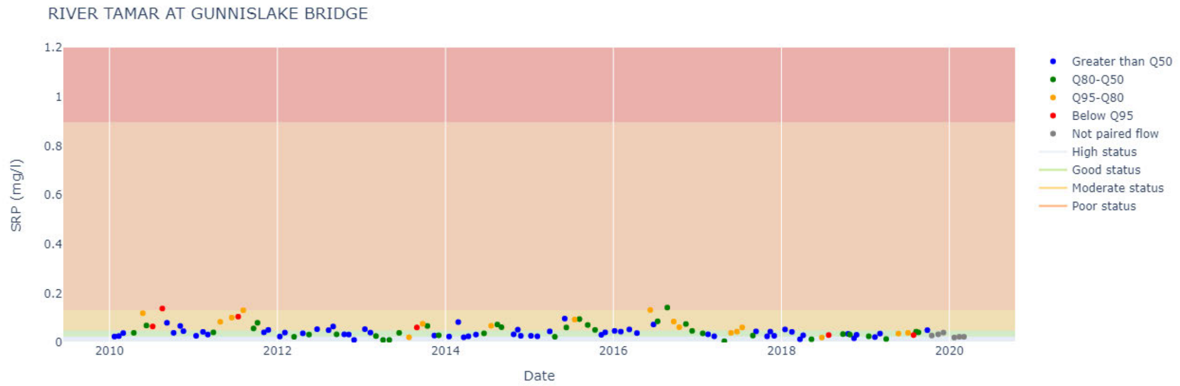

Figure 42: Orthophosphate in River Tamar (at Gunnislake Bridge), incorporating appropriate WFD status bands

Roadford Lake was classified by the Environment Agency at overall Moderate status for 2015, likewise for the Tamar (Lyd to Inny), Lower Lyd and Lower River Tamar. The Wolf and Thrushel waterbodies were classified as overall status Good. All status elements reviewed, including physic-chemical elements were classified in 2015 as Moderate status or above. Of particular note is Phosphate at Moderate status in the Tamar (River Lyd to River Inny), with RNAGs including diffuse pollution relating to agriculture, and point source pollution caused by continuous sewage discharge.

Table 10 WFD status for GB108047008020 (Wolf)

	Classification	2015	2019
	Overall	Good	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Good	Good

	WFD status element	2015	2019
Physio-chemical	Temperature	Good	Good
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Good	High

	WFD status element	2015	2019
Biological Quality	Macrophytes & Phytobenthos Combined	Good	Good
	Fish	High	Good
	Invertebrates	High	High

Table 11 WFD status for GB108047008010 (Thrushel)

	Classification	2015	2019
	Overall	Good	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Good	Good

	WFD status element	2015	2019
Physio-chemical	Temperature	High	High
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	High	High
Biological Quality	Macrophytes & Phytobenthos Combined	Good	Good
	Fish	Good	Good
	Invertebrates	High	High

Table 12 WFD status for GB108047007731 (Lower River Lyd)

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Good

	WFD status element	2015	2019
Physio-chemical	Temperature	High	High
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	High	High
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Good
	Fish	-	High
	Invertebrates	High	High

Table 13 WFD status for GB108047007910 (Tamar (River Lyd to River Inny)) and RNAGs

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	Good	High
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Moderate	Moderate

	WFD status element	2015	2019
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Moderate
	Fish	-	-
	Invertebrates	High	High

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**
Diffuse source	Agriculture – Livestock (Poor soil management)	Phosphate
Diffuse source	Agriculture – Livestock (Poor soil management)	Phosphate
Point source	Sewage discharge (continuous)	Phosphate

Table 14 WFD status for GB108047007860 (Lower River Tamar)

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	High	Good
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Good	Good
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Moderate
	Fish	-	-
	Invertebrates	High	High

Table 15 WFD status for GB30847000 (Roadford Lake) and RNAGs

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**
Diffuse source	Riparian/in-river activities (inc bankside erosion)	Total Phosphorus
Physical modification	Water Industry (Reservoir / Impoundment - non flow related)	Total Phosphorus

5.2.2 Hydrology

Flow data are available for two flow gauges, the Tamar at Polson Bridge (station ID: 47019) and the Lyd at Lifton Park (station ID: 47006), which are located slightly upstream of the new abstraction point at Gatherley on the Rivers Tamar and Lyd, respectively. The combined flow from these gauges should provide a good approximation of the flow at the abstraction point. Flow data for key flow statistics are provided for each gauge, as well as for the gauges combined, in Table 1Table 16. The percentage change in flow that the WCS2 abstraction of 125 MLD will result in relative to the combined flows from the Tamar and Lyd gauges is also shown.

Table 16: Flow statistics for low (Q95) to high (Q5) flows at flow gauges on the Tamar and River Lyd, slightly upstream of the abstraction. The combined flow from these gauges (Tamar + Lyd) should give a relatively close approximation of the flow at Gatherley intake. The percentage change that abstraction associated with Component 2 – Roadford Pumped Storage will result in is shown relative to the Tamar + Lyd flows.

Gauge	Q5	Q10	Q50 (m^3/s)	Q70	Q95
Tamar at Polson Bridge	42.6	28.5	4.55	2.15	0.62
Lyd at Lifton Park	17	12.2	2.81	1.63	0.65
Tamar + Lyd	59.6	40.7	7.36	3.78	1.27
~~% Change from WCS2 125 MLD (1.45 m^3/s) abstraction~~ *WCS2 125 MLD (1.45m^3/s) abstraction as % of total flow*	2.4	3.6	19.7	38.3	113.9

Flow data for key flow statistics at the nearest flow gauge, Tamar at Gunnislake (station ID: 47001), downstream of the proposed abstraction point are shown in Table 17. The percentage change in flow that the WCS2 abstraction of 125 MLD will result in relative to the flows at the Tamar at Gunnislake gauge is also shown.

Table 17: Flow statistics for low (Q95) to high (Q5) flows at the Tamar at Gunnislake flow gauge downstream of the abstraction. The percentage change that the WCS2 abstraction will result in is shown relative to the flow at Tamar at Gunnislake.

Gauge	Q5	Q10	Q50 (m^3/s)	Q70	Q95
Tamar at Gunnislake	81.33	56.7	11.8	6.02	2.22
~~% Change from WCS2 125 MLD (1.45 m^3/s) abstraction~~ *WCS2 125 MLD (1.45m^3/s) abstraction as % of total flow*	2.4	3.6	19.7	38.3	113.9

The abstraction of 125 MLD at Gatherley as part of Component 2 – Roadford Pumped Storage is proposed to operate between November and March. An analysis of the change in flow that the abstraction will cause has been provided based on simulation of river flow upstream and downstream of the abstraction intake for a period during 1975-1976 during which a 1-200 year drought event occurred, with a 1-200 year event representing the worst case scenario the scheme is being planned for (Figure 43). This analysis suggests the impact of the additional abstraction, which will be during periods that generally have higher flow, will be relatively minimal.

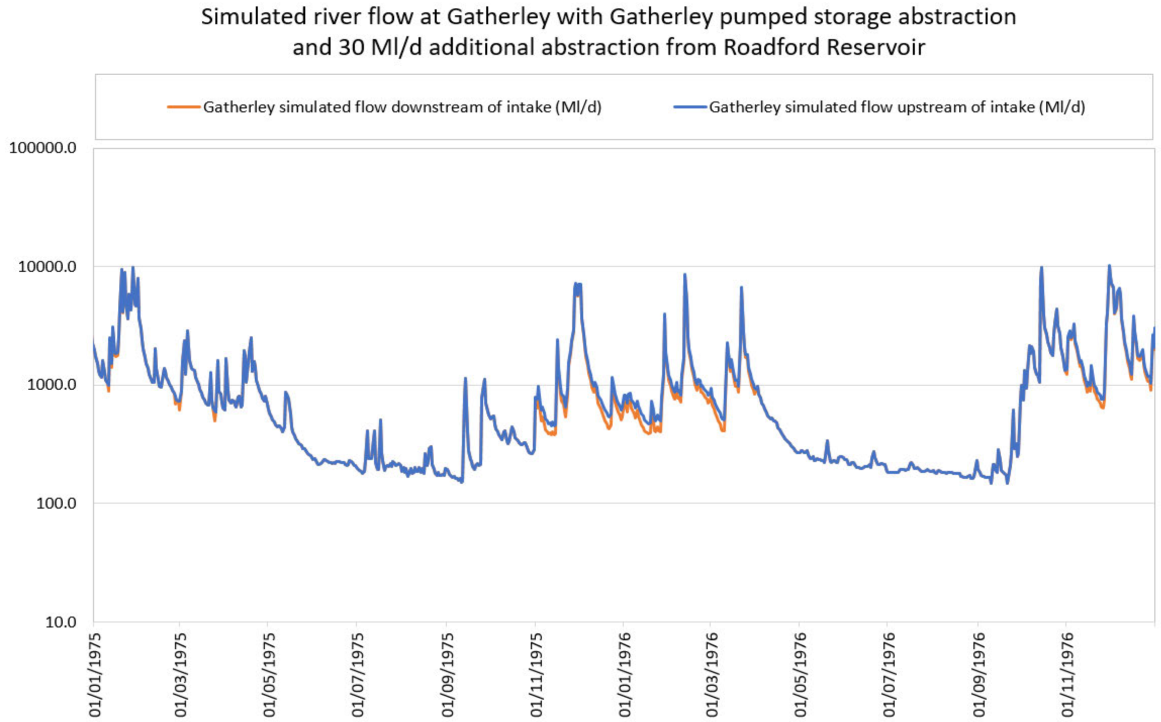

Figure 43:Simulated flow in the Tamar upstream and downstream of the Gatherley intake during 1975-1976.

As Roadford Lake is WFD waterbody, there is a requirement to consider the impact of the additional volume of water being discharged to the lake when the scheme is active. Table 18 shows estimates of the percentage of Roadford Storage that will be comprised by the transferred flow from the Tamar. This is based on the simulated volume of water in Roadford during the worst case drought scenario that is modelled on the 1-200 year drought event in 1975-1976.

Table 18: Percentage of Roadford Lake storage volume that will be comprised of the abstraction from the Tamar using simulated data from the 1975-76 drought period.

Year	Month	Gatherley total simulated pumped storage abstraction for month		Gatherley total simulated pumped storage abstraction for winter period	
		Ml	As % of Roadford net storage (%)	Ml	As % of Roadford net storage (%)
1975	11	3146	9.1	16679	48.3
1975	12	3488	10.1		
1976	1	3321	9.6		
1976	2	3263	9.5		
1976	3	3462	10.0		
1976	11	3375	9.8	16988	49.2
1976	12	3488	10.1		
1977	1	3488	10.1		
1977	2	3150	9.1		
1977	3	3488	10.1		

5.3 Hydrogeology

Potential hydrogeological impacts associated Component 2 – Roadford Pumped Storage are limited to the groundwater interactions that may result from the new pipelines from the Gatherley intake to Roadford Lake and from the pipeline from Roadford to Northcombe WTW. It is recognised that in some river reaches there can be interactions of river flow with superficial aquifers, however these interactions are unlikely to be impacted significantly by a decrease in flow in the Tamar as a result of the scheme.

The new pipeline route may interact with one WFD groundwater waterbodies:

- Tamar (GB40802G806700)

Impacts to these groundwater waterbodies could arise during construction and operation of the pipelines, however at this stage there is insufficient information about the nature of these risks to assess compliance with the WFD groundwater tests.

5.4 Summary of Component 2 (Roadford Pumped Storage) Level 1 WFD Assessment

5.4.1 Water bodies and activities passed forward from Level 1 as requiring further consideration

The Level 1 assessment screens the waterbodies against possible activities that are likely to take place as part of the proposed option. For this Gate 1 assessment, six WFD river water bodies passed forward from Level 1 screening based on medium and high impact scores. For GB3084700 (Roadford Lake) GB108047008020 (Wolf), GB108047008010 (Thrushel) and GB108047007731 (Lower Lyd) these waterbodies have been included in this assessment as they either receiving the abstracted water from the River Tamar or are downstream of Roadford Lake and consequently may be impacted by any changes in compensation regime. At present it is not known if any change to compensation flow will be required and so these waterbodies were screened in relating to water quality.

For (GB108047007910) Tamar (River Lyd to River Inny) and the next downstream waterbody GB108047007860 Lower River Tamar, these were related to abstraction activities (Table 19).

Table 19 Water bodies and activities passed forward from Level 1 as requiring further consideration for Roadford Pumped Storage option

Water body	ACWG listed activity
Wolf (GB108047008020)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body
Thrushel (GB108047008010)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body
Lower River Lyd (GB108047007731)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body
Roadford Lake (GB3084700)	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body

Water body	ACWG listed activity
Tamar (River Lyd to River Inny) (GB108047007910)	New or increased surface water abstraction
Lower River Tamar (GB108047007860)	New or increased surface water abstraction

5.5 Summary of Component 2 (Roadford Pumped Storage) Level 2 WFD Assessment

5.5.1 Potential non-compliance with WFD objectives in Roadford Lake

In the Roadford Lake water body, there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Moderate physico-chemical status for Total phosphorus, and the objective of Moderate for this WFD status objective by 2021. There is potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to improve P status, preventing deterioration and ensuring there is no impediment to improvement).

Table 20 WFD compliance assessment summary for the Poole effluent re-use option for Stour Middle water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Roadford Lake (GB30847000)	No – impediments to GES/GEP No – Possible compromise of RBMP2 measures	sico-chemical quality element – Total Phosphorus

The assessment identified that due to the elevated levels of phosphate in River Tamar relative to Roadford lake, the new abstraction when discharged into Roadford lake may lead to increases in Total Phosphorus. Considering the timing of this scheme it is likely this effect will be reduced as abstractions will take place when phosphate concentrations are lower.

5.5.2 Potential non-compliance with WFD objectives in the River Wolf

In the River Wolf water body, there is the potential for deterioration from Good status. This is related to the existing Moderate physico-chemical status for the River Tamar whereas the River Wolf currently achieves Good status with an objective of Good status by 2015. There is potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to prevent deterioration).

Table 21 WFD compliance assessment summary for the Roadford Pumped Storage option for the River Wolf water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
River Wolf (GB108047008020)	No – deterioration in status possible No – Possible compromise of RBMP2 measures	sico-chemical quality element – Phosphate

The assessment identified that due to the elevated levels of phosphate in the new discharge combined with the objective for Good status that there is a risk of deterioration with respect to the relationship between the new discharge to Roadford lake and any changes to the compensation regime from the reservoir on downstream reaches which may increase phosphate concentrations. It is expected that scheme timing may mitigate any effect on phosphate.

It is noted that there is a lack of understanding of the potential impact of the scheme on compensation flows to the Wolf waterbody. It is assumed that the scheme will not substantially alter the compensation flow regime from Roadford Lake as the transfer of water from the Tamar is intended to increase storage volumes in Roadford Lake, however if compensations flows are required to increase as a result of the scheme, the hydrological and linked impacts on the Wolf waterbody will need to be assessed.

5.5.3 Potential non-compliance with WFD objectives in the River Thrushel

In the River Thrushel water body, there is the potential for status deterioration from Good status. This is related to the existing Moderate physico-chemical status for the River Tamar whereas the River Thrushel currently achieves Good status with an objective of Good status by 2015.

Table 22 WFD compliance assessment summary for the Roadford Pumped Storage option for the River Wolf water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Thrushel (GB108047008010)	No – deterioration in status possible No – Possible compromise of RBMP2 measures	sico-chemical quality element – Phosphate

The assessment identified that due to the elevated levels of phosphate in the new discharge combined with the objective for Good status, the risk is primarily related to the relationship between the new discharge to Roadford lake and any changes to the compensation regime from the reservoir on downstream reaches which may increase phosphate concentrations. It is expected that scheme timing may mitigate any effect on phosphate. There is potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to improve P status, preventing deterioration and ensuring there is no impediment to improvement).

It is noted that there is a lack of understanding of the potential impact of the scheme on compensation flows to the Thrushel waterbody. It is assumed that the scheme will not substantially alter the compensation flow regime from Roadford Lake as the transfer of water from the Tamar is intended to increase storage volumes in Roadford Lake, however if compensations flows are required to increase as a result of the scheme, the hydrological and linked impacts on the Thrushel waterbody will need to be assessed.

5.5.4 Potential non-compliance with WFD objectives in the River Lyd

In the Lower River Lyd water body, there is the potential for status deterioration from Good status. This is related to the existing Moderate physico-chemical status for the River Tamar whereas the Lower River Lyd currently achieves High status with an objective of Good status by 2015.

Table 23 WFD compliance assessment summary for the Roadford Pumped Storage option for the Lower River Lyd water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Lower River Lyd (GB108047007731)	No – impediments to GES/GEP No – Possible compromise of RBMP2 measures	sico-chemical quality element – Phosphate

The assessment identified that due to the elevated levels of phosphate in the new discharge combined with the objective for Good status, the risk is primarily related to the relationship between the new discharge to Roadford lake and any changes to the compensation regime from the reservoir on downstream reaches which may increase phosphate concentrations. It is expected that scheme timing may mitigate any effect on phosphate. There is potential for RBMP2 objectives relating to phosphate/total phosphorus to be compromised (objectives to improve P status, preventing deterioration and ensuring there is no impediment to improvement).

It is noted that there is a lack of understanding of the potential impact of the scheme on compensation flows to the Lower River Lyd waterbody. It is assumed that the scheme will not substantially alter the compensation flow regime from Roadford Lake as the transfer of water from the Tamar is intended to increase storage volumes in Roadford Lake, however if compensations flows are required to increase as a result of the scheme, the hydrological and linked impacts on the Lower River Lyd waterbody will need to be assessed.

5.5.5 Potential non-compliance with WFD objectives in the Tamar (River Lyd to River Inny)

In the Tamar (River Lyd to River Inny) water body, there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Moderate physico-chemical status for phosphate in the River Tamar (Lyd to Inny) with an objective of Good status by 2027.

Table 24 WFD compliance assessment summary for the Roadford Pumped Storage option for the River Tamar (River Lyd to River Inny) water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Lower River Lyd (GB108047007910)	Possible – impediments to GES/GEP	sico-chemical quality element – Phosphate

The assessment identified that due to the elevated levels of phosphate in the River Tamar (Lyd to Inny), flow reduction from the new abstraction and subsequent reduced dilution that there is potential to increase phosphate concentrations downstream during scheme operation which could impede achieving Good status.

5.5.6 Potential non-compliance with WFD objectives in the Lower River Tamar

In the Lower River Tamar water body, there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Moderate physico-chemical status for phosphate in the Lower River Tamar with an objective of Good status by 2027.

Table 25 WFD compliance assessment summary for the Roadford Pumped Storage option for the River Tamar (River Lyd to River Inny) water body

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Lower River Tamar (GB108047007860)	Possible – impediments to GES/GEP	sico-chemical quality element – Phosphate

The assessment identified that due to the elevated levels of phosphate and copper in the Lower River Tamar, flow reduction from the new abstraction and subsequent reduced dilution that there is potential to increase phosphate concentrations downstream during scheme operation which could impede achieving Good status.

5.5.7 Impacts to groundwater waterbodies

The Tamar groundwater waterbody has been identified as potentially at risk of WFD non-compliance as a consequence of pipeline construction and operation as part of WCS2. There is insufficient information available on the design, construction and operation plans for these pipelines to make an assessment of the potential issues that may cause WFD non-compliance with tests for groundwater. However, risks related to construction can be mitigated using construction best practice. Issues surrounding dewatering and associated discharge to surface waterbodies, or issues of groundwater pollution due to pipeline failure will require further consideration when in Gate-2 when the scheme design details are more advanced.

6 Component 3 (Transmission System to Wessex)

6.1 Scheme Overview

This option is considered in order to support transmission options consisting of multiple subcomponents.

a) Northcombe to Prewley
b) Prewley to Parsonage
c) Parsonage to Pynes
d) River Exe: Allers to Pynes (relevant as impacted section of watercourse)
e) River Exe abstraction (new) at Bolham Weir
f) River Exe (abstraction) to Allers
g) Allers to Woodgate
h) Woodgate to Kingston St Mary
i) Kingston St Mary to Summerslade

The option proposes 30 ML/D displacement between Northcombe WTW and Pynes WTW (a-c) and abstraction from the Exe at 30 ML/D (d-g).

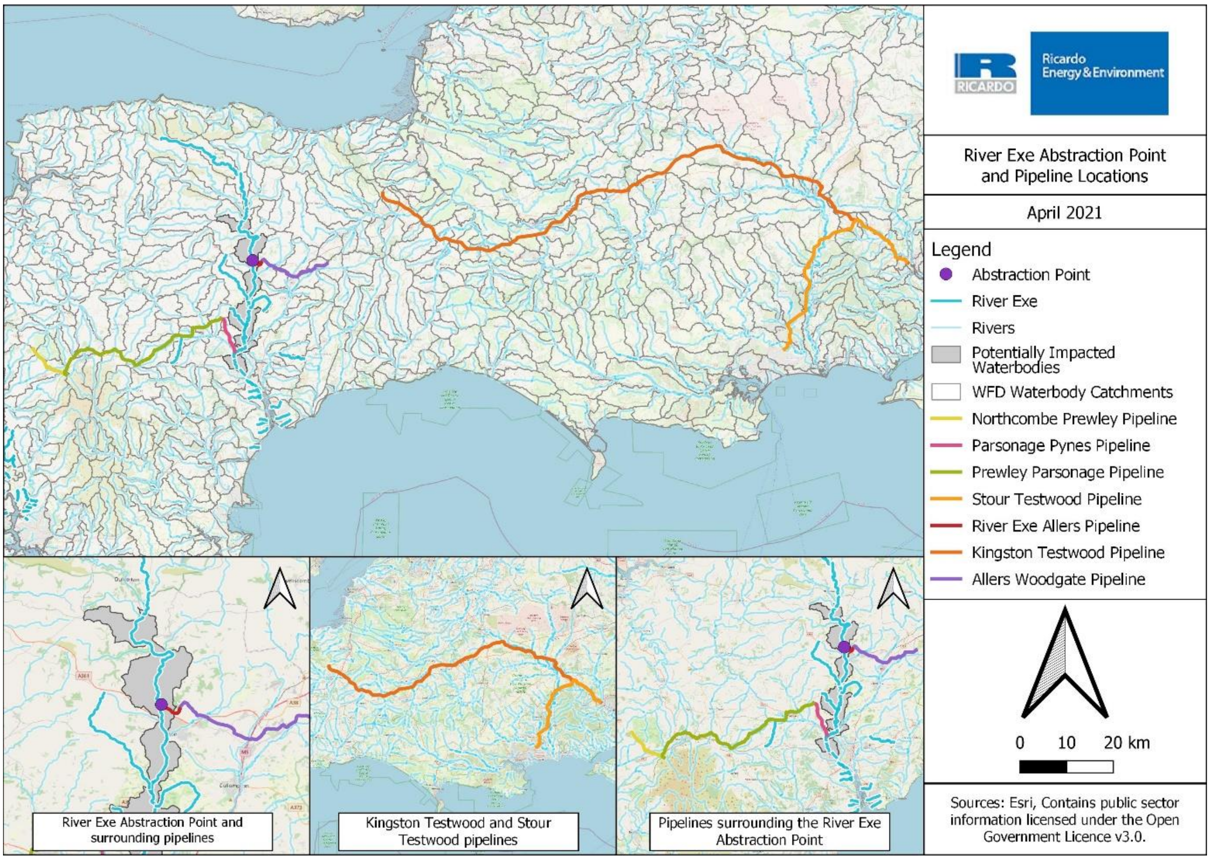

Figure 44 Map showing the location of the proposed Tamar abstraction and Roadford Reservoir

Three WFD River waterbodies (WBs) are identified as potentially being impacted by the transmission system:

- Exe (Barle to Culm): GB108045015050
- Exe (Culm to Creedy): GB108045009060
- Exe (Creedy to Estuary): GB108045009040

Nineteen WFD groundwater waterbodies (WBs) are identified as potentially being impacted by the transmission system:

- Tamar (GB40802G806700)
- South Zeal Area (GB40802G800800)
- Exeter-Whiddon Down Culm (GB40802G800900)
- Permian Aquifers in Central Devon (GB40801G801700)
- Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)
- Lower Dorset Stour and Lower Hampshire Avon
- (GB40802G805800)
- Upper Hampshire Avon (GB40801G806900)
- Central Hants Lambeth Group (GB40702G503800)
- Central Hants Bracklesham Group (GB40702G500900)
- Permian Aquifers in Central Devon (GB40801G801700)
- Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)
- Tone and North Somerset Streams (GB40802G806400)
- Dyrham Formation (North of Yeovil - Fragmented GWB)
- (GB40802G803700)
- Yeovil Bridport Sands / Inferior Oolite (GB40801G804000)
- Corallian – Wincanton (GB40802G804400)
- Upper Hampshire Avon (GB40801G806900)
- River Test Chalk (GB40701G501200)
- Central Hants Bracklesham Group (GB40702G500900)

6.2 Environmental Baseline

6.2.1 Water Quality

This section sets out the baseline water quality of the relevant waterbodies.

Exe (Barle to Culm): GB1108045015050

The Exe (Barle to Culm) includes three water quality monitoring locations:

- River Exe at Exebridge (SW-70550329)
- River Exe U/S Tiverton STW (SW-70550133)
- River Exe at Thorverton Gauging Station (SW-70540224)

The first site used for this assessment, the River Exe at Exebridge (SW-70550329)has been used in conjunction with flow statistics from the River Exe at Stoodleigh Gauging Station to inform the water quality baseline.

Total ammonia concentrations, in River Exe at Exebridge (SW-70550329) see Figure 45 below, were all consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site.

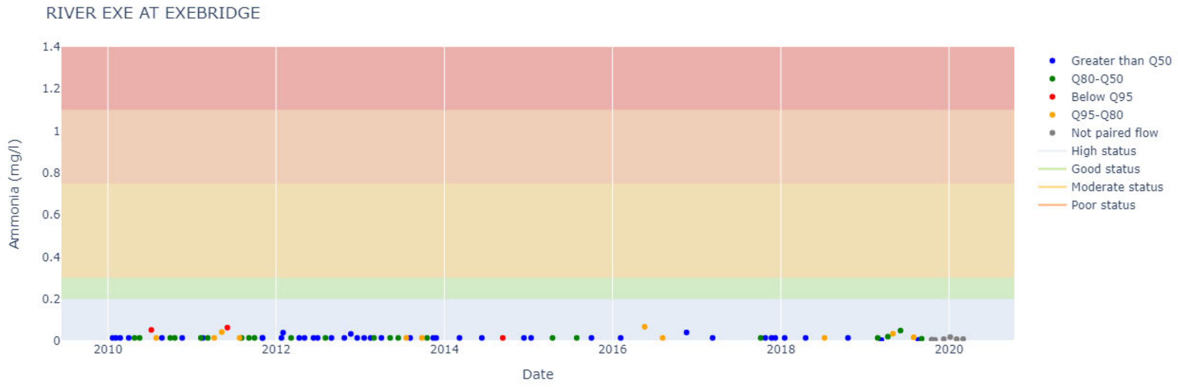

Figure 45: Total ammonia in River Exe at Exebridge (SW-70550329), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Exe at Exebridge (SW-70550329), see Figure 46 below, were consistent with the 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

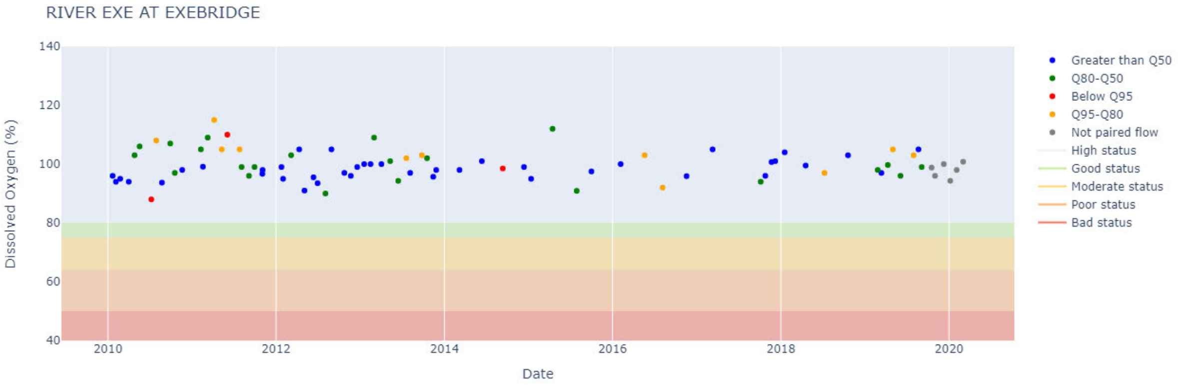

Figure 46: Dissolved oxygen saturation in River Exe at Exebridge (SW-70550329), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Exe at Exebridge (SW-70550329), see Figure 47 below, were mostly consistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.031 mg/l) with most results below 'Good' WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

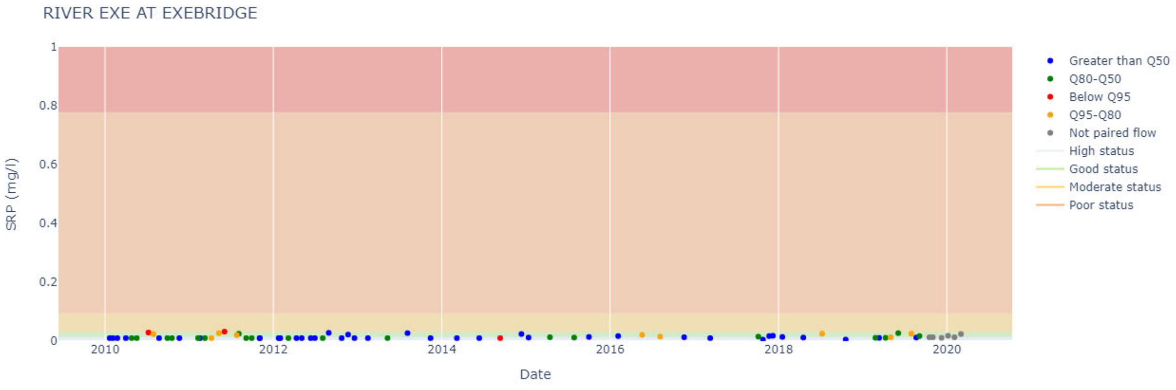

Figure 47: Orthophosphate in River Exe at Exebridge (SW-70550329), incorporating appropriate WFD status bands

The second site used for this assessment, River Exe U/S Tiverton STW (SW-70550133) has been used in conjunction with flow statistics from the River Exe at Stoodleigh Gauging Station to inform the water quality baseline.

Total ammonia concentrations in the River Exe U/S Tiverton STW (SW-70550133) see Figure 48 below, were all consistent with 'Good' WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site.

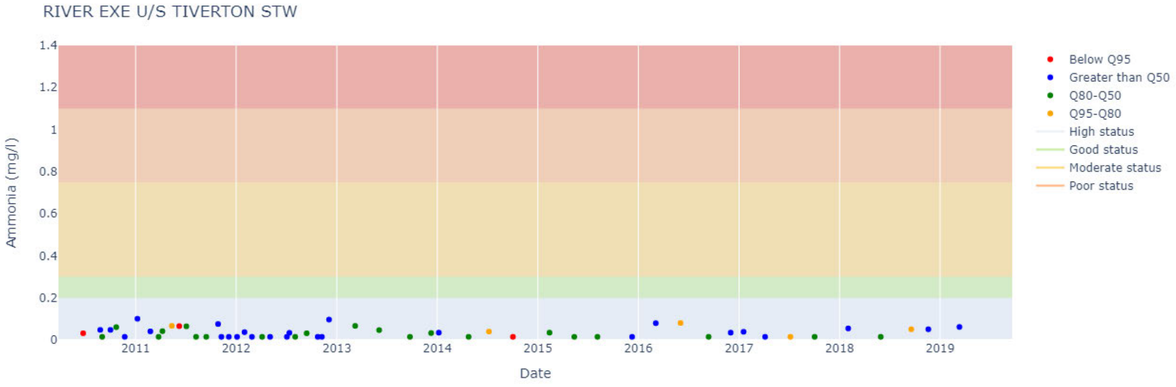

Figure 48: Total ammonia in River Exe U/S Tiverton STW (SW-70550133), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Exe U/S Tiverton STW (SW-70550133), see Figure 49 below, were consistent with the 'Good' WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

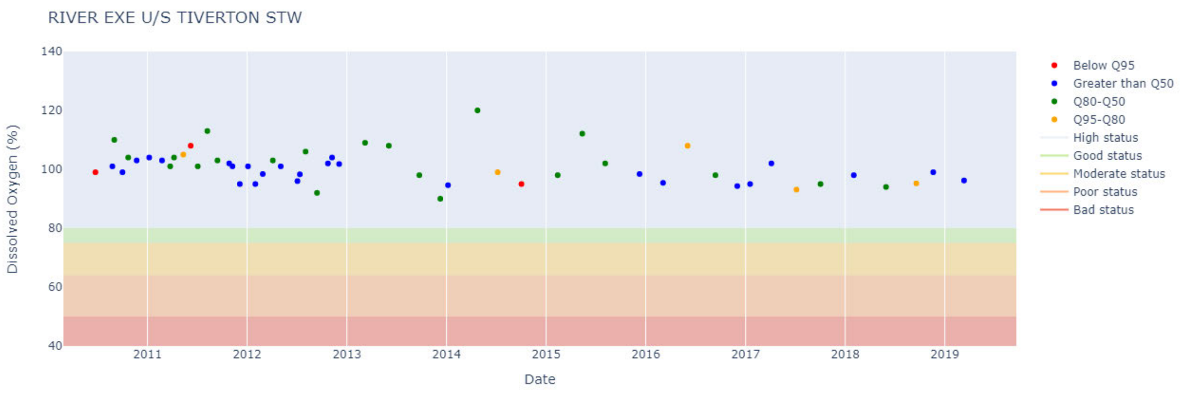

Figure 49: Dissolved oxygen saturation in River Exe U/S Tiverton STW (SW-70550133), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Exe U/S Tiverton STW (SW-70550133), see Figure 50 below, were mostly consistent with 'Good' WFD status for phytobenthos and macrophytes for the watercourse (0.046 mg/l) with most results below 'Good' WFD status. Orthophosphate concentrations do not appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

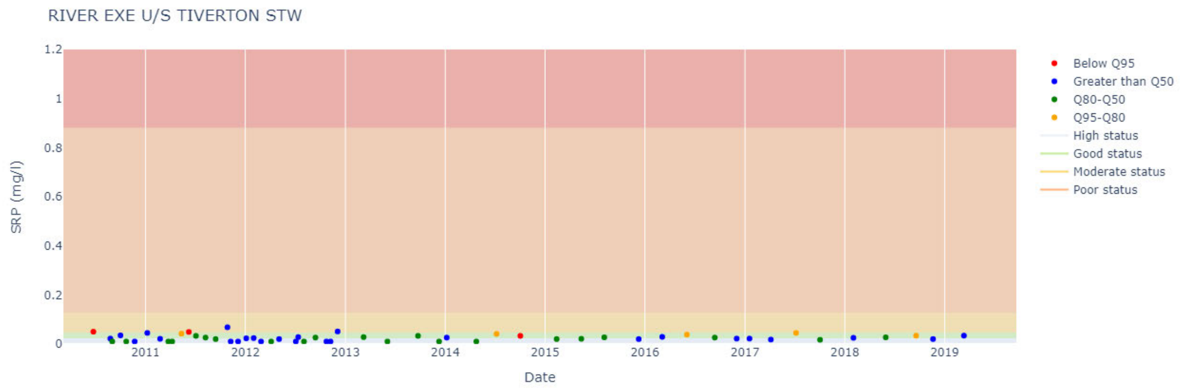

Figure 50: Orthophosphate in River Exe U/S Tiverton STW (SW-70550133), incorporating appropriate WFD status bands

The third site used for this assessment, River Exe at Thorverton Gauging Station (SW-70540224) has been used in conjunction with flow statistics from the River Exe at Thorverton Gauging Station to inform the water quality baseline.

Total ammonia concentrations in the River Exe at Thorverton Gauging Station (SW-70540224), see Figure 51 below, were all consistent with 'Good' WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site.

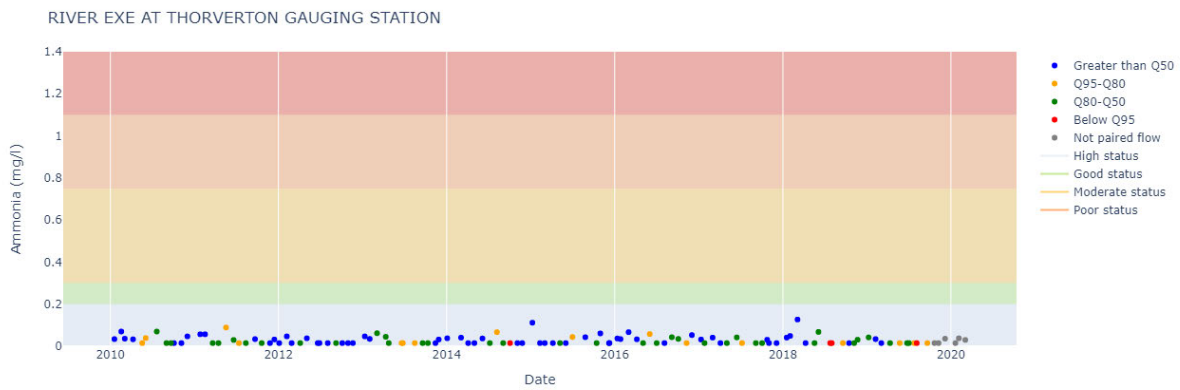

Figure 51: Total ammonia in River Exe at Thorverton Gauging Station (SW-70540224), incorporating appropriate WFD status bands

Dissolved oxygen saturation measurements River Exe at Thorverton Gauging Station (SW-70540224), see Figure 52 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (75% dissolved oxygen saturation). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

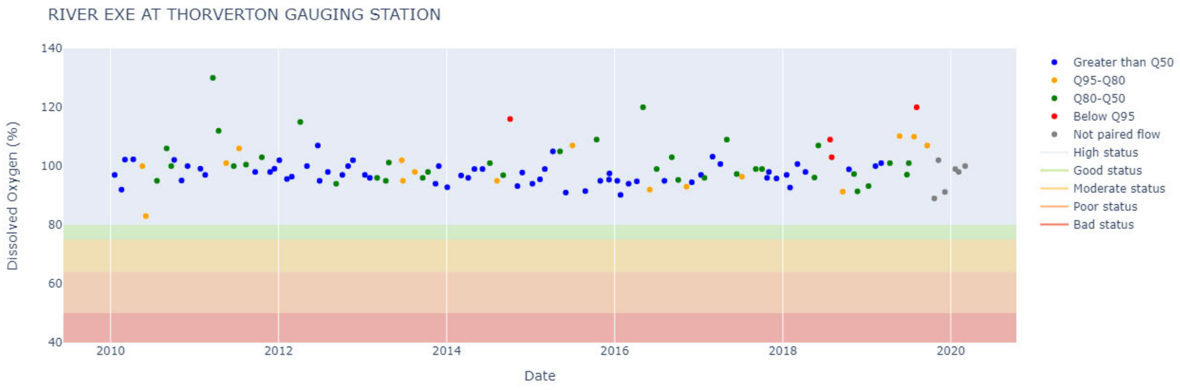

Figure 52: Dissolved oxygen saturation in River Exe at Thorverton Gauging Station (SW-70540224), incorporating appropriate WFD status bands

Orthophosphate concentrations in River Exe at Thorverton Gauging Station (SW-70540224), see Figure 53 below, were mostly consistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.048 mg/l) with most results below ‘Good’ WFD status. Orthophosphate concentrations do not appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

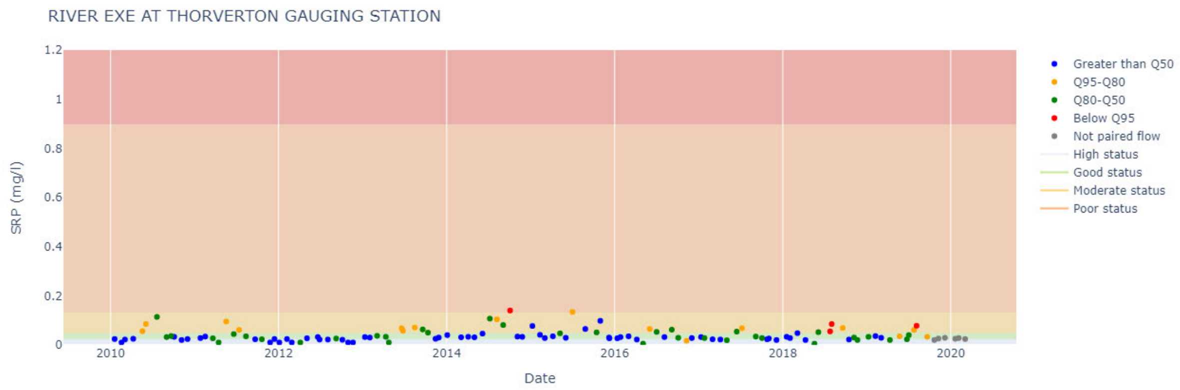

Figure 53: Orthophosphate in River Exe at Thorverton Gauging Station (SW-70540224), incorporating appropriate WFD status bands

Exe (Culm to Creedy): GB108045009060

The Exe (Culm to Creedy) includes one water quality monitoring location:

- River Exe at Stafford Bridge (SW-70540155)

The first site used for this assessment, the River Exe at Stafford Bridge (SW-50340205) has been used in conjunction with flow statistics from the River Exe at Thorverton Gauging Station to inform the water quality baseline.

Total ammonia concentrations, in River Exe at Stafford Bridge (SW-50340205) see Figure 54 below, were all consistent with ‘Good’ WFD status for fish and invertebrates (0.6 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site.

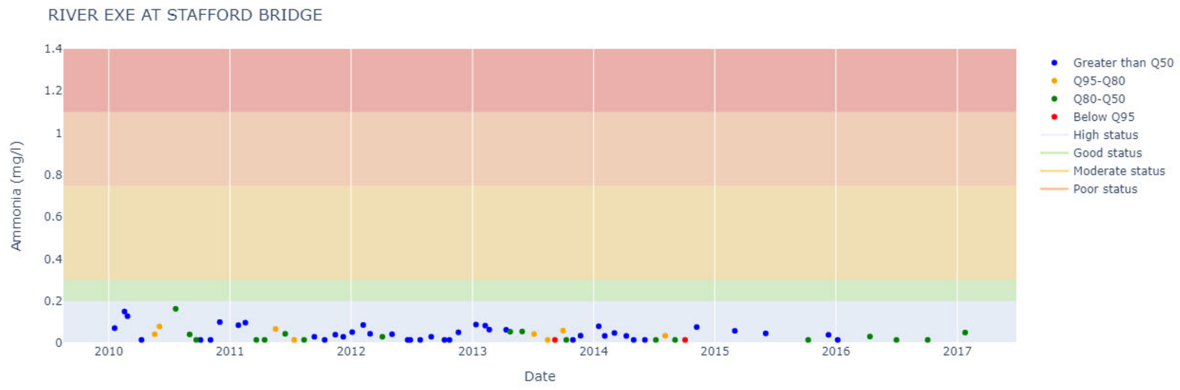

Figure 54: Total ammonia in River Exe at Stafford Bridge (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Exe at Stafford Bridge (SW-50340205), see Figure 55 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (dissolved oxygen saturation of 75%). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

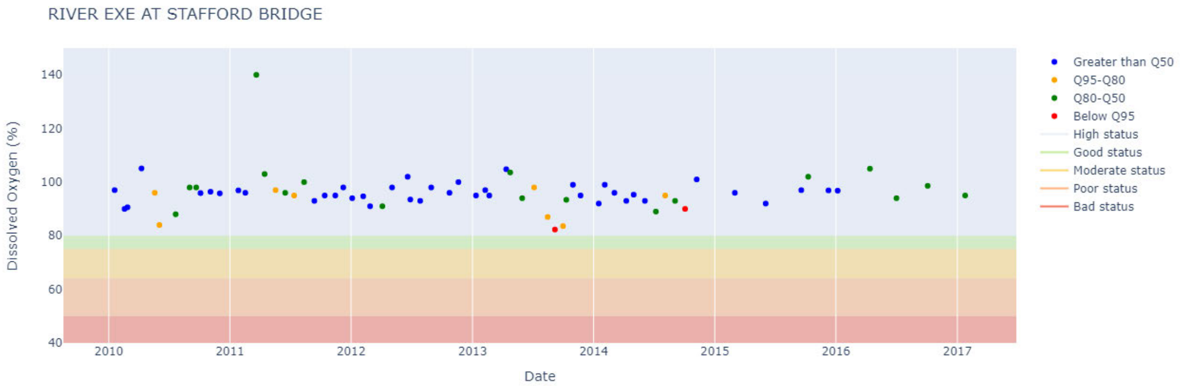

Figure 55: Dissolved oxygen saturation in River Exe at Stafford Bridge (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Exe at Stafford Bridge (SW-50340205) see Figure 56 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.058 mg/l) with several results above ‘Good’ WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

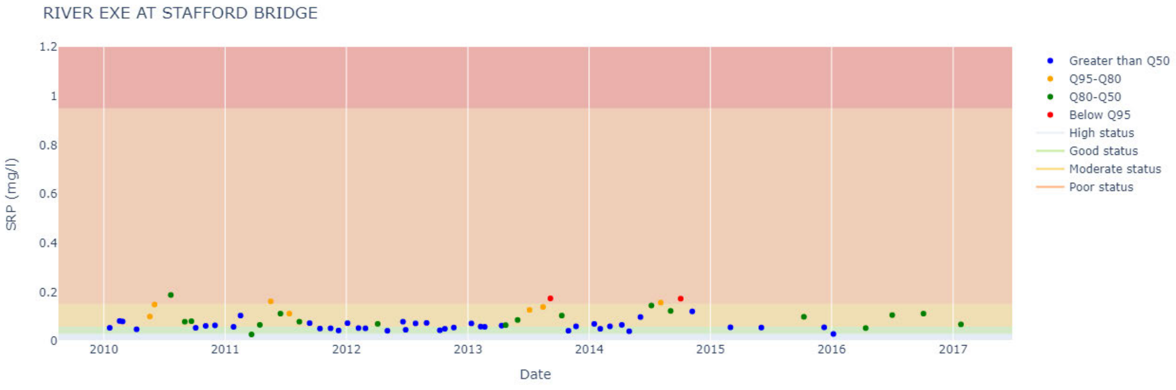

Figure 56: Orthophosphate in River Exe at Stafford Bridge (SW-50340205), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Exe (Creedy to Estuary): GB108045009040

The Exe (Creedy Estuary) includes one water quality monitoring location:

- River Exe at Trews Weir Exeter (SW-70540110)

The first site used for this assessment, the River Exe at Trews Weir Exeter (SW-70540110) has been used in conjunction with flow statistics from the River Exe at Trews Weir Gauging Station to inform the water quality baseline.

Total ammonia concentrations, in River Exe at Trews Weir Exeter (SW-70540110) see Figure 57below, were all consistent with ‘Good’ WFD status for fish and invertebrates (0.3 mg/l). Ammonia concentrations at this site do not appear to be sensitive to river flows. Seasonality is apparent at this site.

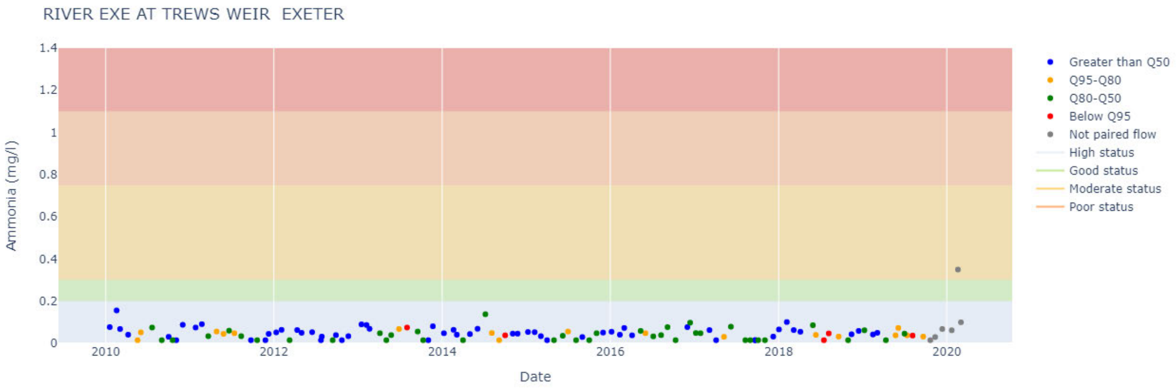

Figure 57: Total ammonia in River Exe at Trews Weir Exeter (SW-70540110), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Dissolved oxygen saturation measurements River Exe at Trews Weir Exeter (SW-70540110), see Figure 58 below, were consistent with the ‘Good’ WFD status for fish and invertebrates (dissolved oxygen saturation of 75%). Dissolved oxygen saturation does not appear to be sensitive to river flows at this site. No seasonality is apparent at this site.

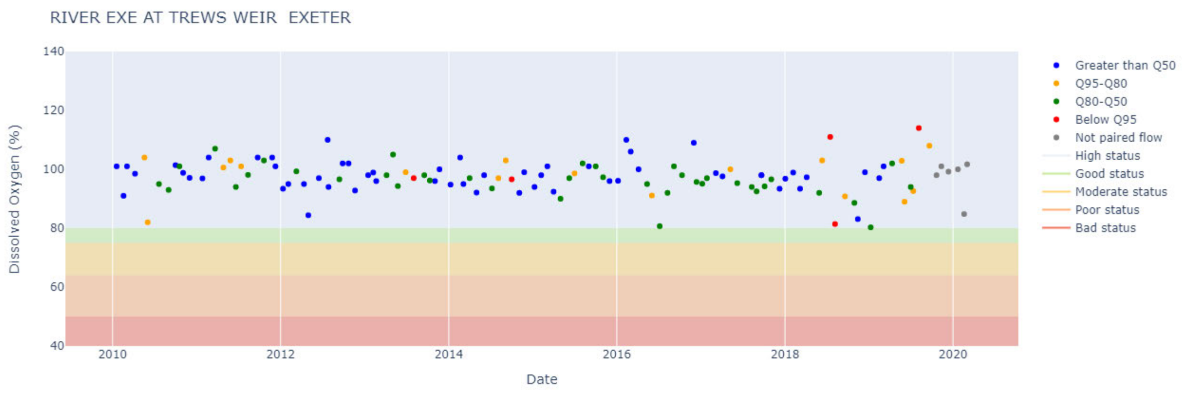

Figure 58: Dissolved oxygen saturation in River Exe at Trews Weir Exeter (SW-70540110), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Orthophosphate concentrations in River Exe at Trews Weir Exeter (SW-70540110) see Figure 59 below, were inconsistent with ‘Good’ WFD status for phytobenthos and macrophytes for the watercourse (0.061 mg/l) with most results above ‘Good’ WFD status. Orthophosphate concentrations appear to be sensitive to river flows at this site. Mild seasonality is apparent at this site.

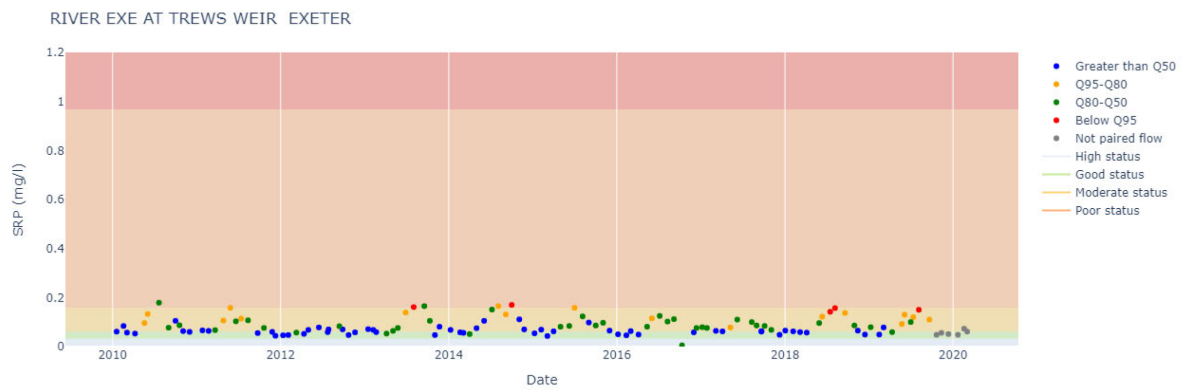

Figure 59: Orthophosphate in River Exe at Trews Weir Exeter (SW-70540110), incorporating appropriate WFD status bands (flow statistic information derived from the Stour at Throop Gauging Station).

Tables 26-28 detail the current WFD statuses for the each of the waterbodies that will be impacted by the scheme, along with reasons for not achieving good status (RNAGS) if the water body is not currently at good status.

Table 26 WFD status for G108045015050 (Exe (Barle to Culm))

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	High	Good
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Good	Good
Bi ol o gi	Macrophytes & Phytobenthos Combined	Moderate	Moderate

	WFD status element	2015	2019
	Fish	-	-
	Invertebrates	High	High

No RNAGS are recorded by the Environment Agency for this waterbody.

Table 27 WFD status for GB108045009060 (Exe (Culm to Creedy)) and RNAGs

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	High	High
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Moderate	Moderate
Biologica l Quality	Macrophytes & Phytobenthos Combined	Moderate	Moderate
	Fish	-	-

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**
Diffuse source	Poor soil management (Agriculture – Arable)	Phosphate
Diffuse source	Poor nutrient management (Agriculture – Livestock)	Phosphate
Point source	Sewage discharge (continuous)	Phosphate

Table 28 WFD status for GB108045009040 (Exe (Creedy to Estuary)) and RNAGs

	Classification	2015	2019
	Overall	Moderate	Moderate
	Ecological (Chemical)	Good	Fail
	Ecological	Moderate	Moderate

	WFD status element	2015	2019
Physio-chemical	Temperature	Good	Good
	pH	High	High
	Dissolved oxygen	High	High
	Ammonia	High	High
	Phosphate	Moderate	Moderate
Biological Quality	Macrophytes & Phytobenthos Combined	Moderate	Moderate
	Fish	-	High
	Invertebrates	-	-

Reasons for not achieving good status and reasons for deterioration		
Significant Water Management Issues	**Activity**	**Classification Element**
Diffuse Source	Poor Livestock Management	Phosphate
Point Source	Sewage discharge (continuous)	Phosphate

6.2.2 Hydrology

Component 3 involves a new abstraction of 30 MLD at Bolham Weir to supply Allers WTW (for treatment and onwards transmission), with a reduction of 30 MLD in the abstraction at Northbridge to Pynes WTW to offset the new abstraction. It is noted that at present this option is being proposed as a new abstraction, as opposed to an increase to the current abstraction that is permitted at Bolham Weir. As the new abstraction is upstream of where the reduction in abstraction is taking place, there is a reach of the River Exe that will see reduced flow as a result of Component 3 (forming part of the wider River Tamar – Testwood transfer scheme). Within this impacted reach, there is a flow gauge, the Exe at Thorverton (station ID: 45001), that can be used to provide an understanding of the potential reduction in flow as result of the new abstraction (Table 29). It should be noted that the Exe at Thorverton gauge is ~14.5 km downstream of the abstraction point, with various tributary inflows between the abstraction point and gauge. Thus, the flow values and percentage change as a consequence of the scheme shown in Table 29 are an underestimate of the impact in areas upstream of the gauging location.

It has also been flagged that the current Bolham Weir abstraction has a prescribed flow that is linked to flows of 3.16 m^3/s at Thorverton and protects low flows in the Exe at flows < Q85. As this option is a new abstraction, it cannot be assumed that it will be subject to the prescribed flow that is used on the abstraction licence for the current Bolham Weir abstraction and thus impacts could be seen across the flow duration curve. However, if the new abstraction at Bolham Weir is licenced with the same prescribed flow as the current abstraction, the potential for impacts on low flow hydrology is lessened, with the potential for impacts being seen at flows that are < Q70 and > Q85.

Table 29: Flow data for key flow statistics at the Exe at Thorverton gauge within the reach of the Exe that will be impacted by the new abstraction within Component 3. The percentage change in flow as a result of the new abstraction is also shown.

Gauge	Q5	Q10	Q50 m^3/s	Q70	Q95
Exe at Thorverton	53.1	38.8	8.94	5.02	2.04
% flow reduction from 30 MLD (0.35) abstraction for WCS3	0.7	0.9	3.9	6.9	17.0

6.3 Hydrogeology

Potential hydrogeological impacts associated with WCS3 are limited to the groundwater interactions that may result from the new pipelines from the Gatherley intake to Roadford Lake and from the pipeline from Roadford to Northcombe WTW. It is recognised that in some river reaches there can be interactions of river flow with superficial aquifers, however these interactions are unlikely to be impacted significantly by a decrease in flow in the Tamar as a result of the scheme.

Component 3a: Northcombe to Prewley pipeline may interact with two WFD groundwater waterbodies:

- Torridge and Hartland Streams (GB40802G800600)

- Tamar (GB40802G806700)

Component 3b: Prewley to Parsonage pipeline route may interact with three WFD groundwater waterbodies:

- Tamar (GB40802G806700)
- Torridge and Hartland Streams (GB40802G800600)
- South Zeal Area (GB40802G800800)
- Exeter-Whiddon Down Culm (GB40802G800900)
- Permian Aquifers in Central Devon (GB40801G801700)
- Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)

Component 3c: Parsonage to Pynes pipeline route may interact with two WFD groundwater waterbodies:

- Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)
- Permian Aquifers in Central Devon (GB40801G801700)
- Exeter-Whiddon Down Culm (GB40802G800900)

Component 3f: Exe to Allers WTW abstraction pipeline route may interact with three WFD groundwater waterbody:

- Permian Aquifers in Central Devon (GB40801G801700)
- Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)
- Culmstock-Wiveliscombe (GB40801G802000)

Component 3i: Kingston St Mary to Summerslade and Component 4a: Summerslade to Testwood may interact with nine WFD groundwater waterbody:

- Tone and North Somerset Streams (GB40802G806400)
- Dyrham Formation (North of Yeovil - Fragmented GWB) (GB40802G803700)
- Yeovil Bridport Sands / Inferior Oolite (GB40801G804000)
- Forest Marble (East of Bruton) (GB40802G805400)
- Corallian – Wincanton (GB40802G804400)
- Upper Hampshire Avon (GB40801G806900)
- River Test Chalk (GB40701G501200)
- Central Hants Bracklesham Group (GB40702G500900)
- Central Hants Lambeth Group (GB40702G503800)

Component 4b: Stour to Testwood pipeline route may interact with five WFD groundwater waterbody:

- Lower Dorset Stour and Lower Hampshire Avon (GB40802G805800)
- Upper Hampshire Avon (GB40801G806900)
- River Test Chalk (GB40701G501200)
- Central Hants Lambeth Group (GB40702G503800)
- Central Hants Bracklesham Group (GB40702G500900)

6.4 Summary of Component 3 (Transmission System) Level 1 WFD Assessment

6.4.1 Water bodies and activities passed forward from Level 1 as requiring further consideration

The Level 1 assessment screens the waterbodies against possible activities that are likely to take place as part of the proposed option. For the Gate-1 assessment, three WFD river water bodies passed forward from Level 1 screening based on high impact scores.

Table 30 Water bodies and activities passed forward from Level 1 as requiring further consideration for the Transmission System

Water body	ACWG listed activity
Exe (Barle to Culm) GB108045015050	Maintenance and use of river intakes
Exe (Barle to Culm) GB108045015050	New or increased surface water abstraction
Exe (Culm to Creedy) GB108045009060	New or increased surface water abstraction
Exe (Creedy to Estuary) GB108045009040	New or increased surface water abstraction

6.4.2 Impacts to groundwater waterbodies

Various groundwater waterbodies have been identified as potentially at risk of WFD non-compliance as a consequence of pipeline construction and operation as part of WCS3. There is insufficient information available on the design, construction and operation plans for these pipelines to make an assessment of the potential issues that may cause WFD non-compliance with tests for groundwater. However, risks related to construction can be mitigated using construction best practice. Issues surrounding dewatering and associated discharge to surface waterbodies, or issues of groundwater pollution due to pipeline failure will require further consideration at Gate 2 when the scheme design details are more advanced. Groundwater impacts have been included at Level 1 assessment in order to identify which specific waterbodies may be impacted and which activities are likely to take place (Table 31), however these have not been progressed to Level 2.

Table 31 Groundwater waterbodies identified as part of the Level 1 assessment

Water body	ACWG listed activity
Torridge and Hartland Streams (GB40802G800600)	Construction of below ground structures (shaft/retaining wall) with associated dewatering, with no sensitive groundwater feature within 500m
Tamar (GB40802G806700)	

Water body	ACWG listed activity
South Zeal Area (GB40802G800800)	Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500m Draining of pipelines for maintenance
Exeter-Whiddon Down Culm (GB40802G800900)	
Permian Aquifers in Central Devon (GB40801G801700)	
Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)	
Lower Dorset Stour and Lower Hampshire Avon (GB40802G805800)	
Upper Hampshire Avon (GB40801G806900)	
Central Hants Lambeth Group (GB40702G503800)	
Central Hants Bracklesham Group (GB40702G500900)	
Permian Aquifers in Central Devon (GB40801G801700)	
Central Devon and Exe - Aylesbeare Mudstone (GB40802G801800)	
Tone and North Somerset Streams (GB40802G806400)	
Dyrham Formation (North of Yeovil - Fragmented GWB) (GB40802G803700)	
Yeovil Bridport Sands / Inferior Oolite (GB40801G804000)	
Corallian – Wincanton (GB40802G804400)	
Upper Hampshire Avon (GB40801G806900)	
River Test Chalk (GB40701G501200)	
Central Hants Bracklesham Group (GB40702G500900)	

6.5 Summary of Component 3 (Transmission System) Level 2 WFD Assessment

6.5.1 Compliance with WFD objectives in the Exe (Barle to Culm)

This waterbody is currently meeting its objective of Good for Phosphate, and the assessment does not show any failures against WFD objectives based on this option. Issues with water quality are seen further downstream where the waterbodies are not achieving Good objectives for Phosphate.

6.5.2 Potential non-compliance with WFD objectives in the Exe (Culm to Creedy)

In the Exe (Culm to Creedy) waterbody there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Moderate physico-chemical status for Phosphate, and the WFD status objective of Good by 2027.

Table 32 WFD compliance assessment summary for the Transmission System for Exe (Culm to Creedy)

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Exe (Culm to Creedy) GB108045009060	No – potential for status deterioration	ach of Environmental Flow Indicator threshold and subsequent effects on biological quality elements.
	No – impediments to GES/GEP	sico-chemical quality element – Phosphate
	No – Possible compromise of RBMP2 measures	

Whilst the assessment did not identify that this proposed scheme would reasonably lead to further deterioration from Moderate status, it is possible that the reduction in dilution of phosphate as a result of this option could make RBMP Objective 2 (achievement of Good status) more difficult to achieve.

It is also noted that the hydrological impacts, especially in the reaches of the Exe close to the new abstraction point, may result in breaches of the Environmental Flow Indicator (EFI) thresholds at least for flows < Q95, assuming there is no prescribed flow in the abstraction licence. Analysis by the Environment Agency has highlighted that in the most heavily impacted reaches, EFI breaches could be seen at flows between Q70-Q85, with the Q85 low flow limit likely reflecting the prescribed flow that is linked to Q85 flows at Thorverton. This does not constitute a breach in WFD objectives in the current assessment, as the assessment is not analysing impacts on supporting elements. However, the potential knock impacts on ecology of the reductions in flow below EFI thresholds could result in status deterioration. This will need further assessment in Gate-2 using the naturalised flow series for Thorverton that the EA hold, along with potential in-combination effects related to borehole abstractions at Brampford Speke and Stoke Canon what may influence baseflow contributions to the Exe.

6.5.3 Potential non-compliance with WFD objectives in the Exe (Creedy to Estuary)

In the Exe (Creedy to Estuary) waterbody there is the potential for the introduction of impediments to achieving Good status. This is related to the existing Moderate physico-chemical status for Phosphate, and the WFD status objective of Good by 2027.

Table 33 WFD compliance assessment summary for the Transmission System for Exe (Culm to Creedy)

Water body	WFD compliant against assessed WFD objectives	Potential non-compliant issue
Exe (Creedy to Estuary) GB108045009040	No – impediments to GES/GEP No – Possible compromise of RBMP2 measures	sico-chemical quality element – Phosphate

Whilst the assessment did not identify that this proposed scheme would reasonably lead to further deterioration from Moderate status, it is possible that the reduction in dilution of phosphate as a result of this option could make RBMP Objective 2 (achievement of Good status) more difficult to achieve.

7 Components 4 & 5 (Transfer to Southern Water)

Component 4 of the WCS SRO schemes covers the transmission system to Southern Water (including the Summerslade to Testwood section and Testwood pre-treatment), whilst Component 5 covers the Southern Water reception points themselves (Testwood WTW, Testwood Lakes (small lake), and potential use of existing or additional potable storage tanks).

For the purposes of this WFD assessment, each component has been assessed with regard to any waterbodies that are likely to be impacted as part of the proposed scheme. As Component 4 consists of the transfer of water within a treatment system (and can therefore be treated as a “closed” system with no waterbody interaction), this has not been assessed under WFD. The same applies to Component 5, as this only relates to reception arrangements and storage options within the existing Testwood WTW complex.

8 Conclusions and recommendations

Component 1: Poole Effluent Re-Use

The proposed effluent re-use scheme has been assessed for Gate 1 using the ACWG guidelines for WFD compliance assessments. For each relevant water body, the ACWG template has been completed. The assessment identified that both the Stour (Middle) and Stour (Lower) are potentially non-compliant with WFD objectives, subject to further development of operating rules and treatment solutions, together with additional potential bespoke aquatic habitat assessment, water quality monitoring and water quality modelling planned at Gate 2.

It is suggested that potential non-compliance with WFD status objective relating to phosphate can be adequately mitigated through engineering design solutions, to achieve a reduction in phosphate at the Poole STW discharge, and subsequent reduction of any additional loading relating to the proposed 30 MLD discharge at the River Stour. It should also be noted that the potential non-compliance relating to phosphate could be exacerbated during the summer when the Stour is likely to experience lower flows and when the effluent re-use option is likely to be operational.

Component 2: Roadford Pumped Storage

The proposed WCS2 pumped storage scheme has been assessed for Gate 1 using the ACWG guidelines for WFD compliance assessments. For each relevant water body, the ACWG template has been completed. The assessment identified that Roadford Lake, the River Wolf, River Thrushel, Lower River Lyd, Tamar (Lyd to Inny) and Lower Tamar are potentially non-compliant with WFD objectives, subject to further development of operating rules and treatment solutions, together with additional potential bespoke aquatic habitat assessment, water quality monitoring and water quality modelling planned at Gate 2.

It is suggested that potential non-compliance with WFD objectives due to risk of increasing total phosphorus and phosphate concentrations in the affected waterbodies can be adequately mitigated. This mitigation may be achieved due to the timing of the scheme, i.e. during periods of generally higher flows. More detailed assessment of the hydrological impacts of the scheme and the potential impacts this may have on phosphorous concentrations in the affected waterbodies is required. If mitigation due to environmental conditions does not occur, appropriate engineering design solutions to achieve reductions in phosphate prior to discharge into Roadford Lake will be required.

Component 3: Transmission System to Wessex

The proposed transmission system scheme has been assessed for Gate 1 using the ACWG guidelines for WFD compliance assessments. For each relevant water body, the ACWG template has been completed. The assessment identified that both the Exe (Culm to Creedy) and Exe (Creedy to Estuary) are potentially non-compliant with WFD objectives. Further development of operating rules is likely to be able to provide mitigation and development of these rules should be supported by additional bespoke aquatic habitat assessment, water quality monitoring and water quality modelling planned at Gate 2.

This potential non-compliance is related to the Moderate status for the physico-chemical status Phosphate and possible impediments to achieving Good status (Objective 2), as well as the potential for impacts of hydro-morphological supporting elements and subsequent status deterioration for biological quality elements (Objective 1).

There are additional assessment and monitoring requirements that should be considered for Gate 2, these apply particularly to the ability to demonstrate acceptability of the 30 MLD Exe abstraction. Gate 2 should consider whether the following assessments are required: hydrological modelling, water quality sampling and analysis, geomorphology surveys, fish surveys, aquatic habitat mapping and INNS surveys for high-risk locations.

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West Country South – Strategic Resource Options

Annex 3: Environmental Assessment

Appendix 3.4: NCA and BNG

Report for Wessex Water, South West Water and
Southern Water

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3	05/07/2021	Minor updates to address EA & (late) NE review comments	[redacted]	[redacted]	[redacted]	[redacted]

Contents

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1 Introduction

1.1 Background

This Natural Capital (NC) and Biodiversity Net Gain (BNG) Report forms a technical appendix of Annexe 3: Environmental Assessment of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of likely NC impacts and BNG opportunities arising from the two schemes being progressed through the WCS SROs at Gate 1.

Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally schemes which will be appraised concurrently by RAPID. This Natural Capital and Biodiversity Net Gain Report therefore provides a single assessment which considers both schemes.

1.2 Context

Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination[1] in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

1. Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
2. Potential water source - Roadford pumped storage scheme (WCS2)
3. Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within Technical Annexes 1.2 – Options Appraisal Report (including WCS1-3 environmental review technical notes) and 1.3 – Concept Design Report respectively.

A proportionate level of environmental assessment needs to be carried out at component and scheme level to underpin the collation of robust Gate 1 submissions for the WCS SROs. The latest Water Resource Planning Guidelines (WRPG)[2] states that water companies should review the natural capital impacts of their future solutions and their contribution to Biodiversity Net Gain (BNG) in order to ensure

[1] Ofwat (2019), PR19 Final Determinations, Strategic regional water resource solutions appendix
[2] Environment Agency, Natural Resources Wales, Office for Water Services (2021). Water resources planning guideline. Updated 17 March 2021

that benefits of the environment to human society, wider environmental and societal objectives, and biodiversity, are taken into account within decision-making. Water companies are expected to make decisions that do not devalue, and look to enhance, the value of the natural world for the benefit of society.

1.3 Purpose and structure of this report

This report sets out the environmental evidence/data used to inform the natural asset baseline and the results of a high-level natural capital and Biodiversity Net Gain assessment. Furthermore, this appendix identifies the remaining data/evidence gaps for consideration in a monitoring programme for Gate 2.

This report includes the following sections:

Section 1: This introduction

Section 2: A summary of the West Country South SRO

Section 3: The methodologies used for undertaking the assessment

Section 4: The results of the Gate 1 Natural Capital and Biodiversity Net Gain assessments

Section 5: Provides a summary of the results and the recommendations for the Gate 2 assessments

2 Overview of West Country SROs

2.1 Summary

As noted in Section 1, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

1. Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
2. Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
3. Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO Concept Design Components and Schemes

Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

1. Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 ML/D effluent[3] from Poole Sewage Treatment Works (STW) via River Stour:
    a. Poole STW infrastructure (pumps and tanks)
    b. Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at new WRC plant)
    c. River Stour section (in-river)
    d. River Stour abstraction (including eel screen)[4]
    e. River Stour bankside storage
    f. River Stour Pre Treatment Works (for onwards transmission)
2. Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 ML/D for onwards transmission:
    a. Abstraction from River Tamar at Gatherley intake (125 ML/D winter months only)
    b. Gatherley to Roadford Lake including outlet (Lifton North route)
    c. Roadford Lake (no major changes to existing reservoir proposed)
    d. Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)
    e. Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)
3. Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)
    a. Northcombe to Prewley
    b. Prewley to Parsonage
    c. Parsonage to Pynes WTW

[3] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). Technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.
[4] Section 3.2.3 of **Annex 2 – Concept Design Report** provides a schematic diagram and outline layout showing the approximate area of Components 1d – f.

   d. River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)
   e. River Exe abstraction (new) at Bolham Weir
   f. River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)
   g. Allers to Woodgate
   h. Woodgate to Kingston St Mary
   i. Kingston St Mary to Summerslade
4. Component 4: Transmission System to SRN (components 4a - 4b)
   a. Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)
   b. River Stour Pre Treatment (Component 1f) to Testwood
      i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage
      ii. Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)
5. Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)
   a. Testwood WTW
   b. Testwood Lakes (small)
   c. Testwood potable storage tanks

Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

1. River Tamar to Testwood Transfer
   a. River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
   b. River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
2. Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

Further details regarding each scheme are provided in **Annex 1.2 – Concept Design Reports**.

The primary levels of assessment are at component and scheme levels as defined above. For the purpose of this assessment, each component part of the two schemes has been considered. Resultant overall impacts for the two schemes and the overarching WCS SROs have also been identified.

3 Methodology

3.1 Assessment overview

A Natural Capital Assessment has been carried out to identify the potential environmental benefits of the proposed components and associated schemes being progressed through the WCS SROs at Gate 1 to allow those with greater potential to achieve environmental enhancement to be considered through decision making. We have also considered the socio-economic aspects of impacted features to give a more holistic view of the consequences of scheme implementation. This highlights the relationships between people and the affected environments and identifies how these relationships could change as a result of the options.

Although Natural Capital Assessment is not a statutory requirement, nonetheless, the approach outlined here will satisfy the requirements of the RAPID expectations for Gate 1, the All Company Working Group (ACWG) methodology[5] for assessment to Gate 1, and the EA's Water Resources Planning Guideline (WRPG) to include natural capital in environmental assessment of water resource options.

The output of this Gate 1 assessment is a high-level assessment of the potential natural capital benefits of the SRO elements and schemes which will feed into Gate 1 decision making. The assessment highlights which schemes present the greatest opportunities for environmental enhancement. It also highlights which schemes do not have natural capital benefits in their current design, but which could incorporate enhancement opportunities to promote biodiversity environmental net gain. This information will feed into the design process to ensure that net gain requirements are met and opportunities for enhancement are maximised. At this conceptual design stage it is not feasible to provide a detailed quantified and/or monetised account for all the Natural Capital metrics: instead at Gate 1 the assessment is focused on providing the foundations (i.e. data, mapping etc) on which to be able to complete more detailed monetisation at Gate 2.

3.2 High-level option assessment to Gate 1 and beyond

The Natural Capital Assessment includes an assessment of baseline natural capital assets and their ability to provide ecosystem services, and how these are likely to change as a result of the options. The approach to Natural Capital Assessment will be in line with the ACWG Environmental Assessment Guidance for SRO schemes[5] to enable consistency across all the SRO schemes going through the RAPID Gated process.

Natural capital assets are the renewable or non-renewable stocks and benefits that we stand to gain, as well as the natural processes behind them. In order to assess the ability of natural capital assets to provide ecosystem services we have to use **ecosystem service metrics**; these are key, measurable benefits that intrinsically link environmental health to the benefits we gain from natural capital assets. There are numerous metrics to choose from so selecting those most relevant to a particular study is an important step to take in the Natural Capital Assessment process.

The EA's WRPG Supplementary Guidance states that Natural Capital Assessments in England should include as a minimum the following five ecosystem services:

- Biodiversity
- Climate Regulation (carbon storage)
- Water Purification
- Water Regulation; and
- Natural Hazard regulation

In addition to those services required as a minimum, we have also considered a **food production** ecosystem service metric due to the significance of agricultural production in the West Country region. Assessment of social benefits is also advocated by the RAPID, therefore additional ecosystem services

[5] Mott MacDonald and the All Companies Work Group, WRMP environmental assessment guidance and applicability with SROs. October 2020.

of **recreation and tourism** and **air quality** have been included to support this requirement (where the latter is related to urban and air quality zone areas).

3.2.1 Regulatory Drivers

The following provides a summary for key legislation/guidance, country applicability and our summary approach related to each for NCA and also biodiversity net gain since the later underpins the NCA biodiversity outputs.

- WRMP24 Supplementary Guidance: Environment and society in decision-making, taking into account the assessment of five minimum ecosystem services (England) namely biodiversity, climate regulation (carbon storage); water purification and natural hazard regulation.
- Environment Bill when announced, is supported by the BNG assessment via the Defra biodiversity metric (England).

As a result the approach follows that outlined by the All Company Working Group (ACWG) environmental assessment guidance for Strategic Resource Options (SROs)[6] (hereafter referred to as ACWG Guidance) whilst taking account of the key requirements above and draws on the EA[7] Water Resources Planning Guideline (WRPG) WRMP24 Supplementary Guidance on Environment and Society in Decision-Making. RAPID gate-1 expectations for Natural Capital Assessment have been incorporated which include:

- Desktop baseline assessment of the five key metrics as included in the WRPG**Error! Bookmark not defined.**;
- List of assumptions made during the assessment including but not limited to: a theory-based Zone of Influence (ZoI); the use of landcover data derived from satellite imagery and;
- The application of a Gross Domestic Product (GDP) inflator for monetised value adjustment (where applicable).

The NCA output at Gate 1 is high-level and intrinsically linked to the BNG (i.e. provides the Natural Capital biodiversity assessment). Where feasible, valuations (both spatially quantitative and monetised) have been provided, noting key assumptions/limitations especially in the context of outline design related limitations as detailed in Section 3.2.2**.** At Gate 1 the required focus is to provide a Natural Capital baseline. The assessment has therefore focused on construction related losses and potential gain related to a 10% BNG uplift based on open source data currently available.

3.2.2 Data sources and gaps

The Natural Capital assessment has been completed using the following data sources, as recommended by the ACWG Guidance[6] and the EA and NRW's Natural Capital Assessment Guidance**Error! Bookmark not defined.** (including Annex 1 of the WRPG Supplementary Guidance**Error! Bookmark not defined.**).

Natural Capital stocks

The ACWG Guidance for a Natural Capital Approach advises that land use should be used as a proxy for habitats, from which ecosystem services and benefits to society can be attributed and then monetised. A range of different open source habitat data was used to inform this assessment, including the Copernicus CORINE Land Cover 2018 dataset [8], Priority Habitats Inventory, OS Open Surface Water, OS Open Greenspace and National Forest Inventory. These habitat data sources were merged to create one habitat layer. Geoprocessing techniques were used to prioritise layers when overlaying on one another to avoid any overlaps. When data sources were combined several land use data types were identified, these land use types were then grouped into nine habitat types to give the total area of each broad habitat within each element's ZoI. The conversion from the detailed habitat layers to broad habitat was undertaken and is outlined in **Table 3-1**. Groups were determined following the broad groups identified for calculation of carbon sequestration by land use from the EA's Supplementary

[6] All Company Working Group (2020). WRMP environment assessment guidance and applicability with SROs
[7] Environment Agency (2020) Water resources planning guideline 2024 supplementary guidance- Environment and society in decision-making (England).
[8] Copernicus (2021) Evolution of CORINE Land Cover. Accessed: https://land.copernicus.eu/pan-european/corine-land-cover

Guidance[7] (see **Table 3-2** below). Where a land cover class could belong in multiple broad habitat groups it was placed within the one that had a lower carbon sequestration rate to give a more conservative estimate of benefits.

Table 3-1 Conversion from habitat data to nine broad habitat types

Land Cover	Broad habitat type	Data source
Coniferous forest	Woodland – Coniferous	CORINE
Conifer	Woodland – Coniferous	National Forest Inventory
Deciduous woodland	Woodland – Deciduous	Priority Habitat Inventory
Mixed mainly conifer	Woodland – Deciduous	National Forest Inventory
Assumed woodland	Woodland – Deciduous	National Forest Inventory
Broadleaved	Woodland – Deciduous	National Forest Inventory
Young trees	Woodland – Deciduous	National Forest Inventory
Mixed forest	Woodland – Deciduous	National Forest Inventory
Traditional orchard	Woodland – Deciduous	Priority Habitat Inventory
Pastures	Arable land	CORINE
Non-irrigated arable land	Arable land	CORINE
Moors and heathland	Heathland	CORINE
Lowland heathland	Heathland	Priority Habitat Inventory
Lowland calcareous grassland	Grassland	Priority Habitat Inventory
Natural grasslands	Grassland	CORINE
Good quality semi-improved grassland	Grassland	Priority Habitat Inventory
Grass moorland	Grassland	Priority Habitat Inventory
Lowland meadows	Grassland	Priority Habitat Inventory
Purple moor grass and rush pastures	Grassland	Priority Habitat Inventory
Transitional woodland-shrub	Shrub	CORINE
Coastal and floodplain grazing marsh	Saltmarsh	Priority Habitat Inventory
Discontinuous urban fabric	Urban	CORINE
Industrial or commercial units	Urban	CORINE
Sport and leisure facilities	Urban	CORINE
Cemetery	Urban	OS Open Greenspace
Religious Grounds	Urban	OS Open Greenspace
Golf Course	Urban	OS Open Greenspace
Public park or garden	Urban	OS Open Greenspace
Allotments or community growing spaces	Urban	OS Open Greenspace
Playing field	Urban	OS Open Greenspace
Construction sites	Urban	CORINE
Water	Freshwater	OS Open Surface Water

Ecosystem Services

Stocks of Natural Capital underpin the provision of ecosystem services, i.e. the goods and services provided by nature that benefit humans and society. Some ecosystem services can be valued in monetary terms based on the benefits they provide. The data sources used to value ecosystem services are described below, these have been taken from the WRPG**Error! Bookmark not defined.**, ACWG Guidance[6] a nd Defra's Enabling a Natural Capital Approach (ENCA) Guidance[9].

Biodiversity and Habitat

Assessment of biodiversity has been based on the habitat data used in the BNG assessments and described above and in **Section 3.2.3.** Further incorporation of these into the Natural Capital Assessment will be included at Gate 2 (see **Section 5**).

Climate Regulations (carbon sequestration)

The carbon sequestration rates for Natural Capital stocks have been taken from the EA WRPG Supplementary Guidance (from JBA Consulting)[10] as shown in **Table 3-2**. Carbon sequestration rates of the relevant Natural Capital assets have been converted into monetary values using the Department for Business, Energy, and Industrial Strategy (BEIS) Interim Non-Traded Carbon Values. Non-traded carbon values have been applied to carbon sequestered as these emissions are not captured by the EU Emissions Trading Scheme. As the prices published by BEIS are in £2018, GDP deflators were used to adjust them to the 2019 base year of modelling.

Table 3-2 Carbon sequestration of land use from EA WRPG Supplementary Guidance

Land use type	C seq rate (t/CO2e/ha/yr)
Woodland (deciduous)	4.97
Woodland (coniferous)	12.66
Arable land	0.10
Pastoral land	0.39
Peatland – Undamaged	4.11
Peatland – Overgrazed	-0.1
Peatland – Rotationally burnt	-3.66
Peatland – Extracted	-4.87
Grassland	0.39
Heathland	0.7
Shrub	0.7
Saltmarsh	5.19
Urban	0
Green urban	0.40

Natural Hazard Regulation

For the purposes of this assessment, flooding was determined to be the most significant natural hazard risk. This is because although the options are likely to be operational during drought periods only, the physical changes to Natural Capital stocks may impact the capacity of habitats to slow the flow of flood water year-round. Monetary values were sourced per broad habitat type from existing studies conducted in the UK**.** Values for woodland and wetlands/ floodplains broad habitat types were identified using the

[9] Defra, Enabling a Natural Capital Approach (2020). https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca
[10] Table 7 of the EA Supplementary Guidance: Environment and Society in Decision-Making (2020).

ENCA Services Databook[11] where the associated studies were evaluated to ensure their suitability for benefit transfer. A value for semi-natural grasslands was not available. Additional studies were identified with the final best estimate for semi-natural grasslands derived from a benefit function from an existing ecosystem services assessment (Christie et al, 2011[13]) noting however, that this value is mainly applicable to lowland meadows (Holzinger & Haysom, 2017[14]).

An annual monetary value was only derived for the flood regulating services of woodland, semi-natural grassland, and wetland/ floodplain assets (see **Table 3-3**). Robust monetary values for the urban and enclosed farmland broad habitat types are not currently available and hence it was not possible to provide a monetised estimate of these services at Gate 1. As a result, the overall value of the NCA is likely to be understated at this stage.

Table 3-3 Benefit Transfer Values: Natural Hazard Regulation

Broad habitat type	Annual Value	Reference	Additional Comments
Woodland	115 (£2018/ha)	Forest Research (2018)[12] & ENCA Services Databook	These results are experimental noting no semi-grassland value
Semi-natural grasslands	197 (£2015/ha)	Christie et al (2011)[13] & Holzinger & Haysom (2017)[14]	Appear applicable to lowland meadow only. Based on an ecosystem services assessment of Chimney Meadows Reserve (UK)
Freshwater (Open waters/ wetlands/ floodplains)	407 (£2011/ha)	Morris & Camino (2011)[15] & ENCA Services Databook	

Water Purification

Since, the WRPG**Error! Bookmark not defined.** does not require the monetisation of Water Purification Services (p. 36) because these services are highly dependent on local factors and there are limited tools available to provide accurate monetised assessment have, at this stage, only undertaken a qualitative rather than a monetised assessment of this service based on habitat data and WFD status information from the EA's Catchment Explorer.[16]

Water Regulation

The WRPG**Error! Bookmark not defined.** does not require the monetisation of Water Regulation Services (p. 4 2). The main benefit of the STW sources is the deployable output, therefore this is not considered as an additional Natural Capital benefit to avoid double counting, and Water Regulation has been screened out of the assessment.

Recreation and Tourism

The Outdoor Recreation Valuation Tool (ORVal)[17] was used to estimate recreation demand from existing or new greenspace as a proxy for recreation value. The values derived from the ORVal[17] tool

[11] https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca#enca-services-databook
[12] Forest Research (2018). Valuing flood regulation services of existing forest cover to inform natural capital accounts. Accessed via: file:///C:/Users/se17/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Final_report_valuing_flood_regulation_services_051218%20(3).pdf
[13] Christie, Mike, Tony Hyde, Rob Cooper, Ioan Fazey, Petter Dennis, John Warren, Sergio Colombo, and Nick Hanley. 2011. Economic Valuation of the Benefits of Ecosystem Services delivered by the UK Biodiversity Action Plan. Report to Defra, London: Aberystwyth University.
[14] Holzinger, Oliver, and Karen Haysom. 2017. Chimney Meadows Ecosystem Services Assessment: An Assessment of how the new management of Chimney Meadows Nature Reserve by Bers, Bucks and Oxon Wildlife Trust impacts on the value of ecosystem services. Oxford: Berks, Bucks and Oxon Wildlife Trust.
[15] Morris & Camino (2011) UK National Ecosystem Assessment Economic Analysis Report, School of Applied Sciences, Cranfield University.
[16] https://environment.data.gov.uk/catchment-planning/
[17] https://www.leep.exeter.ac.uk/orval/

are estimated using a Random Utility Model of travel cost estimates[18]. The values represent the total welfare lost if the site in question were to be removed. In cases where elements consist of more than one site, the marginal values of each site are aggregated based on the assumption that other sites that exist outside of the element scope are substitutes[19].

Air Quality

Airborne pollutants represent a serious threat to human health and wellbeing: assessment of air quality regulation services is therefore also relevant to the well-being goals set out by the Welsh Government**Error! Bookmark not defined.**. Natural habitats are able to reduce these harmful effects by absorbing a ir pollution providing ecosystem service benefit to society. However, as none of the options fall within an Air Quality Management Area, and due to the temporary nature of habitat impacts during construction, Air Quality has been screened out of the assessment.

Agriculture

This study adopts the same principles to ecosystem services associated with agriculture as outlined in the UK Natural Capital Accounts. Namely, the distinction between what is considered natural capital, and therefore what is included in the estimation of provisioning services, and what is produced capital is defined as the *"point at which vegetable biomass is extracted"*[20]. For the purposes of this study, to estimate the annual value per ha of ecosystem services relevant to agricultural production, an adaptation of the whole-farm income method outlined by the UK Office of National Statistics Natural Capital Accounts was used[21]. This approach was used as opposed to the industry residual value method adopted for the 2020 ONS Natural Capital Accounts as this method allows for differentiation between the provisioning services associated with different farm types - in this case arable and pasture- and were therefore considered more appropriate for this study. The marginal values estimated per hectare derived from this method (presented in **Table 3-4** below) remain comparable to the estimated industry residual value per hectare reported by the ONS for their 2020 accounts (£241.80/ ha in 2018)[22].

Table 3-4 Benefit transfer values: Provisioning services supporting agriculture

Farm type	Estimated average £2019 /ha	
	England	***South West***
All farm types	293.63	285.26
Arable (cropping)	237.14	328.12
Pasture (grazing livestock)	227.74	270.00

These values represent the average farm output level estimate of the industry residual value for farms in the South West of England. Data was obtained from the Farm Business Survey (England)[23] and was subject to the following high-level calculation.

$$\frac{Average\ output\ from\ agriculture\ -Average\ costs\ for\ agriculture}{Average\ total\ farm\ area\ (ha)}$$

The original method outlined by the ONS (2019) was adapted after calculations with South West specific data resulted in a negative residual value per hectare for both arable and pasture. This would imply that the provisioning services of these natural assets have no inherent value and that they do not contribute to agricultural production. It is concluded in the literature that a probable explanation of negative resource rents is that they reflect market distortions such as subsidies[24]. The original method outlined

[18] Day & Smith (2017) The ORVal Recreation Demand Model: Extension Project. Accessed via: https://www.leep.exeter.ac.uk/orval/pdf-reports/ORValII_Modelling_Report.pdf
[19] https://www.leep.exeter.ac.uk/orval/pdf-reports/ORVal2_User_Guide.pdf
[20] ONS (2017) Principles of Natural Capital Accounting. [Last accessed 29/04/2021] Accessible via: https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/principlesofnaturalcapitalaccounting
[21] Office for National Statistics (ONS), 2019. *UK natural capital accounts methodology guide: October 2019,* s.l.: ONS
[22] This was calculated by dividing the aggregate industry residual value reported by utilised agricultural area in the UK in 2018.
[23] https://farmbusinesssurvey.co.uk/
[24] Obst, C., Hein, L., & Edens, B., (2016). National Accounting and the Valuation of Ecosystem Assets and their Services, *Environ Resource Econ* 64,pp 1-23.

by the ONS excludes subsidies and agri-environment payments and activities from their calculation, however the adapted method adopted for this study includes these factors. An overview of what is included is outlined in **Table 3-5** below.

Table 3-5 Components included within the adapted farm income method

Variable	Components included
Output from agriculture	- Output from agriculture (excl. subsidies and agri-environment payments) - Subsidies and payments to agriculture (excl. agri-environment payments - Agri-environment and related payments (incl HFA) - Basic Farm payment - Output from diversification
Costs for agriculture	- Costs for agriculture (excluding agri-environment activities) - Costs for agri-environment work - Costs of diversification out of agriculture - Costs associated with Basic Payment Scheme

The total annual benefit values calculated for this study make use of the South West estimated averages calculated for each of the variables and component for each of the high-level farm types associated with this study (arable and pasture).

Component design information

Limited scheme design has been available for the Gate 1 assessment. Only those sub-components with available GIS data have been included in the assessment, this includes the pipelines required for Components 1-4. Other associated infrastructure (e.g. storage tanks, treatment facilities, pumping stations etc) have not been included in the quantitative and monetised assessments as the location and size of these is not currently known. No spatial or design information was available for Component 5 and it has therefore not been included in the quantitative or monetised assessments.

3.2.3 Biodiversity Net Gain (BNG)

Whilst currently BNG is not yet mandatory it is likely to become a legal requirement for development once the Environment Bill has become an Act of Parliament. Delivering net gain for the environment has become a policy requirement and the **25-Year Environment Plan** speaks of embedding an environmental net gain principle for development, including infrastructure.

The Biodiversity Net Gain (BNG) assessment required for Gate 1 is carried out in line with the All Company Working Groups (ACWG) current guidance to SRO Environmental Assessment. The requirements and outputs of the assessment are also consistent with WRPG guidance for WRMP24.

The outputs provide both an assessment of losses and potential net gain opportunities and the data upon which the NCA is compiled related to habitat type (both losses and Net Gain uplift opportunities) for the NC biodiversity metric.

The guidance states that BNG should be demonstrated for each element/option to "**look to maximise biodiversity net gain**" and that "**supply options should incorporate BNG into design and therefore provides a biodiversity optimised programme"**. If significant BNG can be achieved but at significant additional cost this should be included as a separate option. Therefore, BNG calculations should be carried out at long-list stage, Gate 1, and that early identification of opportunities and constraints is essential to design and consideration of any requirement for additional options.

In accordance with the guidance, our approach has been to use a **GIS-based system** to allow for rapid assessment of multiple elements and the application of **Defra's Biodiversity tool 'The Biodiversity Metric 2.0' (Defra BNG Metric)** as a means of scoring the biodiversity gain or loss of each element.

Therefore, the baseline will be developed from spatial data sets of habitat inventories and scored through the Defra BNG Metric.

Achieving Biodiversity Commitments

Our approach assesses whether the ST Sources meets with the 25 Year Environment Plan commitments and statutory environmental duties for biodiversity through taking into account the **biodiversity commitments** (listed below).

The assessment applies the principles of Net Gain, by taking a hierarchical approach to mitigation seeking to avoid loss of key habitats, and therefore species, and strategic identification of opportunities for biodiversity benefits to protect, enhance and provide resilience:

1. Conserving and enhancing SSSIs (Wildlife and countryside Act as amended):
2. Furthering the purposing of the Habitats Directive (and regulations) Conservation of Habitats and Species Regulations 2017 as amended.
3. Achieving the conservation objectives for marine protected areas (marine and Coastal Access Act)
4. Biodiversity net gain for habitats and species of principle importance for the conservation of biodiversity – (Natural environment and rural communities Act).

Key to this, is timely identification of the possible requirement for compensation for likely impacts, such as those to 'irreplaceable habitats' and identify lower impact alternatives.

For Gate 1, the BNG assessment comprised a full assessment for each element. Gate 2 will be a refined assessment to determine the short list of options. Further details of our approach are provided below.

Data collection and review

The first stage involved collection of data and review of relevant, available information to inform of key BNG constraints and opportunities. All the data sets used open source data that is readily available and can be uploaded to a centralised GIS database.

Identifying the biodiversity baseline conditions

The Defra BNG metric is a habitats-based assessment. To demonstrate best outcome (% BNG) will require a **baseline calculation** of current biodiversity value/score. This tool quantifies each habitat type into 'units' based on a number of factors, including habitat distinctiveness, area (or linear equivalent), condition, ecological connectivity and strategic significance. At Gate 1, the assessment of BNG options is a high-level assessment based on available open source data. For this, a range of open source and assessable data was used to gain a good understanding of habitats present within the ZoI that can provide a robust baseline.

Firstly, the habitat data was provided by using existing habitat inventories and areas measured in GIS. Secondly, the identification of habitat distinctiveness, condition and baseline extent for habitats, including priority habitats and designated and non-designated sites, was determined through mapping on the Priority Habitat Inventory and open data on designated sites noting that where data on habitat quality is not available for a habitat, 'moderate' condition was assumed for all habitats other than Priority Habitats, which were assumed 'good' condition, to avoid an over precautionary assessment of habitat lost within the component easement. Any assumptions where a 'moderate' habitat condition has been defined will be reviewed with field surveys to ground truth and reassess the habitat condition. Such assumptions will be refined and addressed at Gate 2.

The baseline scores are adjusted for the associated habitat impacts (gains or losses) related to the construction and operation of each component as area of habitat loss, taking into account the assumption of good practice construction methods and re-instatement. This part of the assessment identifies high risk areas where the proposals will result in a significant loss of biodiversity and offsetting will be more onerous or may identify an 'irreplaceable habitats' that should be avoided, such as certain priority habitats.

The output is the tool spreadsheet, a table of baseline unit scores for each component, which provides early warming of components with high scores where offsetting would be onerous. The results will feedback into the Natural Capital assessment and engineering design of components to identify opportunities to reduce their impact.

Identifying BNG opportunities and calculating the benefit score

It has been assed that terrestrial habitat, including hedgerows, within the working easement will be re-instated. The metric takes into account habitat distinctiveness and risk parameters associated with habitat creation and restoration, such as re-instatement. This means that a 1:1 replacement will not score 0 in terms of gains and losses but a negative number of units, as additional enhancements will be required, for example, to take account of time lag of the establishment of created/restored habitat. Therefore, if additional habitat area is required to offset losses and provide BNG, it is possible that insufficient land may be available on site.

Offsite enhancement measures can include the provision of new habitats, provision of new habitat features and the improved management of existing habitats which will result in a net benefit to biodiversity, over and above the measures required to mitigate and compensate for the impacts of a proposed scheme. Enhancement opportunities were added to the Metric as a habitat area and the Metric re-calculates the quantity or balance of (units) of BNG provided, until a minimum 10 % change from the baseline was achieved.

Opportunities for biodiversity gain will be linked with those within SEA, WFD, HRA mitigation measures where applicable and NC approaches and will require working in parallel to identify solutions to provide best outcomes across these assessments.

The output of this stage is the tool spreadsheet and a table of the habitats and areas required for enhancement/creation to offset the impacts of each component and provide a minimum 10% BNG.

Strategic assessment of opportunity areas

A strategic assessment of off-site opportunity areas has been undertaken to identity suitable parcels of land where the best biodiversity gain could be achieved. These opportunity areas will interface with the Natural Capital approach to identify where benefits can be achieved and are described further below.

Our approach follows the mitigation hierarchy of avoiding, minimising and mitigating the habitat lost/deteriorated and local compensation. Maximum credits can be achieved through identifying opportunities for enhancing the habitat that is lost/degraded rather than replacement. However, where insufficient habitat lies on site to deliver what's required for net gain, alternative locations will be sought.

A review was undertaken of Representation of the BNG opportunities, habitat enhancements or creation, is represented in GIS with areas shown within possible suitable locations based on strategic biodiversity opportunity areas (Natural England's Habitat Network zones). The purpose is to represent the area of enhancement /creation required for a rapid assessment of achievability and flag any unmitigable impacts.

Using the principles of Biodiversity Opportunity Areas, core areas for biodiversity have been identified, such as designated and non-designated sites and priority habitats. The opportunities will be assessed for their suitability for specific net gain features, connectivity opportunities and achievability. Values will then be assigned against areas of mitigation opportunity with potential condition improvement for each feature and opportunity including specific mitigations recommendations.

4 Assessment Findings

4.1 Component Level Analysis

The NCA tables for each of the high-level components (no. 1 – 5) selected for inclusion in the schemes being progressed through the WCS SROs at Gate 1 are provided below. A baseline assessment of Natural Capital stocks and ecosystem service provision has been carried out to inform the assessment of each component. This has been based on a 50m ZoI using habitat data as a proxy for Natural Capital stocks. The flow of ecosystem services under baseline conditions has been assessed using data outlined in **Section 3.**

4.1.1 Qualitative assessment

A qualitative assessment has been carried out describing the likely changes to natural capital assets and the associated changes to ecosystem service delivery arising from the construction and operation of the high-level WCS SRO Components. This is presented in **Table 4-1**.

Table 4-1 Qualitative assessment of natural capital impacts of the WCS SRO

Component	Temporary construction impacts	Operational impacts
1: Poole Effluent Re-use	Construction will lead to loss or degradation of pasture, woodland, floodplain grazing marsh and small amounts of heathland natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence.	Disbenefits to biodiversity related to discharge of treated effluent into River Stour and associated flow and water quality changes, which may affect habitat quality. Disbenefits related to construction of water treatment infrastructure is unknown as size and location of sites are yet to be determined. Potential biodiversity, natural hazard regulation and recreation benefits related to the River Stour bankside storage component, although these will depend on component design. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
2: Roadford Pumped Storage	Construction will lead to loss or degradation of pasture and arable land, and small amounts of woodland, purple moor grass, floodplain grazing marsh and water natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence, for example Higher Combe Forest and Bratton Clovelly wood.	Disbenefits to biodiversity related to increased abstraction from the River Tamar and associated flow and level changes, which may affect habitat quality. Potential disbenefits to biodiversity in the Roadford Lakes due to changes in flow regime from new discharge and abstraction. Disbenefits related to construction of water treatment infrastructure at North Combe WTW is unknown as size and location of the process stream are yet to be determined. Potential biodiversity and recreation benefits related to the discharge into Roadford Lakes if operation will support the reservoir levels in periods of low flow, however this benefit may be limited as abstraction to North Combe WTW will also be operating. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
3: Transmission System to Wessex	Construction will lead to loss or degradation of pasture and arable land, and small amounts of floodplain grazing marsh, urban greenspace, woodland, grassland, water and orchard natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and	Potential biodiversity and recreation benefits related to the discharge into River Exe if operation will support the river levels in periods of low flow, however changes to flow regime and water quality may also cause disbenefits to river habitats. Disbenefits related to construction of surface infrastructure is unknown infrastructure design is yet to be determined. Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.

Component	Temporary construction impacts	Operational impacts
	wellbeing where construction may impede access to local recreation sites within the zone of influence, for example Cranbourne Chase & Wiltshire Downs, as well as several public footpaths.	
4: Transmission System to Southern Water	Construction will lead to loss or degradation of pasture and arable land, and small amounts of floodplain grazing marsh, woodland, grassland, lowland meadows and water natural capital stock, with potential associated disbenefits to biodiversity, carbon regulation, natural hazard regulation, agriculture and water purification services. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence, for example public footpaths through Gatmore Copse, Grovely Woodland and Old Sarum.	Delivery of required BNG to offset construction losses will result in benefits to natural capital stocks and ecosystem service provision. Potential benefits to recreation are dependent on design of BNG mitigation.
5: Southern Water Reception Points	Potential disbenefits during construction depending on infrastructure required, size and location, to be determined at Gate 2.	Potential biodiversity and recreation benefits related to the discharge into Testwood Lakes if operation will support the lake levels in periods of low flow, however this benefit may be limited as additional water will be abstracted for supply. Disbenefits related to construction of water treatment infrastructure at Testwood WTW is unknown as size and location of any required infrastructure is yet to be determined. Potential for habitat improvement if component requires BNG (dependent on size and infrastructure required).

4.1.2 Biodiversity and habitat

Table 4-2 summarises the temporary loss of habitat type, based on a ZoI of 50m for each of the pipelines included within the WCS SRO (i.e. 25m working width on either side of the pipeline). As the location and size of associated infrastructure (e.g. treatment works, storage tanks, pumping stations) are unknown, these could not be included in the quantitative assessment, although a description of potential permanent habitat loss is also included to reflect these.

Only habitats that are present within the ZoI are included.

The assessment indicates that the majority of land use change associated with the WCS SRO is urban or arable land with relatively low biodiversity value noting more detailed analysis local biodiversity features will be required at Gate 2.

Table 4-2 also presents the change in habitats including consideration of required mitigation for BNG. The results show that there is a loss in habitat for most habitat types, even with BNG mitigation in place. This is because at this moment in time only creation of habitats and not enhancement can be quantified from a Natural Capital standpoint. The BNG assessment (see **Section 1**) outlines the required mitigation to produce an overall net gain, however this includes mostly habitat enhancement rather than creation, affecting the quality but not the stock of natural assets. It is not possible to quantify the non-spatial changes in biodiversity and habitat ecosystem services arising from habitat condition improvement.

The only planned habitat creation is woodland. It has been assumed that all new woodland creation will be deciduous woodland, this assumption will be confirmed as scheme design evolves through later Gates.

The assessment shows some anticipated loss of significant areas of higher biodiversity value habitat, such as saltmarsh, heathland and grassland, which support a range of wider ecosystem services. These will need to be mitigated to avoid significant harm to biodiversity.

Table 4-2 Summary of broad habitat types for elements

Component	Habitat type	Temporary habitat change during construction[25] (Ha)	Habitat change following inclusion of BNG mitigation (Ha)
Component 1: Poole Effluent Re-use	Arable land	-4.09	-4.09
	Freshwater	-0.12	0
	Heathland	-2.68	-2.68
	Saltmarsh	-2.48	-2.48
	Urban	-23.90	-23.9
	Deciduous Woodland	-2.92	2.08
Component 2: Roadford Pumped Storage	Arable land	-76.93	-76.93
	Freshwater	-1.94	0
	Grassland	-4.34	-4.34
	Saltmarsh	-3.24	-3.24
	Coniferous Woodland	-6.86	-6.86
	Deciduous Woodland	-7.92	7.08
Component 3: Transmission System to Wessex Water	Arable land	-903.63	-903.63
	Freshwater	-2.38	0
	Grassland	-9.79	-9.79
	Heathland	-0.21	-0.21
	Saltmarsh	-11.77	-11.77
	Shrub	-0.72	-0.72
	Urban	-10.03	-10.03
	Coniferous Woodland	-0.62	-0.62
	Deciduous Woodland	-10.77	21.23
Component 4: Transmission System to Southern Water	Arable land	-273.59	-273.59
	Saltmarsh	-8.85	-8.85
	Urban	-11.28	-11.28
	Deciduous Woodland	-6.39	7.61
	Grassland	-10.39	-10.39
	Freshwater	-0.96	0
	Coniferous Woodland	-2.22	-2.22

4.1.3 Climate regulation

Table 4-7 summarises the baseline land use types within the 50m ZoI of each WCS SRO and the momentary value of the climate regulation ecosystem services they provide. The Transmission System to Wessex water provides the greatest carbon sequestration value under baseline conditions: this is related to the large ZoI as well as the presence of a large amount of arable land within the ZoI which provides carbon sequestration services.

Table 4-3 Summary of non-traded carbon sequestration values per component

Component	Change in non-traded carbon sequestration value during construction (£2019)	Change in non-traded carbon sequestration value following BNG uplift
Component 1: Poole Effluent Re-use	-£1,772.53	-£288.03
Component 2: Roadford Pumped Storage	-£9,108.84	-£4,655.05
Component 3: Transmission System to Wessex	-£12,980.50	-£3,479.72
Component 4: Transmission System to Southern Water	-£8,192.96	-£3,856.69

[25] Assuming temporary loss of all habitats within the 50m working width of all pipelines during construction

4.1.4 Natural hazard regulation

Table 4-4 presents the baseline assessment of natural hazard regulation. Only areas located within flood plain and close to urban areas (where impacts of flooding are likely to be more costly) have been scoped into the assessment. The areas susceptible to flooding were identified using Flood Zone 2 and 3 definitions outlined in National Planning Policy[26].

Baseline land cover was converted to monetary value based on data outlined in **Section 3.** A benefit transfer value has not been identified at this stage for farmland, therefore this has not been accounted for in the baseline assessment.

Table 4-4 Summary of the natural hazard regulation impacts per component

Component	Change in natural hazard regulation value during construction (£2019)	Change in natural hazard regulation value following BNG uplift
Component 1: Poole Effluent Re-use	-£348.69	£237.09
Component 2: Roadford Pumped Storage	-£3,566.90	-£1,809.57
Component 3: Transmission System to Wessex Water	-£4,538.57	-£789.59
Component 4: Transmission System to Southern Water	-£3,671.98	-£2,031.80

4.1.5 Water purification

Baseline provision of water purification services is dependent on the following:

- Land cover (habitat)
- Proximity to receptor (i.e. a water body)
- Current water quality of receptors

Baseline water purification provision has not been quantified at Gate 1. A brief summary of the baseline and potential changes is included below in Table 4-5.

Table 4-5 Summary of baseline water purification service provision per element

Component	Baseline water purification ecosystem service provision
Component 1: Poole Effluent Re-use	Water purification services are currently provided by arable, pasture and grassland habitats. River Stour (Middle d/s Pimperne Brook) WFD waterbody is currently achieving Poor status. Poole STW will discharge up to 30ML/d into River Stour. This will increase the flow and dilute pollutants downstream and therefore have the potential to improve water purification. However, if the effluent is of poor quality, there is a potential of declining water purification services.
Component 2: Roadford Pumped Storage	Water purification services are currently provided by arable, pasture, woodland and grassland habitats. This option involves 125ML/d abstraction from the River Tamar (Thrushel Wolf and Lyd) WFD waterbody which is currently achieving a Moderate status. Therefore, the

[26] https://www.gov.uk/government/publications/national-planning-policy-framework--2

Component	Baseline water purification ecosystem service provision
	abstraction has potential to decline water purification services. The abstracted water will be transferred to Roadford Lake for storage. Roadford Lake WFD waterbody is currently achieving a Moderate status. Water from Roadford Lake will be treated at North Combe WTW. Hence, additional flow and abstraction will have the potential to improve water purification. However, if more water is transferred to North Combe WTW there will potentially be a decline in water purification.
Component 3: Transmission System to Wessex Water	Water purification services are currently provided by arable, pasture, woodland and grassland habitats. River Exe (Barle to Culm) WFD waterbody is currently achieving a Moderate Status. River Exe abstraction (new) at Bolham Weir will potentially improve water or decline water purification with potential impacts on the hydrological regime.
Component 4: Transmission System to Southern Water	No change to water purification as the water will be transferred via a pipeline from Summerslade to Testwood WTW.

4.1.6 Tourism and recreation

Table 4-6 depicts the baseline welfare value for each element, as well as the estimated visitation on a given year. This data is derived from the ORVal[17] tool as described in **Section** Error! Reference source n ot found..

Table 4-6 ORVal outputs

Component	Estimated Welfare Value (£ per year)	Estimated visits (per year)
Component 1: Poole Effluent Re-use	97,039	30,696
Component 2: Roadford Pumped Storage	51,248	15,720
Component 3: Transmission System to Wessex Water	2,627,727	933,845
Component 4: Transmission System to Southern Water	418,683	168,086

The welfare values are based on the proposed pipeline route and a 50m buffer zone. The pipeline cross agricultural/greenfield areas across majority of the pipeline routes for all three components. The loss to welfare for agricultural/greenfield areas are not included in this assessment.

The proposed pipeline route cross paths part of national parks which have higher welfare values. For component three, the closure of a path part of national parks would be temporary and have not been included in the assessment. It is assumed a year of temporary closure of paths and roads as part of construction of the pipelines. Buffer systems going through woodland areas are not assessed as the impact to nearby woodland would be minimal.

It has not been possible to monetise the recreation and tourism benefits of the scheme with BNG uplift as the details of the habitat creation opportunities have not been agreed, therefore these cannot be assessed using the NEVO tool. It is unknown whether new habitat creation sites will provide additional recreation facilities as public access is unknown.

At Gate 2 the BNG opportunities will be developed further and benefits to recreation will be assessed and monetised.

Component 1 – Poole Effluent Re-use

No national parks were identified by the ORVal tool that fall within the ZoI of the pipeline route. The pipeline route crosses agricultural/greenfield areas. The loss to welfare for agricultural/greenfield areas are not included in this assessment. There are potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the ZoI. It is assumed a year of temporary closure of paths and roads as part of construction of the pipelines.

Component 2 – Roadford Pumped Storage

Most of the estimated welfare value is attributed to a path that runs through Higher Combe Forest near the Roadford Lake. The vast majority of the pipeline crosses through agricultural/greenfield areas. There are potential short-term impacts to recreation and wellbeing where construction may impede access to recreation sites.

Component 3 – Transmission system to Wessex Water

The majority of the tourism and recreation value is attributed to several footpaths which will impacted during the construction of the pipeline. There are paths which are within the zone of influence for local recreation sites such as Cranbourne Chase & West Wiltshire Downs. The model predicts a high footfall and therefore a high annual welfare value is estimated. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence.

Component 4 – Transmission system to Southern Water

The pipeline crosses agricultural/greenfield areas along majority of the route. Most of the estimated welfare value is attributed to paths through local recreation sites such as Gatmore Copse. Potential short-term impacts to recreation and wellbeing where construction may impede access to local recreation sites within the zone of influence. The pipeline crosses through Testwood Lakes which has an annual value of £485,320 by the model, this is reflected in the high visitor numbers modelled by the ORVal tool.

4.1.7 Agriculture

Table 4-7 depicts the baseline agriculture value for each element. This data is derived using the adapted whole-farm income method outlined by the ONS as part of their Natural Capital Accounts Methodology Guide (2020) with data from the Farm Business Survey (England) on farms located in the South West of England as described in **Section** Error! Reference source not found.. The values below r epresent the annual value of provisioning services that support agricultural production for the estimated area of each component.

Table 4-7 Baseline assessment of agriculture ecosystem service provision

Component	Estimated agriculture value (£2019)
Component 1: Poole Effluent Re-use	£1,105.22
Component 2: Roadford Pumped Storage	£22,165.34
Component 3: Transmission System to Wessex Water	£272,784.77
Component 4: Transmission System to Southern Water	£59,222.37

4.2 Scheme Level Analysis

Table 4-8 summarises the total change in each of the ecosystem service benefits for the WSC SRO Scheme. Only those ecosystem services which are possible to monetise have been included in this summary. The summary shows that even with habitat creation for BNG mitigation in place, a net loss of ecosystem service values is anticipated during the construction period, this is due to the temporary loss of habitat cover during construction, which is expected to return to baseline levels following habitat reinstatement, and the fact that habitat improvement measures have not been included in the quantified assessment.

Table 4-8 Scheme level assessment of natural capital values

Ecosystem Service	Total change in value during construction (£2019)	Total change in value with BNG mitigation in place (£2019)
Climate regulation	-£30,282.31	-£12,459.17
Natural hazard regulation	-£11,777.44	-£4,393.87
Recreation	-£3,194,697	Not possible to assess at this stage

4.3 In-Combination Effects

At this stage the components of the schemes have been assessed independently for each of the 4 identified in this report. In-combination effects (benefits and disbenefits) cannot be assessed until there is clearly visibility of routes and components that will be taken forward to gate-2. Furthermore, with out more engineering detail and understanding of potential recreation benefits that may accrue as a result any in combination effect assessment would be extremely uncertain. At this stage therefore, an in combination assessment has not been undertaken.

4.4 Biodiversity Net Gain - Baseline

A Biodiversity Net Gain (BNG) assessment has been carried out to identify the potential biodiversity loss of the elements and what replacement habitat could be required to achieve a 10% biodiversity net gain. For this high-level assessment, certain assumptions have been made to quantify the potential net loss and therefore net gain opportunities, which are based on a worst-case scenario, assuming all habitat within the working easement will be lost during construction and re-instated. For net gain, we have also considered spatially where mitigation and offsetting opportunities exist in relation to each element. The assessment identifies the quantity of each habitat type required to make this improvement elsewhere (off-site) to provide this and identifies strategic locations of where these opportunities may lie at a county level.

Section 4.4 addresses the gate-1 expectations for BNG in providing:

- the data sources and how they have been used to assess BNG;
- data gaps and assumptions; and
- baseline conditions for each element;

Section 4. provides:

- the assessment results; and
- a scope for further work on BNG to gate-2.

The assessment (**Section 4.5 and 5.1**) highlights which elements present the greatest biodiversity loss and elements which can achieve mitigation and/or offsetting with the least amount of required land. This information will feed into the design process to ensure that net gain requirements are met and opportunities for enhancement are maximised. At this conceptual design stage, the metric calculations are based on certain assumptions. Gate-1 is focused on providing the foundations for more detailed quantitative calculations at gate-2

The methodology for this assessment has been developed to accommodate the current uncertainty surrounding the elements (design/precise location etc). It is a high-level assessment that is proportional to scale and data availability. As certainty surrounding the schemes increases, the assessment will be updated accordingly with latest available data. At gate-1, the assessment of BNG is a high-level assessment based on open-source data, uploaded to a centralised GIS database. To provide a more robust baseline, habitat surveys will be required at gate-2. Specific detail is given in **Section 4.4.1** where data from these reports have been used to fill data gaps due to lack of survey data.

The BNG assessment has been undertaken of components 1-4, described in **Section 2.1**; however, only the pipeline routes associated within these pipelines have been assessed, as GIS data of the location and easement of other features of the components was not available.

The BNG requirement for the ACWG (section 3.4.2.5 of the guidance[27]) stipulates that each option should look to maximise biodiversity net gain and any required mitigation should be included to enable identification of any significant costs. The ACWG requires a full assessment of BNG using the Defra metric and that BNG calculations would take place at Gate 1 and be further refined throughout the gateway process. In accordance with the ACWG guidance, at gate-1 a biodiversity baseline has been developed from spatial data of habitat inventories and assessed in line with the Defra Metric 2.0, to calculate the change in biodiversity score for each element to include agreed mitigation. The open source habitat data can be supplemented with local data sets or Phase I (habitat) site data to increase the accuracy for each option at gate-2. Therefore, where data gaps arose at gate-1, these should be addressed at gate-2 through the following actions, as set out below. At gate-2, the BNG assessment would be refined through the inclusion of concept designs into the assessment, in accordance with section 3.4.3.5 of the ACWG guidance.

The BNG assessment needs to be refined through greater detail on the construction methods and construction easement to provide great clarity on the impact pathways and habitat scores through the Biodiversity Metrics.

Further assessment on the hydrological impacts on ecology will be undertaken within gate-2 by a suitable water professional to be determined as part of the gate-2 process and procurement. These potential impacts will inform the assessment of operational BNG losses/gains.

Stakeholder consultation is essential to identify opportunities. This will be critical to the opportunity assessment related to mitigation and enhancement. We propose a series of short workshops during gate-2 for key stakeholder to discuss opportunities. This will include key water company representatives and stakeholders (as agreed by the STW steering group). The opportunities which may be discussed include:

- Landowners' land and landownership constraints
- Local wildlife sites
- Whether local councils have allocated land for BNG
- Criteria for prioritisation
- Consideration of specific species targets for net gain options

The improvement of baseline data is required to support gate-1 through site habitat surveys (condition assessment), ground truthing and habitat scoring. Survey locations will be targeted to sensitive areas and to ground truth the variation across the working easements

Table 4.1 of the ACWG guidance includes the requirement to include data on Local Wildlife Sites, which would need to be obtained from the Local Records Centre. Priority habitat layers for hedgerows/arable field margins are not open-source information and will be purchased from the Local Records Centre to improve baseline information.

A more detailed review should be undertaken at gate-2 of National and Local plans and policies, such as River Basin Management Plans, catchment or WFD objectives to identify any specific objectives for BNG that can be delivered. Using the principles of Nature Recovery Networks, core areas for biodiversity have been identified within BOAs. Opportunities for connecting these through habitat restoration/creation should be explored in gate-2 in line with ACWG guidance, which requires more detailed assessment of the options. This more detailed opportunity assessment will include those already identified with local plans, including those already identified within Local Plans/LBAPs/strategies. The opportunities should be assessed for their suitability for specific net gain features, connectivity opportunities and achievability. Values will then need to be assigned against areas of mitigation opportunity with potential condition improvement for each feature and opportunity using the principles of the scoring of the River Biodiversity Metric tool.

The current Biodiversity Metric tool (2.0) has calculation issues when working out river mitigation and units gained. It is anticipated that a 3.0 version of the tool will be released in summer 2021 in which previous errors within the tool will be updated. If available, the Biodiversity Metric calculations will be re-entered into the 3.0 version at gate-2, and this should also allow river mitigation to be calculated.

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[27] All Companies Working Group WRMP Environmental Assessment Guidance and Applicability with SROs, October 2020

The Biodiversity Metric is a habitats-based assessment and is divided into assessments for terrestrial habitats (Habitats), and linear habitats (Hedgerows and Rivers). The baseline has been developed from existing spatial data sets of habitat inventories and identifying impact pathways (Zone of Influence (ZoI)) using data from the SEA, HRA and WFD assessments. The habitat baseline is scored through the tool, which quantifies each habitat type into 'units' (or 'River Biodiversity Unit' (RBU) for rivers and streams) based on a number of factors, including habitat distinctiveness, area (or linear equivalent), condition, ecological connectivity and strategic significance

Baseline mapping

The construction area (easement) of the elements were mapped using QGIS so that habitat analysis could be conducted on the construction area and operational impact pathways. To allow full habitat coverage, four data sources were combined in GIS: Priority Habitat Inventory, Corine Land Cover 2018, National Forest Inventory 2017 and OS Zoomstack (surface water). Habitat types were converted into the UK Hab classifications using the conversation table within the Technical Data tab in the Metric. The area (ha) of each habitat type within the buffer was measured in GIS.

Working Width Calculations

The working width was assessed as 25m either side of the pipeline, reducing to 20m through hedgerows and rivers. Aerial imagery was used to locate sections where the working width changed. The specific construction zone will be refined in the run up to gate-2 once WCS component designs have been developed further and environmental impacts are better understood; however, this provides a reasonable approximation at this stage.

Woodland and trees

Within the working width GIS layer particular sections of pipeline have descriptions listed as '*trees avoided where possible'*. The majority of areas with high tree cover are usually classified as a woodland habitat. Due to the uncertainty associated with the number of trees which may be retained a worst-case scenario will be assumed of total habitat loss in these areas, which will be refined at gate-2.

Arable Field Margins

Arable field margin priority habitat is not currently mapped within the Natural England Priority Habitat Inventory dataset. In order to capture all potential habitat loss, assumptions were made on the location of arable field margins to allow the habitat loss to be quantified with the DEFRA Biodiversity Metric. The JNCC UK Biodiversity Action Plan described arable field margins as '*usually sited on the outer 2–12m margin of the arable field, although when planted as blocks they occasionally extend further into the field centre*.' Aerial imagery combined with the CORINE land cover data was used to approximately calculate the number of arable fields each element intersected. A 4m arable field margin was assumed which was then then multiplied by the working width and number of element intersections. This provided an area which could be added into the DEFRA Biodiversity Metric and classified as '*Cropland - Arable field margins pollen & nectar*' within the tool.

4.4.1 Habitats

The Biodiversity Metric requires the assessment of the following characteristics of the habitats for site habitat baseline:

- Distinctiveness
- Condition
- Ecological connectivity
- Strategic significance

The Biodiversity Metric requires the assessment of the following characteristics of the habitats for habitat creation:

- Distinctiveness
- Condition
- Ecological connectivity

- Strategic significance
- Temporal risk
- Difficulty risk
- Spatial risk

The data sources and how they are used for the assessment are described in the sections below.

Distinctiveness

Each UK Habitat category is automatically assigned a distinctiveness score by the biodiversity Metric tool (see **Table 4-9**) which is based on an assessment of the habitat type's features, including species richness, rarity, percentage of habitat protected within Sites of Special Scientific Interest (SSSIs) (the less protected the higher the distinctiveness) and the capability of the habitat to support rare species which may not be found in other habitat types.

Table 4-9 Distinctiveness categories (Natural England, 2019[28])

Category	Score	Example of habitat type
Very High	8	Priority habitats as defined in Section 41 of the Natural Environment and Rural Communities (NERC) Act that are highly threatened, internationally scarce and require conservation action e.g. blanket bog
High	6	Priority habitats as defined in Section 41 of the NERC Act requiring conservation action e.g. lowland fens
Medium	4	Semi-natural vegetation not classed as a priority habitat e.g. hazel scrub
Low	2	Semi-natural or modified vegetation not classed as a priority habitat and of lower relative value to most wildlife e.g. temporary grass and clover ley; intensive orchard; rhododendron scrub
Very Low	0	Habitats and land cover or little or no value to wildlife e.g. hardstanding or sealed surface

Condition

Normally, the condition of each habitat type is assessed against specific requirements listed within the guidance documents from field survey data. These requirements are specific to each habitat type and relate to physical characteristics, structural attributes, typical species present and positive and negative indicators, such as the presence of invasive species. See **Table 4-10** below.

Table 4-10 Condition categories (Natural England, 2019)

Category	Multiplier
Good	3
Fairly good	2.5
Moderate	2
Fairly poor	1.5
Poor	1
N/A - Agriculture	1
N/A - Other	0

For the high-level assessment at gate-1, the lack of survey data on baseline habitat condition means that habitat condition is assumed to be 'moderate' in all cases. This provides a multiplier of 2 which

[28] http://publications.naturalengland.org.uk/publication/5850908674228224

equates to the average condition score between poor and good and therefore is the best estimate thus holding this variable constant and allowing comparison between elements.

Ecological connectivity

Each habitat type is assessed for its connectivity to other surrounding similar semi-natural habitats, which could enable the movement of species throughout the wider environment (see**Table 4-11**). Connectivity is automatically assigned in the Biodiversity Metric tool based on distinctiveness. Low and Medium distinctiveness habitats are always low connectivity. High or very high distinctiveness are medium connectivity.

Table 4-11 Connectivity categories (Natural England, 2019)

Category	Multiplier
Medium connectivity	1.1
Low connectivity	1

Strategic significance

Strategic significance is measured at a landscape scale, taking into consideration local plans for green infrastructure and biodiversity, national character areas and national objectives. This category gives value to habitats that are situated within optimal locations which could enable biodiversity objectives to be met (see **Table 4-12**). For the purposes of this gate-1 strategic significance is assumed to be 'medium' in all cases where habitat is lost, thus holding this variable constant. Where mitigation is required Biodiversity Opportunity Areas were identified and therefore assessed as ‘high’.

Table 4-12 Strategic significance categories (Natural England, 2019)

Category	Multiplier	Point applied to calculation	
		Pre-impact	Post-impact
High strategic significance Within an area formally identified as being of good environmental potential in local policy	1.15	Yes	Yes
Medium strategic significance Good environmental potential but not in an area formally identified as being of good environmental potential in local policy	1.1	Yes	Yes
Low strategic significance Low environmental potential and not in an area formally identified as being of good environmental potential in local policy	1	Yes	Yes

Temporal risk

Temporal and difficulty multipliers are automatically applied to the biodiversity unit calculation in the case of habitat creation, restoration, or enhancement in order to consider the time it will likely take to achieve the target condition and how difficult it will be to achieve the desired result. This gives some weighting to the level of uncertainty that these factors create (see **Table 4-13**).

There can be a negative impact on biodiversity for a period of time whilst newly created or enhanced habitat is establishing to its required level of maturity. The temporal risk accounts for this time lag.

Table 4-13 Temporal risk multipliers (Natural England, 2019b)

Time to Target Condition (years)	Time to Target Multiplier
30	0.343

20	0.49
10	0.7
5	0.837
1	0.965
0	1

Difficulty risk

The Biodiversity Metric considers how difficult (**Table 4-14**) it is to create or restore different habitat types and applies a multiplier to account for the uncertainty of achieving the target state.

Table 4-14 Difficulty Categories (Natural England, 2019)

Difficulty of Creation Category	Difficulty of Creation Multiplier
Very High	0.1
High	0.33
Medium	0.67
Low	1

Spatial risk

Compensatory habitat created at a greater distance from the site of habitat loss will deplete a local area of natural habitat, risking reduced habitat connectivity and limiting available food sources for a variety of wildlife. As all compensatory habitat discussed is within the Local Planning Authority (LPA), a multiplier of 1 is used in all cases (see **Table 4-15**).

Table 4-15 Spatial risk categories (Natural England, 2019)

Local Risk Category	Spatial Risk Multiplier
Compensation inside LPA, or deemed to be sufficiently local to site of biodiversity loss	1
Compensation outside LPA of impact site but in neighbouring LPA	0.75
Compensation outside LPA of impact site and beyond neighbouring LPA	0.5

4.4.2 Hedgerows

Terrestrial habitat loss and hedgerow loss are two separate assessments within the DEFRA Biodiversity Metric. In order to calculate approximate hedgerow loss aerial imagery was used to count the number of hedgerows intersected by each WCS component. The number of hedgerow intersections was then multiplied by the working width to give an overall length of hedgerow loss. This was then entered into the DEFRA Biodiversity Metric and classified as '*Native species rich hedgerow*' which then quantified the hedgerow loss.

The current working width for all elements is reduced to 20m where hedgerows are impacted as an assumption for gate-1; however, as the detail of the WCS components evolves, this width and number of hedgerows that may be avoided may change as a result of the use of direction drilling techniques during construction.

4.4.3 Rivers

In the Biodiversity Metric 2.0, rivers and streams are defined as those classified as 'Main River' or 'Ordinary Watercourse'. This classification includes all types of watercourses, including canals, canalised rivers and rivers with an ephemeral (temporary) nature, such as Chalk Streams. Coastal, tidal and inter-tidal reaches are not measured within the rivers and streams component of the biodiversity metric. The data to populate the Biodiversity Metric 2.0 tool is normally based on the assessment outputs obtained through a Modular River Survey and the River Condition Assessment Tool[29].

The Biodiversity Metric requires the assessment of the following characteristics of rivers/streams and canals.

- River type and condition
- Distinctiveness
- Strategic significance
- Risk multipliers
- Time to target condition
- Difficulty of creation

However, given the limitations of the River Metric 2.0 and lack of data at gate-1, a high-level assessment was undertaken. The construction baseline usually comprises the river types within the construction (redline) boundary and the principles can be applied for the purpose of this assessment. The construction area is based on GIS data of the element pipeline locations and other structures. In order to calculate approximate temporary river length loss during construction, aerial imagery and WFD waterbody data was used to count the number of watercourses intersected for each element. For all watercourses, it was assumed there would be temporary habitat loss along an 20m easement and re-instatement. Further detail on land take for these structures will be required at gate-2, such as directional drilling or reduction in working easement.

The Biodiversity Metric for rivers is not currently designed to account for operational degradation, only direct impacts from construction. Whilst Ricardo has developed bespoke approach to assessing operational impacts for rivers, there is insufficient hydrological data to complete this assessment for WCS at gate-1. Furthermore, the Defra Metric 2.0 has errors that prevents accurate assessment of the uplift required for net gain, which may be resolved with the release of version 3.0, anticipated in 2021. It is anticipated that Rivers & Streams Metric 3.0 will be available for use at Gate 2, which should address some of the limitations of the Metric 2.0 and should account for both construction and operational phases. Gate 2 should provide more opportunity for habitat condition & extent assessment via habitat surveys, which will allow for better assessment with Metric 3.0.

4.4.4 Net gains/losses

The calculation of net loss/gain within the Biodiversity Metric 2.0 only considers direct impacts resulting in habitat loss, whether permanent or temporary, during construction. The baseline habitat scores are then adjusted for the associated habitat impacts (gains or losses) related to the construction of each element. This is assessed following construction and prior to habitat re-instatement and assumes typical good practice construction methods and mitigation will be used, such that potential for downstream effects of construction will be fully mitigated. This part of the assessment identifies high risk areas where the proposals will result in a significant loss of biodiversity and offsetting will be more onerous or may identify an 'irreplaceable habitat' that should be avoided, such as certain priority habitats. These irreplaceable habitats are flagged by the Metric as 'unacceptable loss 'and require a bespoke mitigation strategy if unable to be avoided. These habitats are then removed from the mitigation calculations which can account for a difference between onsite area lost and onsite habitat creation.

The gains and losses are calculated assuming all habitat within the ZoI from construction impacts will be lost and reinstated with the same habitat. This is assessed as on-site habitat creation within the Biodiversity Metric. Due to the risk factors in habitat creation, such as time lags and difficulty in creation, the habitat units for reinstatement will not equally compensate for the units lost. The results of the deficit 'net loss' for each habitat type per element are provided in **Section 4.5** in table format in habitat units and hectares or linear meters of river/hedgerow. The number of units/hectares to provide 10% net gain are also given for terrestrial habitat and hedgerows. The outputs are presented as summary data tables of habitat gains/losses.

[29] https://modularriversurvey.org/

4.4.5 Strategic assessment of biodiversity opportunities

Enhancement measures can include the provision of new habitats, provision of new habitat features and the improved management of existing habitats which will result in a net benefit to biodiversity, over and above the measures required to mitigate and compensate for the impacts of a proposed scheme. Enhancement opportunities are added to the Biodiversity Metric as a habitat area and the Metric re-calculates the quantity or balance of (units) of BNG provided, which is also given as a % change from the baseline. This stage will require significant manipulation of habitat restoration/creation options to identify the best outcome at gate-2. For gate-1, the mitigation hierarchy was followed to identify like for like replacement habitat opportunities.

The output of this stage is a summary of the Biodiversity Metric output and a table of the habitats and areas required for enhancement/creation (**Section 4.5**). Due to risk parameters associated with habitat creation and restoration a 1:1 replacement in habitat type and area will not score 0 in terms of gains and losses but a negative number of units. Where additional habitat area is required to offset losses, it is possible that insufficient land may be available on-site.

Specific detail of possible mitigation measures and the identification of specific objectives within National and Local plans and policies within is not assessed for gate-1, as this level is detail is not meaningful given the assumptions in the data. For a high-level assessment, firstly the area/length of habitat required for offsetting/net gain was identified and whether this land take is available within the surrounding area and supported by local/national strategies.

Habitats

Natural England have produced a spatial dataset that describes the geographic extent and location of Habitat Networks for 18 Priority Habitats[30]. The data includes the locations of various zones identified as suitable for restoration that would provide better resilience and connectivity for priority habitats. The WCS components would result in the temporary habitat loss of a number of Priority Habitats and non-Priority Habitats and these Habitat Networks could potentially provide suitable locations for offsetting these biodiversity losses.

The data comprises the 'Habitat Components', the location of existing patches of primary habitat (Priority Habitat Inventory). As well as other network zones, the data includes the location of sites where data suggests small fragments of the primary habitat or degraded habitat exists where restoration may be possible, called 'Restorable habitat'. Buffering these zones are Fragmentation Action Zones where habitat creation is also possible to help reduce habitat fragmentation. Land within close proximity to the Habitat Components that are more likely to be suitable for habitat re-creation of that component are termed 'Network Enhancement Zone 1'. Therefore, zones provide opportunities for offsetting and net gain in relation to impacts on priority habitats from the proposed components, as well as non-priority habitats. Buffering these zones are Network Enhancement Zone 2 and Network expansion Zones, which provide further opportunities within the wider area for green infrastructure.

At Gate 1, a qualitative assessment was undertaken to visually assess the locations of these Habitat Networks within 1km of the components to determine the likelihood of suitable biodiversity opportunities. An initial quantification was undertaken of likely suitable area available for offsetting/net gain by measuring the area of habitat with the Restorable habitat, Network Enhancement Zone 1 and Fragmentation Action Zones within 1km of the components. This provides an indication of the biodiversity opportunities local to the components.

At Gate 2, further assessment should be undertaken to link the availability of offsetting habitat within these zones to the particular Habitat Components (priority habitat type). Due to the assumptions in the data at gate-1, this level of assessment will not be particularly meaningful and therefore, it is recommended at Gate 2 once the data is more refined.

The output is a habitat map with core biodiversity features and strategic areas (allocations) and a quantification of habitat availability within 1km of the components. The exact location would be subject to consultation at gate-2.

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30 https://magic.defra.gov.uk/magicmap

Rivers

The River Metric 2.0 currently has errors that prevent assessment of the uplift required for net gain and therefore, whilst it is possible to assess the river units lost from open source data to estimate the attributes required for the assessment, the number of river units lost would have little value without being able to calculate the units required for 10% net gain. Therefore, for comparative purposes, the impact on biodiversity has been assessed through a visual assessment of the number of river intersections and calculation of the length of river temporarily lost to the construction of the components (pipelines only) by multiplying by the number of intersections with the assumed easement width (20m). Offsetting and net gain for rivers would require a bespoke solution agreed through consultation with the regulators. As a high-level indication of the river restoration opportunities, Natural England's spatial dataset for Priority Habitats for Restoration and Restorable Habitat (NE Habitat Network) was compared to the locations of the components to identify the locations and length of rivers within NE networks for restoration within 1km of the components.

Mitigation for WFD compliance can be used to account for 'no net loss' but not 'net gain'. Net gain needs to be additional to count and not part of a statutory requirement. More detailed assessment will be undertaken at Gate 2 to identify:

a. Actions within the river basin /catchment plans can be offsets (to be agreed with the Regulators); and
b. Mitigation for WFD compliance.

4.4.6 Biodiversity Net Gain and Natural Capital

Taking a habitats-based assessment approach, the outputs from the BNG assessment for the WCS components were linked back to the Natural Capital (NC) metrics and the BNG outputs were used to support quantify the Biodiversity and Habitats ecosystem service (**Section 2**).

4.4.7 Data Gaps and Assumptions

Due to the high-level nature of the gate-1 assessment and the lack of available detailed design information, several assumptions have been made, which have been described within the above text.

4.5 BNG Assessment results

A detailed breakdown of construction habitat, hedgerow and river loss per element from the BNG assessment for components 1-4 are provided within **Appendix A1**. The Defra Metric assessments for each component are provided in **Appendix A2i-vi**. The following tables present a summary of the results in **Appendix A1**.

Table 4-16 represents the biodiversity deficit, following habitat re-instatement along the pipeline easements, for offsite compensation. This is given in **Table 4-16** as % loss of biodiversity units and **Table 4-17** of the overall units lost following re-instatement.

Table 4-16 Summary of the percentage, temporary construction loss (post re-instatement and pre off-site compensation) for habitats and hedgerow for each component

	% Terrestrial habitat loss	
Component	**% Loss of habitat units**	**% Loss of hedgerow units**
1 Poole Effluent Reuse	-46.62%	-43.93%
2 Roadford Pumped Storage	-31.97%	-43.93%
3 Transmission System to Wessex Water	-27.24%	-41.38%
4 Transmission System to Southern Water	-28.62%	-41.38%

Table 4-17 Summary of the temporary construction loss (pre-instatement and pre off-site compensation) for rivers for each component

	River habitat loss (km)	
Component	**Non-Priority River Habitats**	**Priority River Habitats**
1 Poole Effluent Reuse	0	0
2 Roadford Pumped Storage	-0.22	-0.02
3 Transmission System to Wessex Water	-1.6	-0.1
4 Transmission System to Southern Water	-0.42	0

Certain priority habitats are unable to be assessed within the DEFRA Metric owing to their uniqueness and difficulty of re-creation and compensation. If lost they require a bespoke compensation strategy. These habitats are not taken forward within the Defra Metric assessment and therefore, no units are given. The hectarage of this loss is shown in **Table 4-18** and these habitats should be avoided at the design stage where possible. The unacceptable loss habitats and their individual areas are given within the baseline metric data, provided within the Appendices for each element. **Table 4-18** also shows the impact on Priority Habitats for each component in units lost.

Table 4-18 Summary of the overall unit construction loss (post re-instatement and pre off-site compensation) for habitats and hedgerow for each component

	Net Biodiversity Unit Loss			
Component	**Loss of habitat (units)**	**Un-acceptable habitat losses (ha)**	**Loss of Priority Habitat (units)**	**Loss of hedgerow (units)**
1 Poole Effluent Reuse	-114.53	0	-75.33	-0.39
2 Roadford Pumped Storage	-194.76	-4.34	-25.04	-4.79
3 Transmission System to Wessex Water	-1,408.99	-0.55	-165.38	-6.81
4 Transmission System to Southern Water	-1,408.99	-2.94	-161.09	-6.81

5 Mitigation Development

5.1 Biodiversity Net Gain Opportunities

To achieve biodiversity net-gain there are opportunities locally for the following habitat enhancement and creation. **Table 5-1** shows for each habitat type impacted by the scheme, the offsite hectarage /km of habitat enhancement or creation required for a minimum 10% net gain in habitats and hedgerows and the metric units that this achieves. As stated in the methodology the majority of habitats were assumed to be in moderate condition. Hectarage required can be halved if habitats are assumed to be in poor condition. The offsite baseline habitat was assumed to be in poor condition and enhanced to moderate condition. The requirement can be approximately halved if it is assumed good condition can be reached, although this is considered unachievable for woodland, for example, in the metric. The individual requirements per WCS component are provided in **Appendix A2i-iv** and summarised in **Appendix A1** and highlights the specific percentage gain. It is important to also consider the need for bespoke mitigation / compensation or 'unacceptable loss habitats' (refer to **Appendix A1**).

The Biodiversity Metric cannot be used to calculate the requirement for 10% net gain for rivers due to errors in the 2.0 version of the metric. A bespoke solution would be required, agreed through consultation with the regulators.

Table 5-1 Summary of the offsetting requirements to achieve an approximate 10% net gain for habitats and hedgerows for each grouping

	Offsetting Requirements for 10% BNG				
Habitat	**Enhancement or Creation**	**Component 1**	**Component 2**	**Component 3**	**Component 4**
Modified grassland	Enhancement	25 ha	30 km	0	50 ha
Neutral grassland	Enhancement	20 ha	50 km	560 ha	150 ha
Lowland heathland	Enhancement	5 ha	0	10 ha	
Broadleaved woodland	Creation (grassland succession)	5 ha	15 km	30 ha	12 ha
Mixed woodland	Creation (grassland succession)	0	0	0	0 ha
Lowland calcareous grassland	Enhancement	0	0	15 ha	5 ha
Traditional Orchard	Creation	0	0	2 ha	1 ha
Native species rich hedgerow	Creation	0.1 km	1.2 km	1.8 km	1.6 km
Total (ha)	**Habitat**	**55ha**	**95ha**	**617ha**	**219ha**
	Hedgerow	**0.1km**	**1.2km**	**1.8km**	**1.6km**
Total (units)	**Habitat**	**+374.47**	**+579.68**	**+4,899.82**	**+1,514.99**
	Hedgerows	**+0.52**	**+6.19**	**+9.65**	**+8.25**

The overall habitat requirement for a 10% net gain is highest for component 3 with regard to hectarage/km required and least for component 1. As noted in Table 4-37 habitats which are categorised as 'unacceptable losses' which is a major consideration due to the requirement for a bespoke mitigation strategy, are highest for component 2 but are also a consideration for components 3 and 4. Additional offsite mitigation will be required for these components.

The availability of land for offsetting per element has been detailed in **Appendix A1**. **Table 5-2** provides a summary of opportunities for delivering BNG for terrestrial habitats, hedgerows and rivers, from published information on strategic land identified within Natural England (NE) Habitat Networks. A spatial dataset of these networks identifies land for re-creation and enhancement in relation to priority habitats (and rivers). The area and the approximate length of river reaches within 1km of the scheme are given in **Table 5-2** for each component. There is no open source GIS data set showing Priority Rivers for Restoration. Therefore, for a high-level assessment at gate-1 of Restorable Habitat within NE's Habitat Network has been qualitatively assessed for river opportunities, with an estimate of river length within 1km of the component. The results are given in **Table 5-2**.

Table 5-2 Area of habitat with biodiversity opportunities (NE's Habitat Network Zones) within 1km of each component

Strategic habitat for re-creation / enhancement	Area (ha) within 1km of component			
	Component 1	Component 2	Component 3	Component 4
Fragmentation Action Zone (FAZ)	41.8	388.8	677.5	988.9
Network Enhancement Zone 1 (NEZ 1)	34.6	615.1	1105.5	2968.4
Restorable Habitat	5.7	146.5	517.6	781.5
TOTAL	**87.5**	**1150.4**	**2300.6**	**4738.8**

Strategic rivers for restoration	Approximate river length within 1km of component			
	Component 1	Component 2	Component 3	Component 4
Restorable Habitat	**0**	**2.5km**	**8km**	**10km**

There is no GIS layer for hedgerows and therefore, more detailed analysis will be required at gate-2 to identify specific locations from aerial imagery. **Figure 2, 4, 6 and 8 within Appendix A1** shows the spatial location of biodiversity opportunity areas within 1km of component 1-4 respectively.

6 Monitoring and Assessment for Gate 2

The following section outlines key Gate 2 requirement and associated next steps. These are based on what has been identified within the overall assessment and delivery of outputs. It also takes account of OFWAT's requirements for Gate 2 especially related to multi-solution decision making and improving on Gate 1 activities related to detail and breadth of studies for a key decision point for strategic solutions. OFWAT states that the solution should be developed to a standard suitable for submitting into final regional plans or final water resources management plans based on refined and consistent costs and benefits. The following key Gate 2 requirement are identified to support this requirement and to build on any new regulatory guidance that may be developed throughout the Gate 2 process.

The following sections outlines key Gate 2 requirement and associated next steps.

6.1.1 Refining the zone of influence

The current ZoI for the assessed elements extends to 1 km from any likely construction zones. Whilst acceptable for a high-level approach as required for Gate 1, greater detail will be necessary for Gate 2. Once the options have been developed further, more in-depth analysis of likely effects on factors such as water quality, bankside habitats or groundwater flow will be possible, and may highlight a necessity to expand or reduce our chosen zones. This will ensure that calculations derived from areas of habitat are more accurate, without over/underestimating the areas that may be affected. It will also allowing for a greater understanding of the impact on the freshwater environment, as rivers and groundwater are likely to have a different zone of interest to terrestrial impacts.

6.1.2 Better representation of recreational areas

ORVal[17], used in this assessment to value recreation and tourism, derives site values from a statistical model. This model does not account for individual characteristics which may determine the site's welfare benefit. In future assessments it would be beneficial to capture site specific features and a less generalised figure for visitor numbers to enable accurate valuation of recreation services. In addition at Gate 1 it has not been possible to monetise the recreation and tourism benefits of the scheme with BNG uplift as details of habitat creation opportunities have not been agreed. These will need to be further assessed and monetised at Gate 2.

6.1.3 Better natural hazard regulation

The assessment currently takes flooding into account as the primary natural hazard, but further investigation into the impact that drought has on habitats ability to slow-flow and provide natural flood resilience. This would help to more accurately identify any risk to natural habitat regulation. In order to accomplish this will require a greater breadth of data than currently available.

6.1.4 Climate change predictions

Habitat type and land usage may change in the future due to changes in global climate, creating disparity between the predicted changes caused by element implementation and the observed changes in the future.

6.1.5 Land use predictions

The vast majority of our Natural Capital Assessment is based on land cover. Upcoming changes in land use will therefore introduce discrepancies in our calculations, making it imperative that we account for planned changes such as large-scale building developments.

6.1.6 Confirming element impacts

It will be important in Gate 2 to look at how the elements will affect their surrounding habitats in closer detail to confirm our current assessment and develop it further, ultimately giving a more accurate predicted change in Natural Capital values.

6.1.7 Incorporating Net Gain into element design and Natural Capital Assessment

The Biodiversity Net Gain assessment focusses on quantifying disbenefits to biodiversity and providing the guidelines to not only mitigate them but to create a 10% increase in biodiversity with the implementation of the chosen element(s). It will be necessary to incorporate the quantified values and mitigation plans so that changes in Natural Capital can be calculated with them in mind including air quality and carbon assessment.

6.1.8 Accounting for habitat condition improvement

The BNG assessment considers options to increase the biodiversity metric score through both habitat creation and enhancement. It has not been possible to account for the natural capital benefits related to habitat enhancement at Gate 1 as habitat extent has been used as a proxy for natural capital stock. For Gate 2 it will be important to consider how habitat condition contributes to delivery of ecosystem services and assess how habitat enhancement measures will affect natural capital values.

6.1.9 Key partners collaboration

At gate-1 this Natural Capital Assessment has focused on the base line Natural Capital within a 1km ZoI, an assessment of the potential opportunities for uplift related to BNG and predicted Natural Capital loss as a result of construction/operation. This has been a desked based study using open source data and outputs from the associated SEA, WFD, and HRA assessments as part of this work. At Gate 2 there is a need to review this work in light of the wider more locally focused Natural Capital work being completed by local partners to ensure synergy between approaches and avoid any double counting.

6.1.10 Refinement of biodiversity and habitat assessment, including aquatic habitats

For Gate 1, the biodiversity and habitats assessment has focussed primarily on high-level broad habitats using CORINE data. The resolution of CORINE data does not allow us to understand local aquatic and terrestrial habitats in detail and what Natural Capital benefits may be related to them. Understanding of impacts will be improved at Gate 2 following detailed aquatic and terrestrial field surveys to confirm habitat condition and extent for BNG assessment, as well as hydrological modelling and detailed WFD assessment. This can then feed into a more detailed assessment of biodiversity ecosystem services.

6.1.11 Accounting for Biodiversity and Habitat Ecosystem Services

At Gate 1 Natural Capital benefits have been aligned with overall high level BNG opportunity areas which have been based on Priority Habitats etc where information has been gained from online sources. There has been no ground truthing of this information to establish where opportunity is likely to be greatest on-the-ground. Ground-truthed BNG and mitigation options (informed by BNG surveys) together with stakeholder engagement (to better understand local authorities) will enable a more refined Natural Capital account to be provided at Gate 2.

6.2 Gate 2 - Biodiversity Net Gain

The BNG requirement for the ACWG (Section 3.4.2.5 of the guidance[31]) stipulates that each option should look to maximise biodiversity net gain and any required mitigation should be included to enable identification of any significant costs. The ACWG requires a full assessment of BNG using the Defra metric and that BNG calculations would take place at Gate 1 and be further refined throughout the gateway process. In accordance with the ACWG guidance, at Gate 1 a biodiversity baseline has been developed from spatial data of habitat inventories and assessed in line with the Defra Metric 2.0, to calculate the change in biodiversity score for each element to include agreed mitigation. The open source habitat data can be supplemented with local data sets or Phase I (habitat) site data to increase the accuracy for each option at Gate 2. Therefore, where data gaps arose at Gate 1, these should be

[31] All Companies Working Group WRMP Environmental Assessment Guidance and Applicability with SROs, October 2020

addressed at Gate 2 through the following actions, as set out within section 2.9 below. At Gate 2, the BNG assessment would be refined through the inclusion of concept designs into the assessment, in accordance with section 3.4.3.5 of the ACWG guidance.

The BNG assessment needs to be refined through greater detail on the construction methods and construction easement to provide great clarity on the impact pathways and habitat scores through the Biodiversity Metrics.

Further assessment on the hydrological impacts on ecology will be undertaken that will inform the assessment of operational BNG losses/gains.

Stakeholder consultation is essential to identify opportunities. This will be critical to the opportunity assessment related to mitigation and enhancement. We propose a series of short workshops for key stakeholder to discuss opportunities. This will include key water company representatives and stakeholders (as agreed by the STW steering group). The opportunities which may be discussed include:

- Landowners' land and landownership constraints
- Local wildlife sites
- Whether local councils have allocated land for BNG
- Criteria for prioritisation
  Consideration of specific species targets for net gain options

The improvement of baseline data is required to support gate-1 through site habitat surveys (condition assessment), ground truthing and habitat scoring. Survey locations will be targeted to sensitive areas and to ground truth the variation across the working easements

Table 4.1 of the ACWG guidance includes the requirement to include data on Local Wildlife Sites, which would need to be obtained from the Local Records Centre. Priority habitat layers for hedgerows/arable field margins are not open-source information and will be purchased from the Local Records Centre at Gate 2 to improve baseline information.

A more detailed review should be undertaken of National and Local plans and policies, such as River Basin Management Plans, catchment or WFD objectives to identify any specific objectives for BNG that can be delivered. Using the principles of Nature Recovery Networks, core areas for biodiversity have been identified within BOAs. Opportunities for connecting these through habitat restoration/creation should be explored in Gate 2, including those already identified within Local Plans/LBAPs/strategies. The opportunities should be assessed for their suitability for specific net gain features, connectivity opportunities and achievability. Values will then need to be assigned against areas of mitigation opportunity with potential condition improvement for each feature and opportunity using the principles of the scoring of the River Biodiversity Metric tool.

The current Biodiversity Metric tool (2.0) has calculation issues when working out river mitigation and units gained. It is anticipated that a 3.0 version of the tool will be released in summer 2021 in which previous errors within the tool will be updated. If available, the Biodiversity Metric calculations will be re-entered into the 3.0 version at Gate 2, and this should also allow river mitigation to be calculated.

West Country South
Strategic Resource Options

Gate 1 Submissions

Annex 3: Environmental Assessment
Appendix 3.5: Carbon Impacts

On behalf of **South West Water, Wessex Water and Southern Water**

Project Ref: 50600/001 | Rev: FINAL | Date: July 2021

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Document Control Sheet

Project Name: West Country South SROs

Project Ref: 50600

Report Title: WCS Carbon Assessment

Date: July 2021

	Name	Position	Signature	Date
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Approved by:	[redacted]	WCS Project Manager	[redacted]	

Revision	Date	Description	Prepared	Reviewed	Approved
Rev 2	06 May 2021	Reduced flow	[redacted]	[redacted]	[redacted]
Rev 3 (Final)	27 May 2021	Separated potable and raw water transfer schemes	[redacted]	[redacted]	[redacted]

Contents

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1 Introduction

1.1 Background

1.1.1 This Carbon Assessment forms a technical appendix of Annex 3: Environmental Assessment of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of likely embodied and operational carbon impacts and arising from the two schemes being progressed through the WCS SROs at Gate 1.

1.1.2 Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally schemes which will be appraised concurrently by RAPID. This report therefore provides a single carbon assessment which considers both schemes.

1.2 Context

1.2.1 Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

1.2.2 PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

1.2.3 Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

- Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
- Potential water source - Roadford pumped storage scheme (WCS2)
- Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

1.2.4 The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components identified through WCS1-3, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within Technical Annexes 1.2 – Options Appraisal Report (including WCS1-3 environmental review technical notes) and 1.3 – Concept Design Report respectively.

1.2.5 A proportionate level of environmental assessment needs to be carried out to underpin the collation and submission of competent Gate 1 submissions for each WCS SRO in accordance with appraisal criteria specified by RAPID and the Environmental Agency (itself a member of RAPID). Guidance issued by Ofwat (April 2020) confirms that Gate 1 environmental appraisal work should focus on establishing scheme feasibility, identifying key environmental (including social and economic) risks, and defining assessment frameworks for further application at Gate 2+.

1.3 Report Structure

1.3.1 The remainder of this Scoping Study is structured as follows:

- **Section 2 – WCS Overview** provides an outline of the components and associated options which together comprise the West Country South Strategic Resource Options (WCS SROs);

- **Section 3 – Carbon assessment** sets out the methodology used to develop the carbon assessments for the schemes, with benchmarking and indicative renewable energy resources required to balance the energy demands of the schemes.

2 WCS Overview

2.1 Summary

2.1.1 As noted in **Section 1**, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

- Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
- Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
- Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO Concept Design Components and Schemes

2.2.1 Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

- Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 ML/D effluent[1] from Poole Sewage Treatment Works (STW) via River Stour:

  a) Poole STW infrastructure (pumps and tanks)

  b) Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at new WRC plant)

  c) River Stour section (in-river)

  d) River Stour abstraction (including eel screen)[2]

  e) River Stour bankside storage

  f) River Stour Pre Treatment Works (for onwards transmission)

[1] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). Technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.

[2] Section 3.2.3 of **Annex 2 – Concept Design Report** provides a schematic diagram and outline layout showing the approximate area of Components 1d – f.

- Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 ML/D for onwards transmission:

    a) Abstraction from River Tamar at Gatherley intake (125 ML/D winter months only)

    b) Gatherley to Roadford Lake including outlet (Lifton North route)

    c) Roadford Lake (no major changes to existing reservoir proposed)

    d) Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)

    e) Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)

- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)

    a) Northcombe to Prewley

    b) Prewley to Parsonage

    c) Parsonage to Pynes WTW

    d) River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)

    e) River Exe abstraction (new) at Bolham Weir

    f) River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)

    g) Allers to Woodgate

    h) Woodgate to Kingston St Mary

    i) Kingston St Mary to Summerslade

- Component 4: Transmission System to SRN (components 4a - 4b)

    a. Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)

    b. River Stour Pre Treatment (Component 1f) to Testwood

        i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage

        ii. Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)

- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)

    a) Testwood WTW

b) Testwood Lakes (small)

c) Testwood potable storage tanks

2.2.2 Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

- River Tamar to Testwood Transfer, referred to as *Roadford potable water transfer scheme*.
- Poole to Testwood Effluent reuse, referred to as *Poole STW raw water transfer scheme*.

2.2.3 Further details regarding each scheme are provided in **Annex 1.2 – Concept Design Reports**.

2.2.4 The primary levels of assessment are at component and scheme levels as defined above. For the purpose of this assessment, each component part of the two schemes has been considered. Resultant overall impacts for the two schemes and the overarching WCS SROs have also been identified.

2.3 Components included in Carbon Assessments

SRO Level Assessment

2.3.1 The *WCS Sources and transfers* carbon assessment includes the embodied and operational carbon impact of the following components (using the component numbering from Section 2.2):

- Component 1: Poole Effluent Re-use (components 1a – 1f)
- Component 2: Roadford Pumped Storage (components 2a - 2e)
- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a - 3i)

2.3.2 The *WCS Southern Water transfer* carbon assessment includes the embodied and operational carbon impact of the following components:

- Component 4: Transmission System to SRN (components 4a - 4b)
- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)

Scheme Level Assessment

2.3.3 The *Roadford potable water transfer scheme* carbon assessment includes the embodied and operational carbon impact of the following components:

- Component 2: Roadford Pumped Storage (components 2a - 2e)
- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a - 3i)
- Component 4: Transmission System to SRN (component 4a)

- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5c)

2.3.4 The *Poole STW raw water transfer schem*e carbon assessment includes the embodied and operational carbon impact of the following components:

- Component 1: Poole Effluent Re-use (components 1a – 1f)
- Component 4: Transmission System to SRN (component 4b)
- Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a-b)

3 Carbon assessment

3.1 Methodology

3.1.1 At Gate 1 a carbon assessment methodology has been developed and a high level carbon assessment undertaken in accordance with UKWIR guidance (2012)[3], which sets out how to calculate embodied and whole life carbon for water industry assets. This has been applied alongside BEIS (2019) guidance[4] to undertake a high-level carbon assessment of WCS SROs at SRO level in relation to two SROs: *WCS Sources & Transfers* and *WCS Southern Water transfer*, which are also presented as two schemes: *Roadford potable water transfer schem*e and *Poole STW raw water transfer schem*e.

3.1.2 In order to produce whole life carbon assessments for the selected options, the embodied carbon (initial carbon related to construction of assets) and operational carbon from annual consumption of energy, chemicals and transport and renewal of assets at specified intervals was calculated. The whole life of the scheme has been taken as 60 years. The renewal periods for asset items were consistent with those used for the West Country North Accelerated Gate 1 schemes to allow comparison with other Gate 1 SROs and are based on the standard renewal periods for many water company assets as set out below:

- Pumps – overhaul after 10 years, replace after 20
- Other mechanical items – replace every 20 years
- ICA – replace every 10 years
- Civils – replace every 60 years
- Tunnels, shafts, reservoirs – replace very 100 years

3.1.3 Further, for process units utilising granular activated carbon (GAC), the South West Water team confirmed that the standard practice is to regenerate GAC every three years and replace with virgin material every nine years.

3.1.4 Embodied emissions were calculated in Stantec's inhouse carbon tool as the sum of the products of quantities and emission factors. These quantities include the amount of construction materials, energy, chemicals and transport used in construction. The embodied carbon of manufactured equipment held in the tool were obtained from suppliers and supplemented by those used by the mechanical engineering team for this project. Emission factors for various materials and activities are taken from the ICE's CESMM Carbon and Price Book (which in turn contains information from the Inventory of Carbon and Energy) or from other recognised sources, such as the Ecoinvent database.

3.1.5 Operational carbon is calculated using product of the annual quantities of chemicals used and the emission factors from the UKWIR carbon assessment workbook version 14 and summed for the duration of the scheme. To this are added the product of electricity use and the relevant emission factors.

3.1.6 It must be noted that the methodology for assessing whole life carbon for water companies (UKWIR 2012) accounts for the projected decarbonisation of the electricity network as a result of increasing renewable energy generation. Accordingly, the emission factors decline year on

[3] UKWIR (2012) A framework for embodied carbon accounting in water industry assets.

[4] BEIS (2019) Valuation of energy use and greenhouse gas: Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government.

year. Projections in the BEIS (2019) have been used to develop the whole life carbon assessments.

3.1.7 The SRO solutions were designed to operate during drought conditions. However, these assets, in particular, potable water assets need to be operated in order for them to be available at the time they are required. A minimum throughput of flows required to maintain process units and water quality was also modelled (7.5 ML/d) to determine a likely lower bound of carbon emissions to compare with the design scenario which would be the upper bound: full throughput (30 ML/d) for the entire 60-year design life, as detailed in Section 3.2.

3.1.8 All the water companies involved in SROs have declared Water UK Net Zero by 2030 commitments. The large operational impacts of SROs, resulting in large measure from the energy demands, will need to be apportioned to individual companies. Accordingly, a scenario of how this could be achieved to address the operational carbon impacts of the likely or full throughput flows for both the SRO schemes will need to be developed to highlight the scale of mitigation that may be required. The detail of this, together with costing of mitigation plans will need to be undertaken if the SROs are taken forward.

3.2 Results

Embodied carbon assessment results

3.2.1 Based on the design information from the civil and mechanical engineers, embodied carbon estimates were derived, as described above. Embodied carbon from the initial construction of the assets associated with the two SROs are shown in **Table 1** along with the embodied carbon per megalitre produced. The water transfer solutions were designed to operate during drought conditions. However, these assets, in particular, potable water assets need to be operated in order for them to be available at the time they are required. The minimal flow to be maintained to ensure water quality (25% utilisation) was used to derive a likely flow, shown in **Table 2**.

Table 1: Embodied carbon associated with SRO construction

Solution	Embodied carbon (tCO_2e)	Embodied carbon per ML at full throughput ($kgCO_2e/ML$)	Embodied carbon per ML at 25% utilisation ($kgCO_2e/ML$)
WCS Sources & Transfers	127,556	194	777
WCS Southern Water transfer	45,961	70	280
Roadford potable water transfer scheme	139,344	212	848
Poole STW raw water transfer scheme	34,174	52	208

Table 2: Continuous flow used in whole life assessment

Solution	Flow at full throughput	25% utilisation used in assessment
WCS Sources & Transfers	30 ML/D	7.5 ML/D
WCS Southern Water transfer	30 ML/D	7.5 ML/D
Roadford potable water transfer scheme	30 ML/D	7.5 ML/D
Poole STW raw water transfer scheme	30 ML/D	7.5 ML/D

Whole life carbon assessment results

3.2.2 The whole life carbon assessment combines the embodied carbon, operational carbon and carbon associated with replacement of assets over the project design life.

3.2.3 Profiles for the two SROs comparing carbon impacts operating continuously at full throughput for 60 years and the likely throughput from **Table 2** are shown in **Figure 1** and **Figure 2**. Similarly, the whole life carbon impacts of the two transmission schemes are shown in **Figure 3** and **Figure 4**. The embodied carbon for the full throughput and minimum flow options are the same, but the operational carbon associated with chemicals and electricity are reduced. Using pumps and other assets at flows much lower than their design flows results in efficiencies, which may lead to higher operational carbon impacts, but this is offset by the fact that there may be less wear and tear on other assets. Accordingly, this finer detail has not been addressed for this Gate 1 submission.

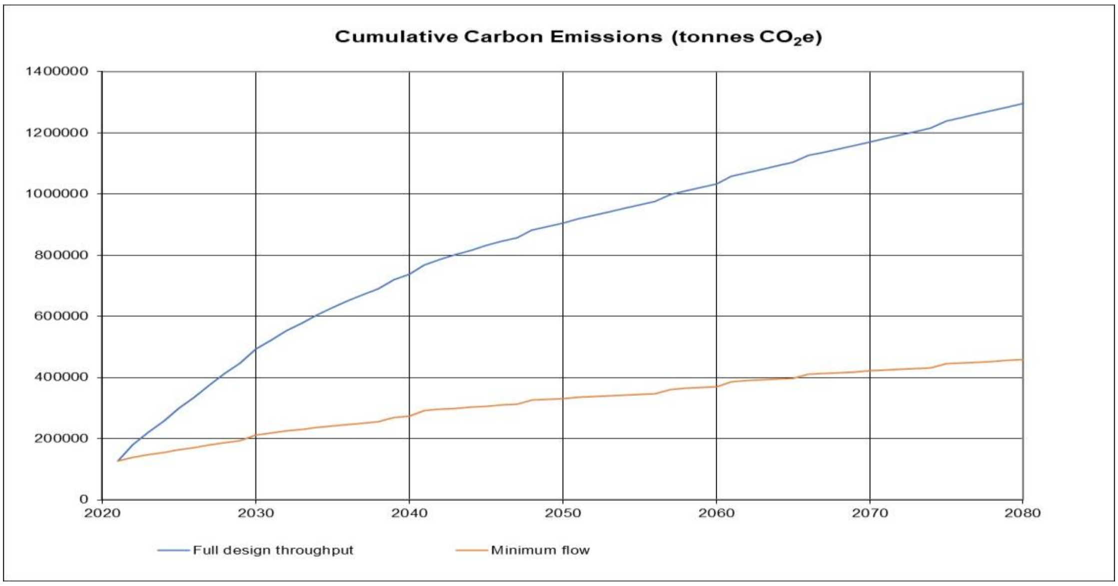

Figure 1 Comparison of whole life carbon profile for WCS Sources & Transfers operating at full through put and minimum flows for 60 years

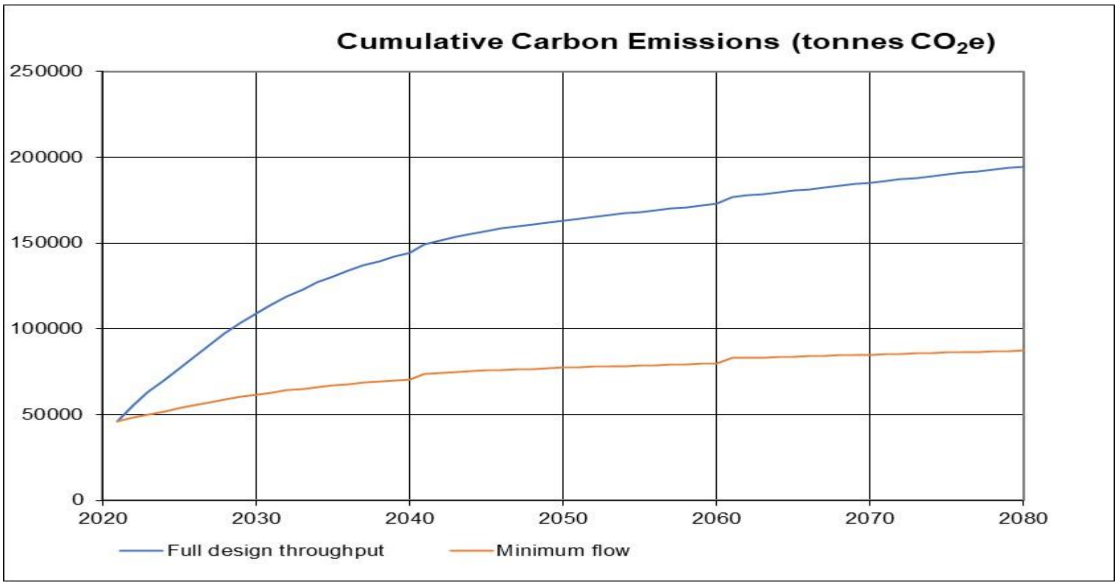

Figure 2 Comparison of whole life carbon profile for WCS Southern Water transfer operating at full through put and likely flows for 60 years

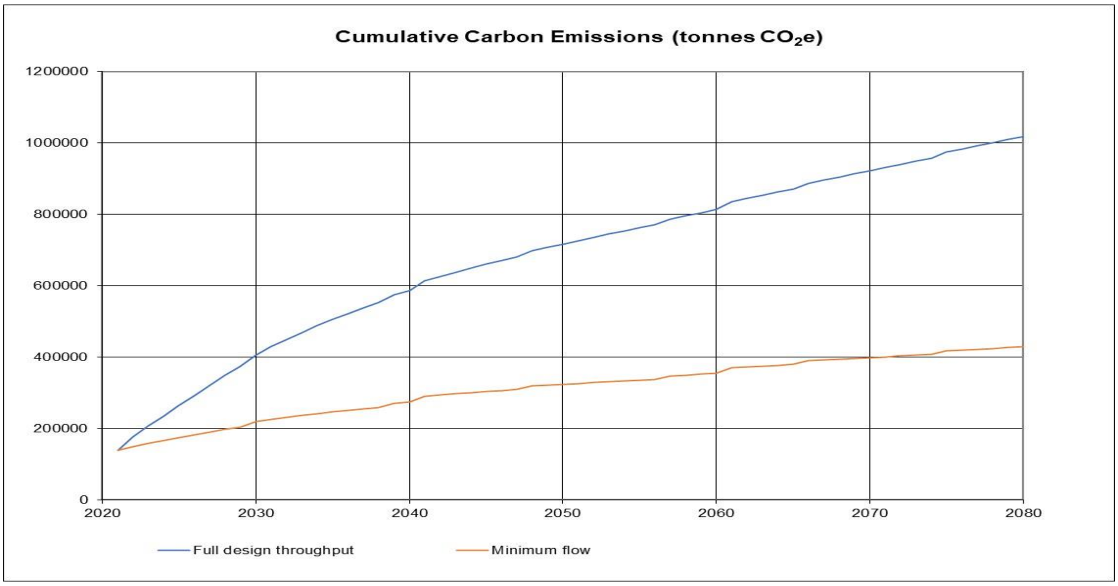

Figure 3 Comparison of whole life carbon profile for Roadford potable water transfer scheme operating at full through put and likely flows for 60 years

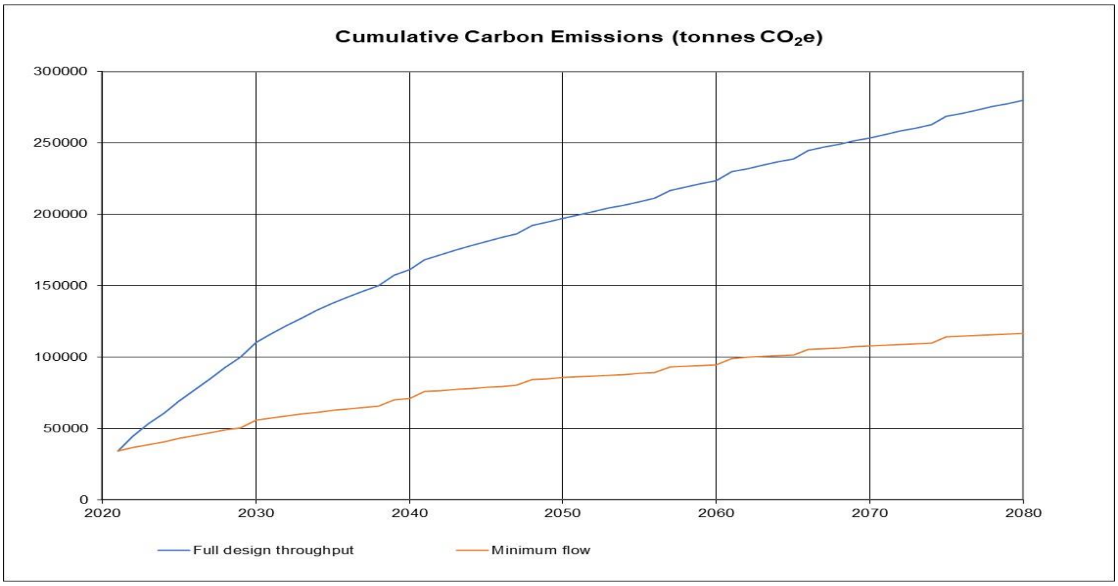

Figure 4 Comparison of whole life carbon profile for Poole STW raw water transfer scheme operating at full through put and likely flows for 60 years

3.2.4 The carbon breakdown of the whole life carbon for the *WCS Sources & Transfers* and *WCS Southern Water transfe*r are presented in **Table 3** and **Table 4**, respectively whilst the data for the *Roadford potable water transfer scheme* and *Poole STW raw water transfer schem*e are presented in **Table 5** and **Table 6**.

3.2.5 As can be seen in **Table 3**, the contribution of granular activated carbon (GAC) regeneration (in operational carbon (chemicals)) and renewal (consumables) is a major source of carbon emissions for this SRO. It is used in the process at Northcombe water treatment works, Allers water treatment works and the effluent re use plant at Newtown. Accordingly, significant carbon savings are possible if the design flow of the scheme could be scaled down, or modularised.

3.2.6 The impact of GAC on operational carbon and consumables is split between the *Roadford potable water transfer scheme* (**Table 5**) and the *Poole STW raw water scheme* (**Table 6**) as the former includes GAC at Northcombe water treatment works and Allers water treatment works, whilst the latter includes the effluent re use plant at Newtown.

Table 3 Breakdown of carbon emission components for the WCS Sources & Transfers

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Total embodied carbon (from construction)	tCO_2e	127,556	127,556
Renewals (e.g. pumps and kiosks)	tCO_2e	29,288	29,288
Consumables (e.g. GAC)	tCO_2e	64,932	64,932
Operational carbon (electrical)	tCO_2e	458,780	131,252
Annual electricity consumption	*MWh/a*	*126,595*	*36,217*
Operational carbon (chemicals and transport)	tCO_2e	425,665	106,416
Whole life carbon (60 years)	**tCO_2e**	**1,106,220**	**459,444**

Table 4 Breakdown of carbon emission components for the WCS Southern Water transfer

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Total embodied carbon (from construction)	tCO_2e	45,961	45,961
Renewals (e.g. pumps and kiosks)	tCO_2e	5,704	5,704
Consumables (e.g. GAC)	tCO_2e	0	0
Operational carbon (electrical)	tCO_2e	141,198	35,300
Annual electricity consumption	*MWh/a*	*38,962*	*9,741*
Operational carbon (chemicals and transport)	tCO_2e	2,942	736
Whole life carbon (60 years)	**tCO_2e**	**195,806**	**87,701**

3.2.7 The *WCS Southern Water transfer* option operated at full throughput has operational carbon impacts four times the operational carbon of the operated at minimum throughput.

Table 5 Breakdown of carbon emission components for the *Roadford potable water transfer scheme*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Total embodied carbon (from construction)	tCO_2e	139,344	139,344
Renewals (e.g. pumps and kiosks)	tCO_2e	27,305	27,305
Consumables (e.g. GAC)	tCO_2e	44,232	44,232
Operational carbon (electrical)	tCO_2e	465,422	132,912
Annual electricity consumption	*MWh/a*	*128,428*	*36,676*
Operational carbon (chemicals and transport)	tCO_2e	344,877	86,219
Whole life carbon (60 years)	**tCO_2e**	**1,021,180**	**430,012**

Table 6 Breakdown of carbon emission components for the *Poole STW raw water transfer scheme*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Total embodied carbon (from construction)	tCO_2e	34,174	34,174
Renewals (e.g. pumps and kiosks)	tCO_2e	7,687	7,687
Consumables (e.g. GAC)	tCO_2e	20,700	20,700
Operational carbon (electrical)	tCO_2e	134,556	33,639
Annual electricity consumption	*MWh/a*	*37,129*	*9,282*
Operational carbon (chemicals and transport)	tCO_2e	83,731	20,933
Whole life carbon (60 years)	**tCO_2e**	**280,847**	**117,132**

3.2.8 The *Roadford potable water transfer scheme* operated at full throughput has whole life carbon impacts 3.5 times those of the *Poole STW raw water transfer scheme*. This difference is due to the embodied carbon of the extensive transmission lines and storage tanks along the route, together with the operational impacts of pumping, as well as treating water to a high quality and maintaining this along the route of the potable water scheme compared to the shorter transmission route and lower treatment requirements of the raw water transfer scheme.

Benchmarking

3.2.9 Typical water industry carbon intensities are 185 to 224 kg CO_2e / ML water treated.

Table 7: Carbon intensity factor per ML

Solution	Carbon per ML at full throughput ($kgCO_2e/ML$)	25% utilisation ($kgCO_2e/ML$)
WCS Sources & Transfers	1,684	2,797
WCS Southern Water transfer	298	534
Roadford potable water transfer scheme	1,554	2,618
Poole STW raw water transfer scheme	427	713

3.2.10 The carbon intensity of the *WCS Sources & Transfers* shown in **Table 7** is 10 to 14 times (for full throughput and the 25% utilisation flow, respectively) typical water industry carbon intensities. Similarly, the carbon intensity of the *Roadford potable water transfer scheme* is approximately 8 to 13 times the typical water industry values. Contributing to the intensity are the size of the GAC contact tanks and the number of energy-intensive high lift pumping stations.

3.2.11 At full throughput, the *WCS Southern Water transfer* is approximately 1.5 times more energy intensive than conventional water supplies. This increases to 2.6 times more when the scheme is only partially used. Again, this illustrates the need to carefully size the schemes and flow regimes to reduce the scale of the schemes, if they are only partially utilized.

3.2.12 the *Roadford potable water transfer scheme* has carbon intensities approximately 3 times those of the *Poole raw water transfer scheme,* that are 2 to 3 times more carbon intensive than typical industry values. Both schemes could have lower carbon intensities if consideration is given to the arrangement, size and utilisation of GAC tanks, however, the shorter transfers and reduced pumping would still make the *Poole raw water transfer scheme* the preferred solution in terms of carbon intensities.

Indicative renewable energy sources to meet electricity demand

3.2.13 Given that many water companies are aiming to achieve Net Zero by 2030 and will aim to balance new energy demands with renewable energy sources or other measures, an indicative assessment of wind or solar requirements to meet the scheme requirements have been derived.

3.2.14 It has been assumed that 4 MW wind turbined would be installed, each with a land take of 1.6 hectares. An average wind speed for the area would be in the order of 5.5 m/s.

3.2.15 Solar PV radiation has been taken as the average in the South East to estimate the area of PV.

3.2.16 The results for the two SROs, shown in **Table 8** and **Table 9**, although only indicative, illustrate the additional land required to meet the demands of these schemes. This assessment would need to be undertaken in more detail at Gate 2, 3 or 4.

Table 8 Indicative renewable energy sources to meet electricity demands for the *WCS Sources & Transfers*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Solar PV	hectares	205	59
Wind	hectares	24	6.4

Table 9 Indicative renewable energy sources to meet electricity demands for the *WCS Southern Water transfer*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Solar PV	hectares	63	16
Wind	hectares	8	1.6

3.2.17 Similarly, **Table 10** and **Table 11**, although only indicative, illustrate the additional land required to meet the demand of the potable water and raw water transfer schemes.

Table 10 Indicative renewable energy sources to meet electricity demands for the *Roadford potable water transfer scheme*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Solar PV	hectares	208	59
Wind	hectares	24	6.4

Table 11 Indicative renewable energy sources to meet electricity demands for the *Poole STW raw water transfer scheme*

Carbon contribution	Units	Flow at full design throughput	25% utilisation
Solar PV	hectares	60	15
Wind	hectares	6	1.6

West Country South – Strategic Resource Options

Annex 3: Environmental Assessment

Appendix 3.6: INNS

Report for Stantec on behalf of Wessex Water

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Customer:

Wessex Water

Customer reference:

ED15024

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Roadford Lake, Devon.
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3	01/07/2021	Minor consistency update following receipt of NE review comments	Tom Clayton and Oliver Parr	Martin Ferreira	Joe Leeves	Will Warner

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1 Introduction

1.1 Background

This Invasive Non-Native Species (INNS) Risk Report forms a technical appendix of Annex 3: Environmental Assessment of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report presents an initial analysis of INNS risks arising from the two schemes being progressed through the WCS SROs at Gate 1.

Owing to inter-relationships between the two WCS SROs, at this initial concept design stage (Gate 1) the projects have been progressed in tandem by an integrated team. This has resulted in the initial development of two functionally schemes which will be appraised concurrently by RAPID. This INNS Risk Report therefore provides a single assessment which considers risks from both schemes.

1.2 Context

Ofwat, through the PR19 Final Determination, has identified the potential for companies to jointly deliver strategic regional water resources solutions to secure long-term resilience on behalf of customers while protecting the environment and benefiting wider society. As part of the assessment of companies' PR19 business plans, Ofwat introduced proposals to support the delivery of Strategic Regional Water Resource Options (SROs) over the next 5 to 15 years with solutions required to be 'construction ready' for the 2025-2030 period. Ofwat's Final Determination[1] in December 2019 set out a gated process for development of Strategic Resource Options (SROs) for the co-ordination and development of a consistent set of SROs.

PR19 Final Determination (Ofwat, 2019) identifies WCS Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate SROs to be developed and assessed through a multi-stage process. The requirements for Gate 1 are to establish scheme feasibility and develop a concept level design, likely to comprise a number of options in respect of each scheme as a whole and its constituent components. This will inform the identification of a preferred option/solution at Gate 2 and detailed design and planning at Gates 3 - 4.

Between November 2020 – February 2021, three initial feasibility assessments were undertaken corresponding with each potential component part of the WCS SROs, namely:

1. Potential water source - strategic effluence re-use options in Wessex Water (WSX) area (WCS1)
2. Potential water source - Roadford pumped storage scheme (WCS2)
3. Potential intra-regional and inter-regional connections to transfer identified available water to, and receipt within, Southern Water's Hampshire zone (WCS3)

The purpose of this early work was to identify an unconstrained options list, examine showstoppers constraints and key risks and thus generate an initial evidence base to establish a set of potentially feasible component-level options (and associated schemes to progress through the WCS SROs. The selected components, comprising both the use of available water sources and transmission routes, were further developed through a concept design process and are now included in two functionally separate transfer schemes at Gate 1. The options appraisal process and concept design outcomes are detailed within Technical Annexes 1.2 – Options Appraisal Report (including WCS1-3 environmental review technical notes) and 1.3 – Concept Design Report respectively.

A proportionate level of environmental assessment needs to be carried out to underpin the collation and submission of competent Gate 1 submissions for the WCS SROs. The latest Water Resource Planning Guidelines (WRPG)[2] states that water companies must review whether current abstraction operations and future solutions will risk spreading INNS or create pathways which increase the risk of spreading Invasive Non-Native Species INNS. Where there are increased risks, water companies must propose measures to manage that risk. The EA and NE have therefore jointly identified the need for SROs to be

[1] Ofwat (2019), PR19 Final Determinations, Strategic regional water resource solutions appendix
[2] Environment Agency, Natural Resources Wales, Office for Water Services (2021). Water resources planning guideline. Updated 17 March 2021

supported by proportionate INNS risk analysis throughout the gated appraisal process. Reflecting the need for initial feasibility assessments to be completed at Gate 1, this Invasive Non-Native Species (INNS) Risk Report therefore presents an initial analysis of INNS Risks arising from the two functionally separate schemes being progressed through the WCS SROs (refer to Section 2 for details).

1.3 INNS Risks

INNS of flora and fauna are considered the second biggest threat after habitat loss and destruction to biodiversity worldwide. The annual cost of invasive non-native species to the Great Britain economy was estimated in 2010 to be £1.7billion per year, of which around 5 million was attributed to water industry management of INNS. New and existing INNS pose a threat to achieving Water Framework Directive (WFD) objectives. The UKWIR project completed by Ricardo Energy & Environment (Ricardo)[3], provided further evidence of the implications of INNS to the water industry.

Subsequently, the EA in 2017, set out a position paper on the assessment of the risks of spread of INNS posed by existing water transfers. The position paper set out the scope, outcomes and timelines expected for the raw water transfer risk assessments and options appraisal that water companies should deliver in AMP7.

As a result, INNS became a new "driver" within PR19. In previous price reviews, there was some scope for limited INNS work, justified within the biodiversity drivers. Having a separate driver recognises the increasing evidence and understanding of the risks posed by INNS. The guidance supporting this driver is explicit in stating that "the most cost beneficial and least damaging way to manage invasive species is to prevent their arrival and spread."[4] This highlights the need to understand the *pathways* by which INNS can be *transferred* and hence spread. Furthermore, the EA has specifically identified raw water transfers (RWTs) as a subgroup of pathways that should have priority risk assessments (RAs) of INNS spread[5].

The guidance provided indicates that all water companies will need to consider:

- Pathways of spread (understanding and reducing the risk from different pathways),
- Preventing spread (controlling, eradicating or managing INNS to prevent spread where this will contribute to WFD prevention of deterioration), and
- Action on INNS to achieve conservation objectives of SSSI and Habitats Directive sites.

The WRPG indicates that any RA needs to give regard to the EA's position on pathways (as set out above). Subsequently, guidance has been provided by the National Appraisal Unit (NAU) as to the minimum requirements for gate-1 INNS assessments. This guidance indicates that the gate-1 assessments should include:

- A review of the EA's Position statement and isolated catchment maps.
- High level screening:
  - Screening against Schedule 9 of the Wildlife and Countryside Act and Invasive Alien Species (Enforcement & Permitting) Order 2019,
  - INNS Heat map to identify whether the transfer areas is of high risk, and
  - Scenarios and possible mitigation measures may be beneficial to help refine resource options at this stage.

1.4 Purpose and structure of this report

This report sets out the environmental evidence/data used to inform the baseline distribution of INNS and the results of a high-level screening and heat mapping exercise. This reports also includes a more detailed risk assessment using available RA tools. Furthermore, this appendix identifies the remaining

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[3] UKWIR (2016). Invasive and Non-Native Species (Inns) Implications on The Water Industry. Report produced by Ricardo Energy & Environment. Report Number 16/DW/02/82. October 2016
[4] EA. 2017. PR19 Driver Guidance, Driver Name: Invasive Non-Native Species (INNS)
[5] EA. 2017. PR19 - Assessing the risks of spread of Invasive non-native species posed by existing water transfers - OFFICIAL

data/evidence gaps for consideration in a monitoring programme for gate-2 as captured in the Evidence and Assessment Gap Analysis Report.

This report includes the following sections:

Section 1: This introduction

Section 2: A summary of the West Country South SRO

Section 3: The methodologies used for undertaking the assessment

Section 4: The results of the gate-1 INNS Risk Assessment

Section 5: Provides a summary of the results and the recommendations for the gate-2 assessments

2 Overview of West Country SROs

2.1 Summary

As noted in Section 1, PR19 final determinations: Strategic regional water resource solutions (Ofwat, 2019) identifies West Country South (WCS) Sources & Associated Transfers and WCS – Southern Water Transfer as two of 17 candidate strategic water resources transfer schemes ('SROs') to be developed and assessed through a multi-gated process. The two WCS SROs have been developed in tandem by an integrated team at Gate 1, resulting in the development of two functionally separate water transfer schemes, each comprising a suite of infrastructure and non-infrastructure related components. In summary, the main elements within the schemes comprise:

1. Water recycling from Poole Sewage Treatment Works (STW) to generate a strategic source (30ML/D) for onwards transmission.
2. Transfer of 125 ML/D raw water between River Tamar and existing Roadford pumped storage (Roadford Lake) to change the local supply/demand balance, thereby releasing resources at Wimbleball Reservoir or generating additional supply at Northcombe Water Treatment Works (WTW) for onward transmission.
3. Long-distance transmission system (pipeline and associated infrastructure) to transfer above water sources to a suitable reception point (Testwood Lakes) in Southern Water's Hampshire zone.

2.2 WCS SRO Concept Design Components and Schemes

Following initial optioneering and screening, the components (infrastructure and non-infrastructure) selected for concept design and inclusion within the WCS SRO schemes at Gate 1 comprise:

1. Component 1: Poole Effluent Re-use (components 1a – 1f) - tertiary treatment and indirect re-use of up to 30 ML/D effluent[6] from Poole Sewage Treatment Works (STW) via River Stour:
    a. Poole STW infrastructure (pumps and tanks)
    b. Poole STW to River Stour discharge point north west of Corfe Mullen (including tertiary treatment at new WRC plant)
    c. River Stour section (in-river)
    d. River Stour abstraction (including eel screen)[7]
    e. River Stour bankside storage
    f. River Stour Pre Treatment Works (for onwards transmission)
2. Component 2: Roadford Pumped Storage (components 2a – 2e) - abstraction to enhance resilience and increase storage at Roadford Lake, generating 30 ML/D for onwards transmission:
    a. Abstraction from River Tamar at Gatherley intake (125 ML/D winter months only)
    b. Gatherley to Roadford Lake including outlet (Lifton North route)
    c. Roadford Lake (no major changes to existing reservoir proposed)
    d. Roadford Lake to Northcombe WTW transfer (including replacement pumping infrastructure)
    e. Northcombe WTW upgrade (side-stream process units to facilitate additional capacity and onward transmission)
3. Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)
    a. Northcombe to Prewley
    b. Prewley to Parsonage
    c. Parsonage to Pynes WTW

[6] Based on initial analysis of dry weather effluent resource availability at Poole STW and River Stour WFD classifications (refer to **Annex 1 – Options Appraisal** and **Annex 2 – Concept Design Report** for further details). Technical environmental studies and further analysis needed at Gate 2 to confirm deployable output (DO) and operational regime.
[7] Section 3.2.3 of **Annexe 2 – Concept Design Report** provides a schematic diagram and outline layout showing the approximate area of Components 1d – f.

   d. River Exe: Allers to Pynes (only relevant as impacted section of watercourse, no infrastructure proposed)
   e. River Exe abstraction (new) at Bolham Weir
   f. River Exe Abstraction to Allers WTW (for treatment and onwards potable transfer)
   g. Allers to Woodgate
   h. Woodgate to Kingston St Mary
   i. Kingston St Mary to Summerslade
4. Component 4: Transmission System to SRN (components 4a - 4b)
   a. Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route sections)
   b. River Stour Pre Treatment (Component 1f) to Testwood
      i. Sub-component 4b.1: River Stour to Redlynch WBS/Storage
      ii. Sub-component 4b.2: Redlynch to Testwood (partially utilises WCN Gate 1 route sections)
5. Component 5: Southern Water Reception Points at SRN Testwood complex (components 5a – 5c)
   a. Testwood WTW
   b. Testwood Lakes (small)
   c. Testwood potable storage tanks

Formed from combinations of the concept design components, the two functionally separate water transfer schemes included within the WCS SROs are:

1. River Tamar to Testwood Transfer
   a. River Tamar to Pynes WTW pumped storage and displacement (components 2a – 2e, 3a – 3c)
   b. River Exe to Testwood transfer (components 3d – 3i, 4a, 5a – 5c)
2. Poole to Testwood Effluent Re-Use (components 1a – 1f, 4b(i) and 4b(ii), 5a – 5c)

Further details regarding each scheme are provided in **Technical Annex 1.2 – Concept Design Reports**.

The primary levels of assessment are at component and scheme levels as defined above. For the purpose of this initial INNS risk assessment, each component of the two schemes has been assessed. Resultant overall risks for the two schemes and the overarching WCS SROs have also been identified.

3 Methodology

As noted in Section 1, NAU guidance indicates that in relation to potential INNS risks, SRO Gate 1 assessments should include:

- A review of the EA's Position statement and isolated catchment maps.
- A high-level screening which includes:
    - Screening against Schedule 9 of the Wildlife and Countryside Act and Invasive Alien Species (Enforcement & Permitting) Order 2019.
    - INNS Heat maps to determine whether a raw water transfer area is of high risk

Furthermore, the NAU guidance indicates that at Gate 1, the use of scenarios and possible mitigation measures may be beneficial to help refine resource options at this stage. Based on the guidance from NAU the assessment of o the risk of distribution of INNS associated with the WCS SROs considered a pathway approach and comprised of:

1. A screening of the distribution of INNS associated with the source, connection and destination locations/areas,
2. A heat map to show the density of INNS and the subsequent risk of distribution,
3. A high-level assessment of the risk of INNS distribution (qualitative approach), and
4. A more detailed assessment using a bespoke risk assessment tool (quantitative approach).

The approach/methodologies used to complete these assessments and the data sources are provide din the sections below.

3.1 Screening of INNS species and heat maps

The baseline data review considered INNS occurrence records stored within the NBN Atlas and NBN Atlas Wales INNS Portal covering a period of 11 years (1 January 2009 - 31 December 2019) of data. In addition, 11 years of ecology data obtained from the EA Ecology Data Explorer was also reviewed for the occurrence of INNS.

INNS species listed under; Schedule 9 of the Wildlife and Countryside Act, WFD UKTAG Aquatic Alien Species, EU Invasive and Alien Species Regulation, Wales Priority Species for Action, MSFD – UK priority species, WFD UKTAG alarm species, GB NNSS Alert species have been identified from the datasets for consideration.

The purpose of the data review was to establish which species are currently known to be present within the waterbodies/reaches associated with the WCS SRO. Species records were assessed to identify which species are likely to facilitated by a raw water transfer by becoming entrained and transported to new sites and/or the associated construction activities of the individual components.

A Kernel Density estimation algorithm was applied to the data captured during the NBN Atlas data review using geographical imaging software (GIS). The algorithm provides a visual representation of occurrence record densities for occurrences of INNS located within 500 m of the watercourse and associated components. This allows for the identification of regions with a higher density of recorded INNS occurrences based upon the number of records within a 250 m radius of each record. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

3.2 High Level Risk Assessment

A high-level risk assessment of the potential pathways for the movement of INNS has also been completed. The high-level risk assessment aims to be mostly descriptive/qualitative.

Factors affecting the risk levels include (but is not limited to):

- Transfer source water,
- Type connection: pipeline/canal/shipping (tankering),
- Destination of transferred water

- Existing or new connections between open channel habitats and waterbodies
- Transfer volume
- Frequency of operation
- Proximity to nationally and internationally protected sites.

These factors where considered to provide a high-level risk associated with each of the WCS SRO components and sub-components.

The first step in the high-level risk assessment is the identification of the inherent risk score for each component. This provides an assessment of the risk associated with a component, irrespective of the frequency/duration/volume of the transfer. As noted in **Table 1**, the inherent risk score considers the nature of the connection pathway which includes the transfer source, the connection type (e.g. pipeline) and the reception point/destination of the transfer. The inherent risk score also considered whether there is an existing connection between the source and destination or whether a new connection will be established. For example, a low risk transfer often includes a transfer where the sources are groundwater or treated effluent from a STW/WwTW and where the transfer is directly into a WTW.

The second step in the high-level risk assessment is consideration of the operation of the transfer and considers both the volume of the transfer and the frequency of operation (see **Table 2**). Low volume transfer that are rarely operated is considered to have a lower risk when compared to a transfer that includes large volumes of water and operated continuously as the latter will result in a more frequent and higher abundance of the transfer of INNS species (directly) or through the transfer of large quantities of propagules.

The final risk score (see **Table 3**) is determined using a matrix approach to consider both the inherent risk score and the operational frequency and transfer volumes associated with each component.

The high-level risk assessment includes a qualitative description of the risk associated with each component and sub-component to identify where mitigation measures and scheme design will be most beneficial to disrupt distribution pathways or reduce the risk of INNS distribution.

Table 1: Inherent Risk Score

Transfer/Connection Type	Existing connection between Waterbody/watercourses and open channel	New connection between Waterbody/watercourses and open channel
Groundwater/Water treatment - Pipeline - Water treatment	Low	Low
Groundwater/Water treatment - Pipeline - Waterbody/watercourse	Low	Low
Groundwater/Water treatment - Open channel - Water treatment	Low	Low
Groundwater/Water treatment - Open channel - Waterbody/watercourse	Mod	High
Waterbody/watercourse - Pipeline - Water treatment	Mod	High
Waterbody/watercourse - Pipeline - Waterbody/watercourse	High	V-High
Waterbody/watercourse - Open channel - Water treatment	High	V-High
Waterbody/watercourse - Open channel - Waterbody/watercourse	V - High	V-High

Table 2: Operational frequency and volume risk score

Frequency/Volume	0-30Ml/d	30-100Ml/d	100-200Ml/d	200+Ml/d
Continuous	High	High	V -High	V -High
Frequent	Mod	Mod	High	V -High
Infrequent	Low	Mod	Mod	High
Rare	Low	Low	Mod	Mod

Table 3: Final risk score.

		Operation Frequency and Volume risk score			
		Low	Mod	High	V-High
Inherent Risk Score	V-High	High	High	V -High	V -High
	High	Mod	Mod	High	V -High
	Mod	Low	Mod	Mod	High
	Low	Low	Low	Mod	Mod

3.3 Detailed Risk Assessment

The pathway-based INNS assessment approach was used to assess the possible pathways for the introduction of INNS for each component included within the initial concept design of the two schemes being progressed through the WCS SROs at Gate 1. This was accomplished using the INNS risk assessment tool developed by Ricardo. This tool has been subject to independent review and verification, provided by INNS specialist Dr David Aldridge, and has been agreed for use by the EA.

The risk assessment tool has been developed using previous examples of similar assessment tools and with the guidance set out by the EA[8]. The EA provides a definitive list of what should be included within the INNS pathway risk assessment which includes parameters such as the nature of the connection (for example, piped transfer, natural, navigation), the distance of each connection and frequency of operation.

Additionally, the EA states that the risk assessment should not be specific to individual species of INNS but highlights the utility of understanding the transfer pathways which are likely to occur within a connection (for example, vegetative reproduction, egg dispersal, planktonic larvae)[9].

The risk assessment tool utilised in this report has been developed by Ricardo and is standardised approach applied to all SROs. In consideration of the EA guidance, Ricardo has developed the tool to adopt both a descriptive and quantitative approach. The descriptive elements (e.g. scheme design) are an important consideration when reviewing the options for mitigation associated with each system component.

The risk assessment tool also considers the pathway approach, advocated in EA guidance. This grouping approach recognises that certain types of asset or Raw Water Transfers (RWTs) provide a range of pathways, with different pathways having greater relevance and thus risk spread of certain INNS groups. These pathways may include new or existing pathways and may be related directly to the SRO operation or related to the usage of the asset by the public e.g. Leisure craft. The combination of pathway risk associated with groups of INNS and occurrence of this pathway at/within an asset/RWT

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[8] PR19 - Assessing the risks of spread of Invasive non-native species posed by existing water transfers – OFFICIAL. Environment Agency, 2017.
[9] EA. 2017. PR19 - Assessing the risks of spread of Invasive non-native species posed by existing water transfers - OFFICIAL

allows INNS risk assessment and INNS risk scores to be developed. This grouping approach provides efficiencies for INNS and individual assessments. It also allows for the consideration of the current environment associated with each intake and discharge location of the system components. As such, the risk to WFD (objectives, status and measures) and protected sites can also be considered in the tool.

Horizon scanning has also been considered. Species that could potentially spread in systems in the future are included in this tool for SROs which are likely to be developed after 2050. This includes consideration of climate change, potential changes in habitat because of the development of an SRO (e.g. a new reservoir), and the creation of new pathways and environments suitable for INNS not currently considered a risk within a catchment.

The tool intends to provide a rapid, transparent assessment of the theoretical risk of transfer of INNS. The tool can be applied to a wide range of transfer options to quantify the relative risk of each transfer connection **before** the application of mitigation measures.

The tool is not intended to provide a complete assessment of the impact of INNS but is intended to provide a rapid comparative tool and a foundation to which a detailed assessment and comparison of transfer options can be developed in gate-2.

At the basis of the INNS transfer risk assessment are two questionnaires which have been created to collect the relevant information for INNS and specific water transfer connections. Data from the questionnaires are then combined in the final assessment which interprets the data collected from each to assess the risk of INNS being transferred by a raw water transfer (RWT). The output of the assessment provides a value to which further connections can be compared. The value is categorised into four risk bands visible in **Table 4**.

Table 4: Risk category bands (based upon low and high-risk theoretical scenarios utilising the current assessment tool (22/01/2020). ***NB These bandings are subject to change with the addition of species and/or pathways in future iterations of the tool***

Risk Category	Score
Low	1.69 – 3.99
Medium	3.98 – 6.28
High	6.27 – 8.58
Very High	8.55 – 10.88

For the purposes of the Ricardo INNS assessment tool, each RWT is split into connections. A connection is defined by three steps: the water source, the connection mechanism and the receiving water body or facility. In assessing each connection, we can provide an assessment of each stage of a water transfer option for which there may be multiple connections. For a detailed description of the tool, please see the methodology report by Ricardo (2020[10]).

A detailed breakdown of the pathways present and species that are likely to be facilitated by each pathway type are provided for each connection. There are nine possible additional pathways included within the assessment:

- **Pet/ornamental release**
  - The plant species utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese Knotweed or butterfly bush. It is important to note that plant species in this category, although ornamental garden species, are perhaps more likely to be transported to the site unintentionally rather than being purposefully

[10] Ricardo Energy & Environment (2020). Strategic Resource Options Invasive Non-Native Species Risk Assessment Methodology. Report for United Utilities. November 2021.

planted at the site. As such these species are captured in more than one pathway scenario. Animal species utilising this pathway reproduce via live bearing or egg laying and may include species with similar distribution and reproductive pathways as Northern River Amphipod, African Clawed-frog and various ornamental Crayfish.

- **Angling**
  - The species utilising distribution pathways associated with anglers accessing the connection source, or connection mechanism habitat, where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese Knotweed, Giant Knotweed or butterfly bush. The remaining animal species utilising this pathway reproduce via live bearing, egg laying or planktonic larva and may include species with similar distribution and reproductive pathways as Signal, White River and Red Swamp Crayfish, Killer Shrimp and other amphipods as well as New Zealand mud-snail.
- **Survey/Site operatives**
  - The species utilising distribution pathways associated with site operatives accessing the connection source or connection mechanism habitat where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese Knotweed, Pirri Piri burr, Andean Water Milfoil or butterfly bush. The remaining animal species utilising this pathway reproduce via live bearing, egg laying and planktonic larvae and may include species with similar distribution and reproductive pathways as Killer Shrimp, Signal, White River and Red Swamp Crayfish as well as New Zealand mud-snail and quagga mussel amongst others.
- **Animal/waterfowl (phoresis)**
  - INNS may utilise distribution pathways associated with the transportation of adults and propagules by waterfowl or animals using the connection source or connection mechanism habitat where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese Knotweed and Pirri Piri burr. The remaining animal species utilising this pathway reproduce via live bearing, egg laying or planktonic larvae and may include species with similar distribution and reproductive pathways as northern river amphipod, New Zealand mud-snail, zebra mussel or signal crayfish.
- **Boat/Leisure craft**
  - Species utilising distribution pathways associated with use of boats and leisure craft at the connection source or connection mechanism habitat where they may be transported as propagules or adults between waterbodies where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Giant Knotweed and Andean water milfoil. The remaining animal species utilising this pathway reproduce via live bearing, egg laying and planktonic larvae and may include species with similar distribution and reproductive pathways as northern river amphipod, killer shrimp, zebra mussel and New Zealand mud-snail.
- **Walkers/Bikers**
  - Species which may utilise distribution pathways associated with walkers and bikers utilising the connection source or connection mechanism habitat where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese, Giant and Himalayan Knotweed and butterfly bush. Animal species utilising this pathway, reproducing via egg laying and may include species with similar distribution and reproductive pathways as New Zealand mud-snail.

- **Wind**
  - These species may be distributed by wind to the connection source or connection mechanism habitat where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as butterfly bush and pampas grass.
- **Flood**
  - Species which may be distributed by flooding to the connection source or mechanism habitat where they may establish and be distributed by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese and Giant Knotweed, butterfly bush and Andean Milfoil. The remaining animal species utilising this pathway reproduce via live bearing, egg laying and quagga mussel and may include species with similar distribution and reproductive pathways as the New Zealand mud-snail, signal crayfish and quagga mussel.
- **Construction**
  - Species which may be distributed by construction operations at the connection source and connection mechanism habitat where they may establish and be distributed further by the RWT. The plant species selected by the tool as utilising this pathway reproduce via seed/spore dispersal or vegetative reproduction and may include species with similar distribution and reproductive pathways as Japanese and giant knotweed, butterfly bush, Andean milfoil and waterfern. The remaining animal species utilising this pathway may include species with similar distribution and reproductive pathways as the signal crayfish.

4 INNS Risk Assessment Results

4.1 Screening of INNS and heat maps

4.1.1 Component 1: Poole Effluent Re-use (components 1a-f)

Results of the baseline/evidence review highlighted 27 species of INNS recorded within 500 m of the Poole Effluent Re-use (components 1a -f). INNS data was also gathered in the upstream catchment of the River Stour abstraction.

The most frequently recorded INNS species includes terrestrial species such as pheasant, squirrel and birds which are unlikely to be distributed due to the construction or operation of the components. Sixteen species within the baseline area are likely to be transported by a raw water transfer, including species that can be distributed via seeds or propagules (e.g. Least Duckweed, Nuttall's Waterweed, Jenkins' Spire Snail and Himalayan Balsam).

Results of the evidence review have been used to produce heatmaps which indicate occurrence record densities for the invasive species within 500 m of the assessed reach (**Figure 4.1**). Records indicate that a high number of occurrences have been recorded at and round Joiners Copse Woodland and Corfe Hills Natiure Reserve. Mitigation measures aimed at reducing the risk of INNS distribution will therefore be required during construction activities. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

Table 5: INNS species recorded within 500m of Component 1: Poole Effluent Re-use (components a to f).

Scientific name	Common name	Occurrences	Likely to be transferred as a consequence of the operation of an RWT?
Lemna minuta	Least Duckweed	20	Yes
Elodea nuttallii	Nuttall's Waterweed	18	Yes
Harmonia axyridis form succinea	Harlequin Ladybird	17	Yes
Leptoglossus occidentalis	Western Conifer Seed Bug	16	Yes
Contarinia quinquenotata	Hemerocallis Gall Midge	11	Yes
Potamopyrgus antipodarum	Jenkins' Spire Snail	10	Yes
Impatiens glandulifera	Himalayan Balsam	9	Yes
Pinus nigra subsp. laricio	Corsican Pine	8	Yes
Chrysolina americana	Rosemary Beetle	6	Yes
Ailanthus altissima	Tree-of-heaven	5	Yes
Hyacinthoides hispanica	Spanish Bluebell	4	Yes
Buddleja davidii	Butterfly-bush	2	Yes
Pseudotsuga menziesii	Douglas Fir	2	Yes
Campylopus introflexus	Heath Star Moss	1	Yes
Datura stramonium var. stramonium	Thorn Apple	1	Yes
Gunnera tinctoria	Giant-rhubarb	1	Yes
Phasianus colchicus	Pheasant	720	No
Sciurus carolinensis	Eastern Grey Squirrel	285	No
Cygnus atratus	Black Swan	172	No
Aix galericulata	Mandarin Duck	143	No
Netta rufina	Red-crested Pochard	95	No
Harmonia axyridis	Harlequin Ladybird	75	No
Lilioceris lilii	Lily Beetle	26	No
Mus musculus	House Mouse	4	No
Cervus nippon	Sika Deer	2	No
Harmonia axyridis form conspicua	Harlequin Ladybird	2	No
Tadorna ferruginea	Ruddy Shelduck	1	No

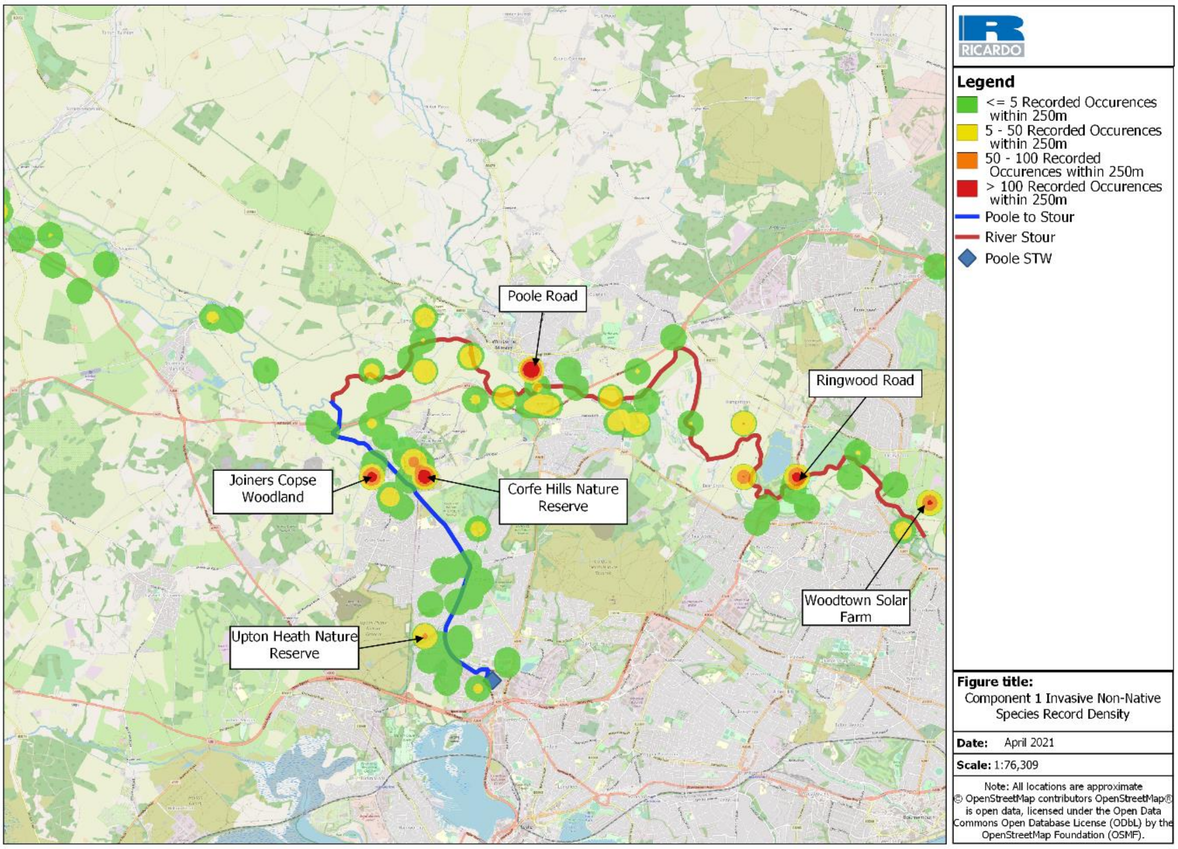

Figure 4.1: INNS occurrence record heatmap for Component 1: Poole Effluent Re-use (components a and b).

4.1.2 Component 2: Roadford Pumped Storage (components 2a – 2e)

Results of the baseline/evidence review highlighted 15 species of INNS recorded within 500 m of the Roadford pumped storage (components 2a -2e). Component 2 includes the Gatherley intake to Roadford lake section and the Roadford to Northcombe WTW section. INNS data was also gathered from the abstraction “catchment” includes the Rivers Tamar, Wolf, Lyd and Thrushel.

The most frequently recorded INNS species includes terrestrial species such as pheasant which is unlikely to be distributed due to the construction or operation of the components. Six species within the baseline area are likely to be transported by a raw water transfer, including species that can be distributed via seeds or propagules (e.g. Himalayan Balsam, Jenkins' Spire Snail and Signal Crayfish).

Results of the evidence review have been used to produce heatmaps which indicate occurrence record densities for the invasive species within 500 m of the assessed reach (**Figure 4.2**). Records indicate that a moderate number of occurrences have been recorded at Polson bridge, Lifton and Roadford Lake. Mitigation measures aimed at reducing the risk of INNS distribution will therefore be required during construction activities. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

Table 6: INNS species recorded within 500m of Component 2: Roadford Pumped Storage (components 2a – 2e).

Scientific name	Common name	Occurrences	Likely to be transferred as a consequence of the operation of an RWT?
Impatiens glandulifera	Himalayan Balsam	19	Yes
Potamopyrgus antipodarum	Jenkins' Spire Snail	19	Yes
Pacifastacus leniusculus	Signal Crayfish	5	Yes
Acer pseudoplatanus	Sycamore	4	Yes
Lamiastrum galeobdolon subsp. argentatum	Variagated Yellow Archangel	2	Yes
Crangonyx pseudogracilis	Northern river crangonyctid	1	Yes
Phasianus colchicus	Pheasant	66	No
Cairina moschata	Muscovy Duck	3	No
Anser indicus	Bar-headed Goose	3	No
Sciurus carolinensis	Eastern Grey Squirrel	2	No
Harmonia axyridis	Harlequin Ladybird	1	No
Lilioceris lilii	Lily Beetle	1	No
Chrysolina americana	Rosemary Beetle	1	No
Pseudotsuga menziesii	Douglas Fir	1	No
Muntiacus reevesi	Chinese Muntjac	1	No

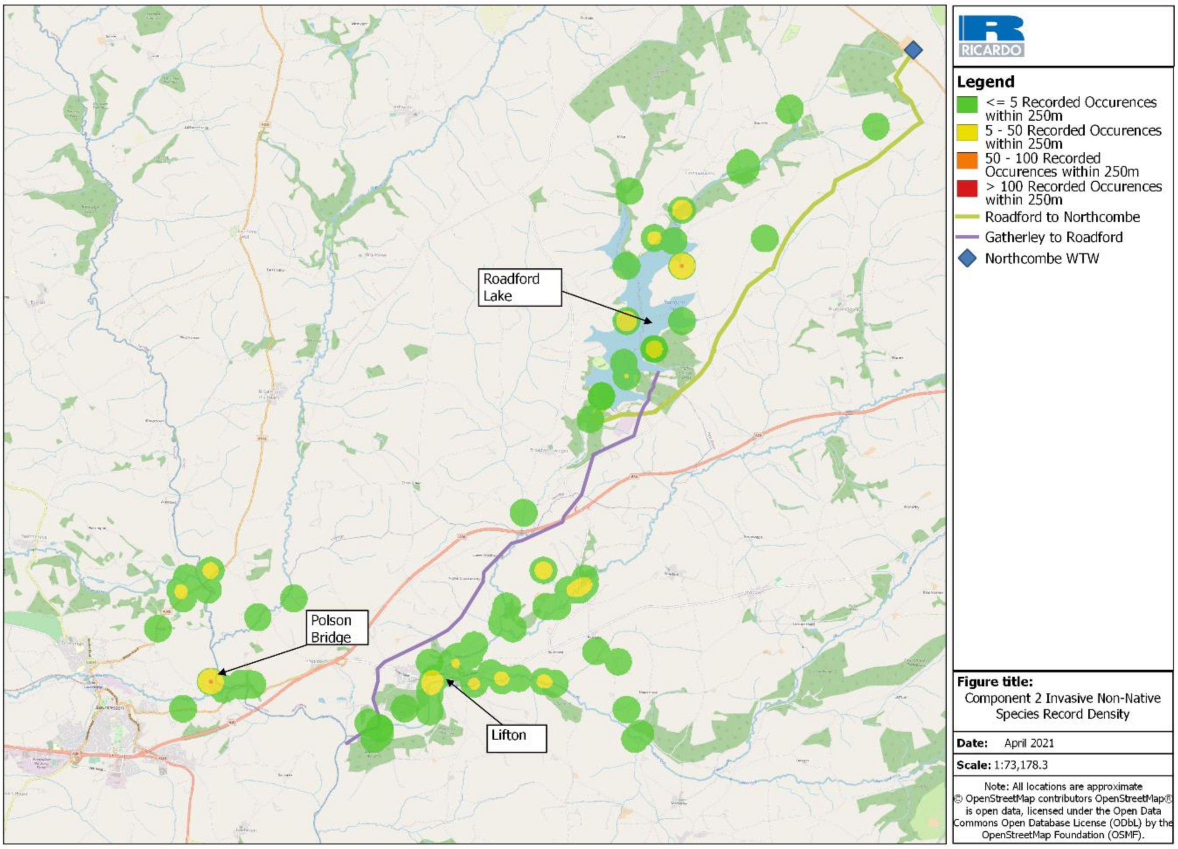

Figure 4.2: INNS occurrence record heatmap for Component 2: Roadford Pumped Storage (components 2a – 2e).

4.1.3 Component 3: Transmission System to Wessex Water (components 3a – 3i)

Results of the baseline/evidence review highlighted 42 species of INNS recorded within 500 m of the transmission system to Wessex Water (Components 3a - 3i). Component 3 includes 8 reaches from Northcombe WTW to Summerslade. INNS data was also gathered from the upstream catchment of the River Exe abstraction (new) at Bolham Weir.

The most frequently recorded INNS species includes terrestrial species such as pheasant and squirrel which are unlikely to be distributed due to the construction or operation of the components. Thirty-one species within the baseline area are likely to be transported by a raw water transfer, including species that can be distributed via seeds or propagules (e.g. Himalayan Balsam, Nuttall's Waterweed and Sycamore) as well as water dwelling species (e.g. Jenkins Spire Snail).

Results of the evidence review have been used to produce heatmaps which indicate occurrence record densities for the invasive species within 500 m of the assessed reaches (**Figure 4.3**). Records indicate that high numbers of occurrences have been recorded at numerous areas across the components including Bolham, Kingston St Mary, Shoebrook Park and other locations displayed in **Figure 4.3**. Mitigation measures aimed at reducing the risk of INNS distribution will therefore be required during construction activities. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

Table 7: INNS species recorded within 500m of Component 3: Transmission System to Wessex Water (components 3a – 3i).

Scientific name	Common name	Occurrences	Likely to be transferred as a consequence of the operation of an RWT?
Impatiens glandulifera	Himalayan Balsam	163	Yes
Potamopyrgus antipodarum	Jenkins' Spire Snail	111	Yes
Elodea nuttallii	Nuttall's Waterweed	56	Yes
Acer pseudoplatanus	Sycamore	52	Yes
Aegopodium podagraria	Ground-elder	22	Yes
Azolla filiculoides	Water Fern	21	Yes
Prunus laurocerasus	Cherry Laurel	17	Yes
Pseudotsuga menziesii	Douglas Fir	15	Yes
Pacifastacus leniusculus	Signal Crayfish	14	Yes
Symphoricarpos albus	Snowberry	14	Yes
Lamiastrum galeobdolon subsp. argentatum	Variagated Yellow Archangel	12	Yes
Petasites fragrans	Winter Heliotrope	11	Yes
Lemna minuta	Least Duckweed	10	Yes
Crocosmia pottsii x aurea = C. x crocosmiiflora	Montbretia	8	Yes
Parthenocissus quinquefolia	Virginia-creeper	6	Yes
Buddleja davidii	Butterfly-bush	5	Yes
Syringa vulgaris	Lilac	5	Yes
Fallopia japonica x sachalinensis = F. x bohemica	Knotweed hybrid	4	Yes
Hyacinthoides hispanica	Spanish Bluebell	4	Yes
Allium triquetrum	Three-cornered Garlic	3	Yes
Campylopus introflexus	Heath Star Moss	3	Yes
Quercus ilex	Evergreen Oak	3	Yes
Acaena novae-zelandiae	Pirri-pirri-bur	2	Yes
Contarinia quinquenotata	Hemerocallis Gall Midge	2	Yes
Cortaderia selloana	Pampas-grass	2	Yes
Crangonyx pseudogracilis	Northern river crangonyctid	2	Yes
Orthodontium lineare	Cape Thread-moss	2	Yes
Picea sitchensis	Sitka Spruce	2	Yes

Senecio inaequidens	Narrow-leaved Ragwort	2	Yes
Smyrnium olusatrum	Alexanders	1	Yes
Cotoneaster simonsii	Himalayan Cotoneaster	1	Yes
Phasianus colchicus	Pheasant	542	No
Sciurus carolinensis	Eastern Grey Squirrel	275	No
Anser indicus	Bar-headed Goose	87	No
Harmonia axyridis	Harlequin Ladybird	37	No
Aix galericulata	Mandarin Duck	29	No
Lilioceris lilii	Lily Beetle	28	No
Cairina moschata	Muscovy Duck	13	No
Netta rufina	Red-crested Pochard	12	No
Chrysolina americana	Rosemary Beetle	6	No
Syrmaticus reevesii	Reeves's Pheasant	5	No
Harmonia axyridis form spectabilis	Harlequin Ladybird	3	No

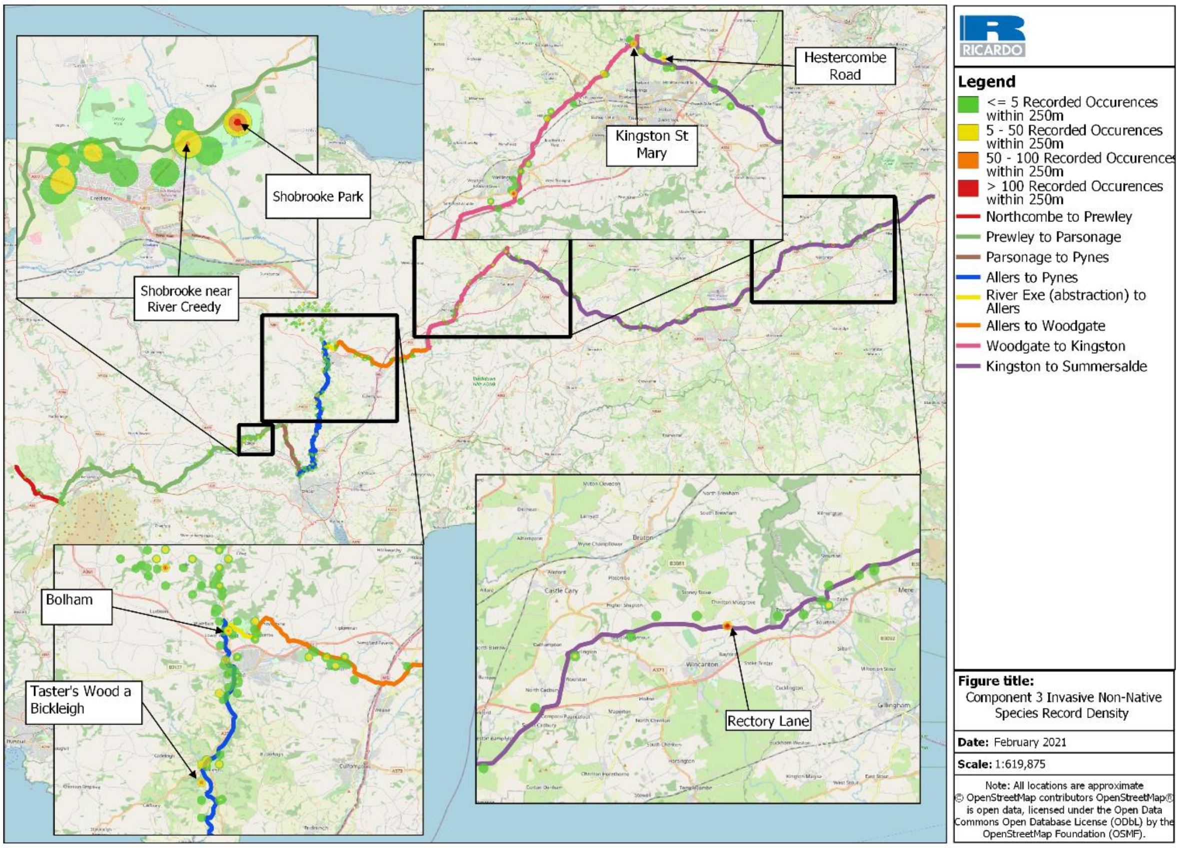

Figure 4.3: INNS occurrence record heatmap for Component 3: Transmission System to Wessex Water (components 3a – 3i).

4.1.4 Component 4: Transmission System to Southern Water (components 4a - 4b)

Results of the baseline/evidence review highlighted 46 species of INNS recorded within 500 m of the transmission system to Southern Water (Components 4a and 4b). This component includes the Summerslade to Testwood and River Stour pre-treatment to Testwood sections.

The most frequently recorded INNS species includes terrestrial species such as pheasant and duck which are unlikely to be distributed due to the construction or operation of the components. Thirty species within the baseline area are likely to be transported by a raw water transfer, including species that can be distributed via seeds or propagules (e.g. Himalayan Balsam) as well as water dwelling species (e.g. Jenkins Spire Snail).

Results of the evidence review have been used to produce heatmaps which indicate occurrence record densities for the invasive species within 500 m of the assessed reach (Figure 4.4). Records indicate that a high number of occurrences have been recorded at locations such as Bushy Copse, Timberley Lane, Romsey Road and other locations shown in Figure 4.4. Mitigation measures aimed at reducing the risk of INNS distribution will therefore be required during construction activities. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

Table 8: INNS species recorded within 500m of Component 4: Transmission System to Southern Water (components 4a - 4b).

Scientific name	*Common name*	*Occurrences*	*Likely to be transferred as a consequence of the operation of an RWT?*
Impatiens glandulifera	Himalayan Balsam	322	Yes
Acer pseudoplatanus	Sycamore	175	Yes
Lemna minuta	Least Duckweed	139	Yes
Aegopodium podagraria	Ground-elder	129	Yes
Elodea nuttallii	Nuttall's Waterweed	67	Yes
Potamopyrgus antipodarum	Jenkins' Spire Snail	63	Yes
Elodea canadensis	Canadian Waterweed	50	Yes
Buddleja davidii	Butterfly-bush	41	Yes
Anser caerulescens	Snow Goose	26	Yes
Prunus laurocerasus	Cherry Laurel	26	Yes
Symphoricarpos albus	Snowberry	21	Yes
Solidago canadensis	Canadian Goldenrod	18	Yes
Hyacinthoides hispanica	Spanish Bluebell	17	Yes
Allium triquetrum	Three-cornered Garlic	15	Yes
Petasites fragrans	Winter Heliotrope	12	Yes
Senecio squalidus	Oxford Ragwort	12	Yes
Sedum album	White Stonecrop	11	Yes
Mimulus guttatus	Monkeyflower	10	Yes
Lamiastrum galeobdolon subsp. argentatum	Variagated Yellow Archangel	8	Yes
Azolla filiculoides	Water Fern	7	Yes
Pinus nigra	Austrian Pine	6	Yes
Contarinia quinquenotata	Hemerocallis Gall Midge	5	Yes
Pacifastacus leniusculus	Signal Crayfish	4	Yes
Chrysolina americana	Rosemary Beetle	3	Yes
Cornus sericea	Red-osier Dogwood	3	Yes
Leptoglossus occidentalis	Western Conifer Seed Bug	2	Yes
Syringa vulgaris	Lilac	2	Yes
Campylopus introflexus	Heath Star Moss	1	Yes
Crocosmia pottsii x aurea = C. x crocosmiiflora	Montbretia	1	Yes
Harmonia axyridis form spectabilis	Harlequin Ladybird	1	Yes
Phasianus colchicus	Pheasant	2183	No
Aix galericulata	Mandarin Duck	691	No
Sciurus carolinensis	Eastern Grey Squirrel	565	No
Harmonia axyridis	Harlequin Ladybird	106	No
Lilioceris lilii	Lily Beetle	85	No
Aix sponsa	Wood Duck	15	No
Anser indicus	Bar-headed Goose	15	No
Netta rufina	Red-crested Pochard	15	No
Tadorna ferruginea	Ruddy Shelduck	14	No
Cygnus atratus	Black Swan	13	No
Chrysolina americana	Rosemary Beetle	10	No
Cairina moschata	Muscovy Duck	5	No
Anser caerulescens	Snow Goose	2	No
Nycticorax nycticorax	Night-heron	1	No
Crangonyx pseudogracilis	Northern river crangonyctid	51	Yes

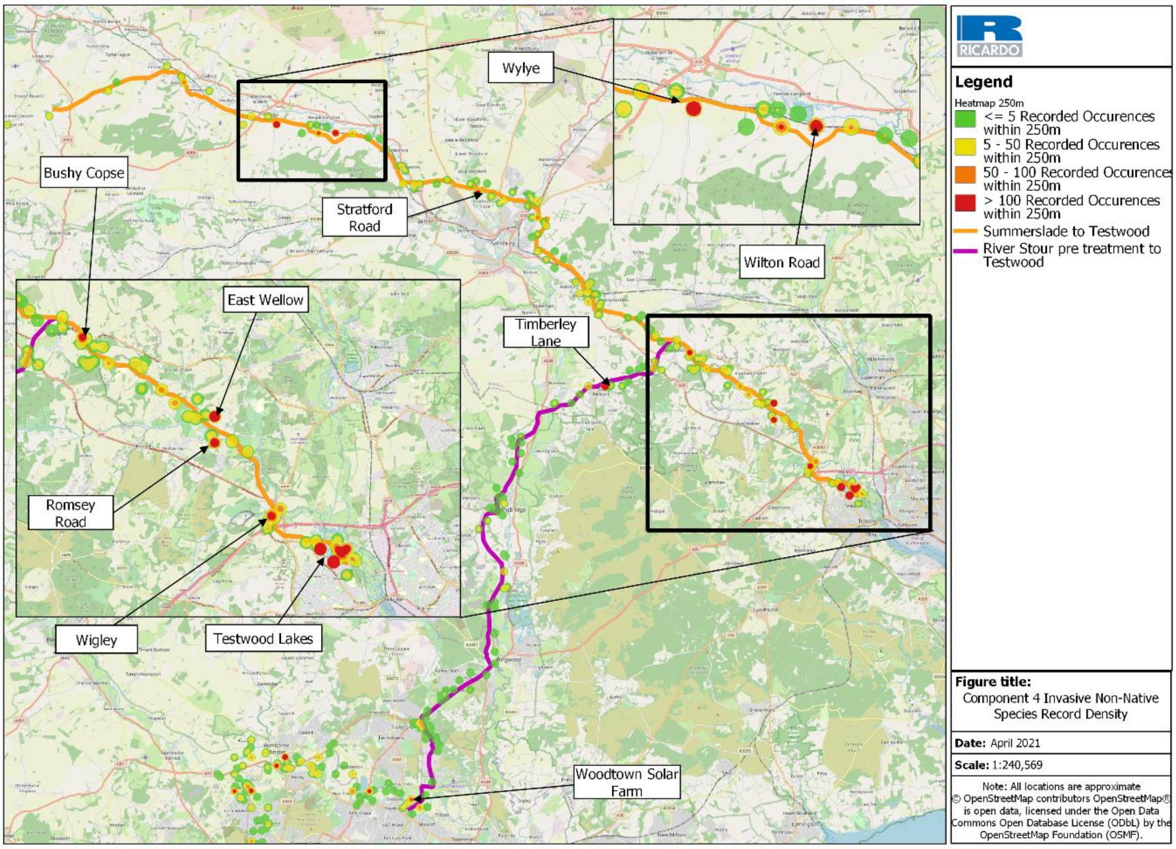

Figure 4.4: INNS occurrence record heatmap for Component 4: Transmission System to Southern Water (components 4a - 4b).

4.1.5 Component 5: Southern Water Reception Points (components 5a – 5c)

Results of the baseline/evidence review highlighted 14 species of INNS recorded within 500 m of the Southern Water reception points. Component 5 includes the Testwood WTW, Testwood Lakes and the Testwood portable storage tanks.

The most frequently recorded INNS species includes terrestrial species such as pheasant and mandarin duck which are unlikely to be distributed due to the construction or operation of the components. Five species within the baseline area are likely to be transported by a raw water transfer, including species that can be distributed via seeds or propagules (e.g. Himalayan Balsam, Least Duckweed and Nuttall's Waterweed) as well as water dwelling species (e.g. Jenkins' Spire Snail and the Northern river crangonyctid).

Results of the evidence review have been used to produce heatmaps which indicate occurrence record densities for the invasive species within 500 m of the assessed reach (**Figure 4.5**). Records indicate that a high number of occurrences have been recorded at and round Testwood Lakes and Stephenson Road. Mitigation measures aimed at reducing the risk of INNS distribution will therefore be required during construction activities. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

Table 9: INNS species recorded within 500m of Component 5: Southern Water Reception Points (Components 5a-5c).

Scientific	Common name	Occurrences	Likely to be transferred as a consequence of the operation of an RWT?
Impatiens glandulifera	Himalayan Balsam	260	Yes
Lemna minuta	Least Duckweed	75	Yes
Crangonyx pseudogracilis	Northern river crangonyctid	67	Yes
Potamopyrgus antipodarum	Jenkins' Spire Snail	17	Yes
Elodea nuttallii	Nuttall's Waterweed	7	Yes
Phasianus colchicus	Pheasant	1217	No
Aix galericulata	Mandarin Duck	817	No
Sciurus carolinensis	Eastern Grey Squirrel	434	No
Harmonia axyridis	Harlequin Ladybird	108	No
Lilioceris lilii	Lily Beetle	68	No
Anser caerulescens	Snow Goose	40	No
Aix sponsa	Wood Duck	23	No
Anser indicus	Bar-headed Goose	23	No
Netta rufina	Red-crested Pochard	17	No

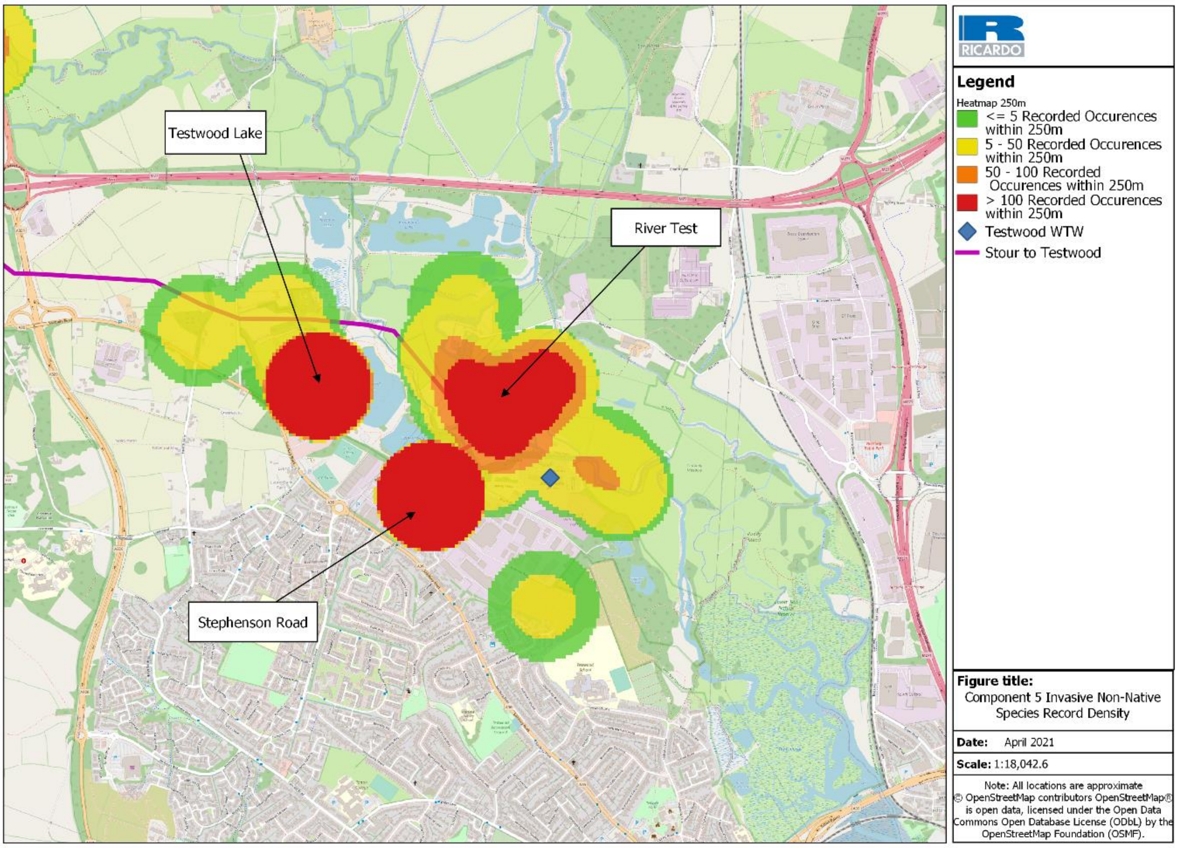

Figure 4.5: INNS occurrence record heatmap for Component 5: Southern Water Reception Points (Components 5a-5c).

4.2 High-Level Risk Assessment

4.2.1 Component 1: Poole Effluent Re-use (components 1a-f)

A summary of the high-level risk assessment for Component 1: Poole Effluent Re-use (comprising components 1 a-f) is provided in **Table 6**.

From the results it is evident that the risk of INNS distribution from the source (Poole STW) is considered low. Whilst this component of the scheme is expected to operate frequently (8-30 ML/D), the input source (treated effluent) will be treated as per existing arrangements at Poole STW and then subject to tertiary treatment at a dedicated WRC prior to onwards transmission and discharge. It is therefore assumed that the effluent will be subject to secondary and tertiary treatment to ensure compliance with Water Framework Directive (WFD) water quality standards. As such, there will be further mitigation against the distribution of any seeds, fragments, or other propagules.

The transfer of recycled water will increase flows in the River Stour, which increases the likelihood of INNS already present in the waterbody being distributed further downstream or could result in alterations of habitat to be more favourable to certain INNS groups.

The new abstraction of raw water from the River Stour presents a new pathway for INNS distribution, with the risk further exacerbated should the bankside storage system consists of open ponds which will introduce possible secondary pathways (e.g. recreational users). Such additional pathways could result in an increased risk in terms of both the transfer and the operation of the abstraction (i.e. distribution of new INNS into the River Stour). As such, the INNS risk for this component is considered high.

The scheme design should consider the risk of secondary pathways and the bankside storage system should consider a closed system (e.g. covered reservoir) to avoid the introduction of INNS.

The risk will remain high for this components 1 c-f, until the raw water is treated at a WTW (Testwood).

Table 6: Summary of the high-level risk assessments for Component 1: Poole Effluent Re-use (components 1a-f)

Nr	Description	Magnitude	Justification
A	Poole STW (including existing effluent treatment)	Low	The source of the water associated with this component is wastewater and sewerage which will be subject to standard treatment processes. It is assumed that treated effluent will require further (secondary and/or tertiary treatment to ensure compliance water quality standards prior to discharge into the River Stour. As such, any INNS or propagules will be removed prior to discharge into the River Stour.
B	Poole STW to River Stour – including new tertiary treatment at WRC	Low	The proposed transfer of treated effluent will be via a pipe. As noted above, the effluent is unlikely to be a source of INNS due to the tertiary treatment process prior to river discharge. Although several INNS are associated with the proposed pipeline rote, standard biosecurity measures will be mitigated against the introduction of INSN during construction.
C	River Stour section	Moderate	The transfer mechanism at this point will be a river. As noted above, the discharge of treated effluent is unlikely to result in the distribution of INNS. However, as the transfer mechanism is open water (the River Stour) the risk is considered moderate. Component 1 c is likely to increase flows within the River Stour (an existing connection) and could increase the likelihood of any existing INNS is further distributed downstream.
D	River Stour abstraction	High	The abstraction of raw water from the River Stour and the subsequent transfer to a bankside storage system creates a new INNS distribution pathway. Any INNS present within the River Stour would likely be transferred to the bankside storage system. Depending on the design of the bankside storage system (e.g. open vs closed system), INNS could also potentially be introduced into the River Stour as the presence of the bankside storage system provides a secondary pathway. This is of particular concern should the bankside storage system include recreational access (e.g. open ponds). Mitigation measures (including scheme design) needs to be considered. The risk of INNS distribution will remain high up to the permeant works. After treatment, the risk will be considered every low.
E	River Stour bankside storage	High	
F	River Stour Pre Treatment Works (for onwards transmission)	High	

4.2.2 Component 2: Roadford Pumped Storage (components 2a – 2e)

A summary of the high-level risk assessment for Roadford Pumped Storage (components 2a – 2e) is provided in **Table 7**. From the results it is evident that the risk of INNS distribution from the source (the River Tamar) is considered very high. This is mainly due to the source of the water being raw water and the discharge point also being raw water.

Although Roadford Lake and the River Tamar are already hydrologically connected, the connection is in a “downstream” direction with the reservoir discharging into the River Wolf and then flowing into the River Tamar. The new abstraction point at Gatherley and subsequent transfer to Roadford Lake provides a new distribution pathway for INNS in an “upstream” direction. The INNS catchment includes the rivers Tamar, Lyd and Thrushel and could result in the distribution of INNS into the Roadford Lake and potentially both upstream and downstream into the River Wolf. It is note that the transfer would require a pipeline of approximately 9.5km, but many aquatic species, seeds, eggs and propagules could still be distributed via a raw water pipeline (i.e. could survive being fully submerged).

The distribution risk will remain high until the raw water reaches the Northcombe WTW where the treatment process will reduce the risk of onwards INNS transmission to low.

Further mitigation measures will be required as part of the scheme design (e.g. treatment facilities at the River Tamar intake) to reduce the risk of INNS distribution to an acceptable level. Moving the intake location to upstream of the confluence with the rivers Lydd and Thrushel could also reduce the risk of INNS distribution although this option was discounted through WCS2 (initial feasibility assessment) due to uncertainty regarding resource availability.

Table 7: Summary of the high-level risk assessments for Component 2: Roadford Pumped Storage (components 2a – 2e)

Nr	Description	Magnitude	Justification
A	Abstraction from River Tamar at Gatherley intake	Very High	The source of the water associated with this component is raw water from the River Tamer. The transfer of raw water from the River Tamer to the Roadford Lake creates a new pathway for the distribution of INNS. Although the transfer mechanism is likely to be a pipeline, INNS species that spread via eggs and seeds are still likely to be distributed via the pipeline into Roadford Lake. The dam impounds water from the River Wolf so there is potential for the distribution of INNS to other river waterbodies as well. The Roadford Lake provides a secondary pathway from the introduction for INNS, but it is noted that the Roadford Lake discharges into the River Tamar and there is an existing downstream direction pathway for this component. The location of the abstraction location is also downstream of the confluence of the River Tamar with the rivers Lyd and Thrushel would, however, result in an increase in the size of the catchment that can act as a source of INNS and subsequently the Roadford Lake. The risk is likely to remain high to very high for the distribution of INNS until the connection reaches the Northcombe WTW. While there is a risk of introduction of INNS during construction, this can be mitigated through adopting standard biosecurity measures.
B	Gatherley to Roadford pipeline	Very High	
C	Roadford Lake	Very High	
D	Roadford Lake to Northcombe WTW	High	
E	Northcombe WTW	Low	The source of water for the WTW is raw water which presents a high risk of containing INNS. However, following treatment process, the INNS risk for onward transmission is considered very low with the treatment process expected to remove any seeds, plant material and other propagules.

4.2.3 Component 3: Transmission System to Wessex Water (components 3a – 3i)

A summary of the high-level risk assessment for Component 3: Transmission System to Wessex Water (components 3a – 3i) is provided in **Table 8**.

For components 3a – 3c, the risk is considered low as the transfer is via a pipeline and the source and destination of the water are WTWs (treated water). The treatment process will remove any INNS both at source and at the destination locations.

The risk associated with the reduction in flow as a result of the abstraction of raw water from the River Exe abstraction (new) at Bolham Weir is also considered high. Although there is an existing connection pathway (from downstream to upstream), the new abstraction could result in changes in flow which, in turn, could result in habitat changes that favours the existing INNS groups present with the river. A more detailed assessment will be required at Gate 2 to fully understand the potential changes in flow and water quality as a result of the proposed abstraction.

The proposed new abstraction on the River Exe presents a new pathway as raw water will be abstracted for the transfer. This risk will remain high until the raw water is treated (i.e. at Allers WTWWTW).

Table 8: Summary of the high-level risk assessments for Component 3: Transmission System to Wessex Water (components 3a – 3i)

Nr	Description	Magnitude	Justification
A	Northcombe to Prewley	Low	The source of the water that will be transferred via the transmission system to Wessex Water will be treated water from the Northcombe WTW. The destination of the water will be the Pynes WTW. The connection will be via a new pipeline (66km). As such, the risk at the source and the destination point is considered very low, despite the distance of the transfer and the fact that the scheme might be operational permanently/regularly. While there is a risk of introduction of INNS during construction, this can be mitigated through adopting standard biosecurity measures.
B	Prewley to Parsonage	Low	
C	Parsonage to Pynes	Low	
D	River Exe: Allers to Pynes (relevant as impacted section of watercourse)	High	Raw water will be abstracted from the River Exe near Allers. This will result in a reduction in flow in the River Exe. Although there is an existing connection, the reduced flows could result in a change in habitat that favours INNS groups which are already present within the waterbody
E	River Exe abstraction (new) at Bolham Weir	High	This component is considered a high risk as it represents a new distribution pathway and the source is raw water. The transfer is also likely to operate regularly/permanently. The risk will remain high until the raw water destination is the Allers WTW. While there is a risk of introduction of INNS during construction, this can be mitigated through adopting standard biosecurity measures.
F	River Exe (abstraction) to Allers WTW	High	
G	Allers WTW to Woodgate	Low	
H	Woodgate to Kingston St Mary	Low	
I	Kingston St Mary to Summerslade	Low	

4.2.4 Component 4: Transmission System to Southern Water (components 4a - 4b)

A summary of the high-level risk assessment for Component 4: Transmission System to Southern Water (components 4a - 4b) is provided in **Table 9**.

This component will result in the creation of a new pathway as raw water will be abstracted for the transfer using a new abstraction location and distribution network. This risk is considered until low as the raw water from the River Exe will be treated at Allers water is treated (see Section 4.2.5).

Table 9: Summary of the high-level risk assessments for Component 4: Transmission System to Southern Water (components 4a - 4b)

Nr	Description	Magnitude	Justification
A	Summerslade to Testwood	Low	This component will be transferring treated water from Allers WTW and therefore the INNS risk will be low. While there is a risk of introduction of INNS during construction, this can be mitigated through adopting standard biosecurity measures.
B	River Stour Pre Treatment to Testwood	Low	

4.2.5 Component 5: Southern Water Reception Points (components 5a – 5c)

A summary of the high-level risk assessment for Component 5: Southern Water Reception Points (components 5a – 5c) is provided in **Table 10**.

This component represents the different end points for the transfer of raw water from the River Exe or the River Stour. Should the end point be the Testwood WTW, the risk is considered low as there will be no further pathway for distribution. Similarly, where the end point includes potable storage tanks, the risk is considered low as there is no risk for further transmission.

Where the endpoint is the Testwood Lakes, the risk is considered high as the transfer includes a transfer from a watercourse to a waterbody in a different WFD catchment. This could result in the introduction of INNS currently not present within the Testwood Lakes. As the lakes are also open to the public, there is a secondary risk of transferring any new INNS to the wider catchment as the public moves between sites.

The risk could be reduced through the introduction of biosecurity measures for lake users, but would be further reduced through treatment of the raw water prior to discharge into the lakes.

Table 10: Summary of the high-level risk assessments for Component 5: Southern Water Reception Points (components 5a – 5c)

Nr	Description	Magnitude	Justification
A	Testwood WTW	Low	Transfer of raw water from the River Exe of the River Stour would consist of a raw water transfer via a pipeline. As the end point is a treatment works the risk is considered low as the treatment process will eradicate any INNS and there will be no onward distribution of INNS.
B	Testwood Lakes (small)	Very High	Transfer of water from the River Stour or the River Exe would consist of a raw water transfer via a pipeline. As the end point is another waterbody, the risk is considered high, despite the transfer via a closed system. As the lakes are being used by the public, there is a risk that any new INNS can be further distributed into the wider catchment without biosecurity measures in place (i.e. secondary pathways).
		Low	It is note that raw water from the River Exe will be treated at the Allers WTW prior to onward transmission. As such, the risk of transferring INNS from this source into the Testwood Lakes is considered low.
C	Testwood potable storage tanks	Low	Transfer of raw water from the River Exe of the River Stour would consist of a raw water transfer via a pipeline. As the end point is potable storage tanks is considered low as there will be no onward distribution of INNS.

4.3 Detailed Risk Assessment

4.3.1 Component 1: Poole Effluent Re-use (components 1a-f)

A pathway-based risk assessment for Component 1: Poole Effluent Re-use (components 1 a-f) has been deemed not appropriate as the component does not represent a transfer of raw water between waterbodies/watercourses. The Component utilises water derived from treatment works which is transferred via the River Stour, this volume is then re-abstracted downstream where it is pumped to bankside storage and onwards to the Stour Pre-treatment works before continuing to further treatment. As the source of the transfer is wastewater that will be subject to treatment at the STWs. It is assumed that the effluent will be subject to secondary and /or tertiary treatment to ensure compliance with Water Framework Directive (WFD) water quality standards. As such, there will be further mitigation against the distribution of any seeds, fragments, or other propagules.

The new abstraction of raw water from the River Stour may present a new pathway for INNS distribution if the bankside storage system consists of open ponds which will introduce possible additional pathways (e.g. recreational users) and represent an open waterbody which may be utilised by INNS. Therefore, it is recommended that the bankside storage will be closed system preventing interaction with additional pathways such as recreational usage which may facilitate the transfer of INNS.

In operation there would be a volume of 30 Ml/d abstracted from the River Stour and pumped via a pipeline to Little Testwood Lakes, it is believed that the option would operate continuously. The waterbodies are not currently connected and are in separate catchments. Based upon the parameters provided the connection is categorised as a “High Risk” transfer with a score of 7.34. A total of 52 species were selected within the tool based upon the presence of likely pathways that may facilitate the spread of the species, the location of the transfer, the types of habitat at the connection source, connection mechanism and destination and the seasonality of the transfer (see **Table 11**).

Table 11: Result of the REE Assessment tool implemented in the assessment of the River Stour to Testwood Reservoir option

	30Ml/dTransfer
Operation parameters	Continuous, year-round operation.
Connection source habitat	Lowland River
Additional INNS transfer pathways present at the connection source habitat.	Construction operations Anglers Boat/Leisure Craft Walkers/Bikers Pet/ornamental release Waterfowl/animal (Phoresis) Wind Flood Survey/Site operative
Connection Mechanism Habitat	Pipeline
Connection Destination	Lowland Reservoir
INNS listed within the database which may be transported from the connection source and establish in the connection mechanism, and/or, from the connection mechanism and establish in connection destination assuming no mitigation is in place.	Zebra Mussel Japanese Knotweed Cape Pondweed Pirri-pirri burr Australian Blackwood Tree-of-Heaven Three-cornered Garlic Common Ragweed Giant Cane Noble Crayfish Turkish Crayfish Water Fern Butterfly Bush Carolina Fanwort Asian clam Pampas grass Northern River Amphipod Swamp Stonecrop Dikerogammarus haemobaphes Killer shrimp Quagga mussel Large-flowered Waterweed Canadian Pondweed Nuttall's waterweed Tingiringi Gum Cider Gum Shining Gum Giant Knotwood Giant Rhubarbs Floating pennywort Curly Waterweed Pumpkinseed Water Primrose American skunk cabbage

	30Ml/dTransfer
	Monkey flower Parrot's Feather Andean water milfoil Rusty Crayfish Spiny-cheek crayfish Virile Crayfish Signal Crayfish Marsh frog Himalayan knotweed Ponto-Caspian gobies New Zealand Mudsnail White river crayfish Marbled Crayfish Red swamp Crayfish American Bullfrog Rhododendron False acacia African Clawed-frog
Seasonality of the transfer? Year-round, spring, summer etc.	Year-round
Connection Risk Score = ((Volume of water transferred × duration of transfer) × Frequency of transfer) × Distance of the transfer for Open Channel connections	10950
INNS transfer risk score = (Sum of (species risk score x INNS Risk Potential Factor) x Connection risk score)	7325550
Waterbody connectivity	2 - Between WFD waterbodies within the same catchment.
Final Score with Waterbody/Catchment Weighting	21976650
Logarithm transformation (Log^{10})	7.34
Category	High Risk

4.3.2 Component 2: Roadford Pumped Storage, River Tamar to Roadford Lake (Components 2a – 2e)

Components 2a – 2c consist of a volume of 125 Ml/d abstracted from Gathley Intake on the River Tamar being pumped via a pipeline to Roadford Lake, the option would operate between Winter and Spring (November – March) and has been assessed based upon an operational duration of 120 days. The waterbodies are currently connected in a downstream direction as Roadford Lake feeds the River Wolf, a tributary of the Tamar which confluences upstream of the Gathley Intake.

A pathway-based risk assessment for Component 2d and 2e has been deemed not appropriate as the component does not represent a transfer of raw water between waterbodies/watercourses. All transfers for this component are via a pipeline, the sources of the options for this component are Raw water from Roadford Lake the destination for all components are WTWs. As such, treatment processes are assumed to mitigate against the distribution of any seeds, fragments, or other propagules. Therefore, the option represents no likely pathways which may facilitate the distribution of INNS.

Results of the assessment of the transfer encompassed by components 2a – 2c is visible in **Table 11**. Based upon the parameters provided the connection is categorised as a “High Risk” transfer with a score of 6.66. A total of 48 species were selected within the tool based upon the presence of likely pathways that may facilitate the spread of the species, the location of the transfer, the types of habitat at the connection source, connection mechanism and destination and the seasonality of the transfer.

Table 12: Result of the REE Assessment tool implemented in the assessment of the Roadford Pumped Storage option

	125Ml/dTransfer
Operation parameters	up to 120 days during Winter or Spring.
Connection source habitat	Lowland River
Additional INNS transfer pathways present at the connection source habitat.	Construction operations Anglers Boat/Leisure Craft Walkers/Bikers Pet/ornamental release Waterfowl/animal (Phoresis) Wind Flood Survey/Site operative
Connection Mechanism Habitat	Pipeline
Connection Destination	Lowland Reservoir
INNS listed within the database which may be transported from the connection source and establish in the connection mechanism, and/or, from the connection mechanism and establish in connection destination assuming no mitigation is in place.	Zebra Mussel Japanese Knotweed Pirri-pirri burr Australian Blackwood Tree-of-Heaven Three-cornered Garlic Common Ragweed Giant Cane Noble Crayfish Turkish Crayfish Water Fern Butterfly Bush Carolina Fanwort Asian clam Pampas grass Northern River Amphipod Swamp Stonecrop Dikerogammarus haemobaphes Killer shrimp Quagga mussel Large-flowered Waterweed Canadian Pondweed Nuttall's waterweed Giant Knotwood Giant Rhubarbs Floating pennywort Curly Waterweed Pumpkinseed Water Primrose American skunk cabbage Monkey flower Parrot's Feather Andean water milfoil Rusty Crayfish Spiny-cheek crayfish Virile Crayfish Signal Crayfish Marsh frog Himalayan knotweed Ponto-Caspian gobies New Zealand Mudsnail White river crayfish Marbled Crayfish Red swamp Crayfish American Bullfrog

	125Ml/dTransfer
	Rhododendron False acacia African Clawed-frog
Seasonality of the transfer? Year-round, spring, summer etc.	Winter - Spring
Connection Risk Score = ((Volume of water transferred × duration of transfer) × Frequency of transfer) × Distance of the transfer for Open Channel connections	15000
INNS transfer risk score = (Sum of (species risk score x INNS Risk Potential Factor) x Connection risk score)	8940000
Waterbody connectivity	2 - Between WFD waterbodies within the same catchment.
Final Score with Waterbody/Catchment Weighting	26820000
Logarithm transformation (Log^{10})	7.43
Category	High Risk

4.3.3 Component 3: Transmission System to Wessex Water (components 3a – 3i)

A pathway-based risk assessment for Component 3: Transmission System to Wessex Water (components 3a – 3i) has been deemed not appropriate as the component does not represent a transfer of raw water between waterbodies/watercourses. For components 3 a-c the transfer is via a pipeline, the sources of the options for this component are WTW. For components 3 d-f, the source of the water is raw water from the River Exe. The likely reception point/destination is the Allers WTW. As such, treatment processes are assumed to mitigate against the distribution of any seeds, fragments, or other propagules. Therefore, the option represents no likely pathways which may facilitate the distribution of INNS to new habits though they may be affected by changes in physical parameters within the River Exe.

4.3.4 Component 4: Transmission System to Southern Water (components 4a - 4b)

A pathway-based risk assessment for Component 4: Transmission System to Southern Water (components 4a - 4b) has been deemed not appropriate as the component does not represent a transfer of raw water between waterbodies/watercourses. This component only includes the transfer mechanism (a pipeline) to Testwood with three (3) different destination/reception points. The different receptions points have been subject to a more detailed assessment in Section 4.3.5.

4.3.5 Reception Points (Components 5a – 5c)

Components 5 represents the reception arrangements at Southern Water.

A pathway-based risk assessment for Component, 4a, 4b, 5a and 5c has been deemed not appropriate as the component does not represent a transfer of raw water between waterbodies/watercourses. All transfers for this component are via a pipeline, the sources of the options for this component are treated water from Allers WTW and the reception point/destination for all components are WTWs or potable storage tanks. As such, treatment processes are assumed to mitigate against the distribution of any seeds, fragments, or other propagules. Therefore, the option represents no likely pathways which may facilitate the distribution of INNS.

Th exception is the potential transfer of water from the River Stout to Testwood Lakes. The detailed risk assessment is provide in Section 4.3.1

5 Conclusion and recommendations

This Invasive Non-Native Species (INNS) Risk Report forms a technical appendix of Technical Annexe 1.X - Environmental Annexe of the West Country South Strategic Resource Options (WCS SROs) Gate 1 submission. The report has presented an initial analysis of INNS risks arising from the two schemes being progressed through the WCS SROs at Gate 1. This analysis followed NAU guidance and includes:

- A review of the EA's Position statement and isolated catchment maps.
- A high-level screening which includes:
  - Screening against Schedule 9 of the Wildlife and Countryside Act and Invasive Alien Species (Enforcement & Permitting) Order 2019.
  - INNS Heat maps to determine whether a raw water transfer area is of high risk

The result of the screening of INNS species and catchment heatmaps identified that INNS are widely distributed within the source catchment and along the potential transfer routes up to the point of treatment at existing WTW. While many of these INNS records are species that are considered terrestrials species (i.e. unlikely to be distributed via a transfer), sever species have been identified in the associate catchments that would likely be distributed through transfers in the absence of mitigation measures. The extensive distribution of INNS in the terrestrial environment particularly along transfer routes, is an important consideration during construction an biosecurity measures should be considered as part of the scheme design to ensure that INNS are not distributed further as a result of construction activities and the associated movement of material, vehicles and contactors.

A high-level assessment identified the following:

- Poole Effluent Re-Use
  - The transfer of treated effluent from the Poole STW is considered a low risk
  - The risk associated with the River Stour is considered high as increased flows could result in further distribution of INNS within the already connected systems
  - The abstraction and transfer of raw water into a bankside storage system creates a new pathway and is therefore consider a very high risk. The bankside storage system design should consider a closed system to avoid the creation of additional (secondary) pathway for INNS distribution
  - The risk will remain very high until the raw water is treated (possibly at Testwood WTW)
- Roadford Pumped Storage
  - There is a very high risk associated with the transfer of raw water from the River Tamar to Roadford Lake
  - The INNS "catchment" incudes the rivers Lyd and Thrushell which could introduce new INNS species to Roadford Lake where a secondary pathway (recreational users) could result in the onward distribution of INNS to other catchments.
  - The risk will remain very high until the water is treated at the Northcombe WTW
  - The scheme design should consider additional mitigation measures including pre-treatment of abstracted water prior to discharge into Roadford Lake and the possible change abstraction location to reduce the extent of the INNS "catchment"
- Transmission to Wessex
  - The abstraction and subsequent transfer of raw water from either the River Exe or the River Stour present a very high risk for INNS distribution. The changes in flow within the River Exe and/or Stour could also result in habitat changes that may favour the distribution and establishment of INNS
  - The risk will remain high until the water is treated at Allers WTW
  - The risk associated with the transfer of treated water from Northcombe WTW is considered low
- WCS3
  - The transfer of raw water from either the rivers Exe or Stour will remain a very high risk until the water is treated at Allers WTW
  - The distribution pathway from the Stour should be disrupted should the reception point/destination transfer include either potable storage tanks or the Teswood WTW

- Where the reception point/destination include the transfer of any raw water into the Testwood Lakes, the pathway is considered to present a very high risk. Such a transfer could result in a distribution of INNS within a different catchment with secondary pathways at the lakes potentially resulting in the wider distribution n of INNS within the Southern Water's region.

A more detailed risk assessment provided similar results with the raw water transfer into Roadford Lake and into Testwood Lakes resulting in a high risk for distribution. The more detailed risk assessment identified a total of 48 and 52 species, respectively, that were selected within the tool based upon the presence of likely pathways that may facilitate the spread of the species, the location of the transfer, the types of habitat at the connection source, connection mechanism and destination and the seasonality of the transfer.

It is noted that the assessment does not consider any mitigation measures and that the risks would likely be reduced through scheme design.

The National Appraisal Unit (NAU) has identified that at Gate 2 the requirements will include undertaking a full INNS Pathway Risk Assessments which complies with EA guidance. Gate 2 assessments will also need to consider:

- if risks can be mitigated and whether uncertainties can be managed, and
- consulting on mitigation measures.

The NAU will be providing an updated risk assessment tool for the gate-2 assessments and it is recommended that the risk assessments completed to date is updated to consider the availability of any new tools.

It is recommended that a target INNS monitoring programme is implemented to provide a more detailed baseline of the species associated with the River Tamar, River Lyd, River Thrushel, River Exe and River Stour as well as the Roadford Lake and Testwood Lakes. These data would be important to consider in further scheme design and the identification of suitable mitigation measures (including pre-treatment requirements).

It is recommended that a review is completed to understand the risk of distribution into the wider catchment where propagules are removed through the treatment process and sludge/waste from the WTW is transferred to terrestrial habitats within the destination catchment.