

STRATEGIC REGIONAL WATER RESOURCE SOLUTIONS
PRELIMINARY FEASIBILITY ASSESSMENT

Standard gate one submission for:

- West Country South sources and transfers
- West Country South - Southern Water transfer

Queries raised by RAPID and Solution owner responses

September 2021

Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS001
Date sent to company	13/07/2021
Response due by	15/07/2021

Query

I request the submission of the following documents to enable the Environment Agency and Natural England to make an appropriate assessment of the evidence supporting the schemes' Gate 1 submissions:-

Environmental Assessment

Strategic Environmental Assessment

Habitats Risk Assessment

Water Framework Directive Assessment

Natural Capital and Biodiversity Net Gain Assessment

Carbon Assessment

Invasive Non-Native Species Risk Assessment

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Solution owner response

Throughout the development of the gate one study we have had continuous engagement with the EA and NE as described in section 5 page 16 of our gate one report. This has included monthly progress meetings, specific meetings on particular topics and the sharing draft versions of all the assessments referred to in your query.

We understood that the NAU would be making their assessment of our submission based on the draft environmental assessments and on the level of engagement during the project. We received feedback regarding the engagement undertaken from NE and EA on 21st June and 2nd July 2021 respectively.

A schedule of comments was received from the EA on 9th June 2021, with feedback provided by NE in letter format on 21st June 2021. Owing to the overlapping nature of the comments, the assessment team needed to first review all comments together before being able to progress appropriate responses. Minor clarifications have since been incorporated into final gate one environmental assessments and a comments log has been prepared to respond to all points raised by the EA and NE.

In order to ensure that the EA and NE have the latest versions of all the environmental assessments, our SRO Environmental coordinator has provided them to the EA's National Assessment Unit pan-area lead and to NE's lead for the West Country, and they have confirmed receipt.

In addition we have now uploaded the environmental assessments to the RAPID sharepoint site.

In all cases the documents submitted to RAPID contain information that is commercially confidential. Please ensure that appropriate steps and safeguards are observed in order to maintain the security and confidentiality of this information. Any requests made to RAPID or any organisation party by third parties through the Freedom of Information Act 2000, the Environmental Information Regulations 2004, or any other applicable legislation requires prior consultation and consent by each of the partner companies (South West Water, Southern Water and Wessex Water) before information is released as per the requirements under the respective legislations. The content of the documents 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.

Date of response to RAPID	15 July 2021 Updated 21 July 2021
Strategic solution contact / responsible person	Julian Welbank julian.welbank@wessexwater.co.uk

Gate 1 queries process

Strategic solution(s)	West Country Sources South
Query number	WCS002
Date sent to company	16/07/2021
Response due by	20/07/2021

Query

- 1) *Please explain why the deployable output volume for a 1 in 200 year drought stated as 30 MI/d is less than that stated in the final determination of WRMP19 of 65 MI/d.*
- 2) *Please explain why a DO for 1:500 year drought has not been used.*
- 3) *Please explain what assumptions have been made regarding scheme utilisation to inform the Opex costs. Please explain the reasoning behind the utilisation value(s) used.*

Solution owner response

Query 1)

The total deployable output of the SRO is 60 MI/d, not 30 MI/d. The SRO comprises two schemes: Roadford treated water transfer at 30 MI/d and Poole effluent reuse at 30 MI/d, totalling 60 MI/d.

The 65 MI/d included in the PR19 FD (not WRMP19) was made up of the following elements:

- Roadford pumped storage and Poole effluent re-use and transfer to southern = 45 MI/d (our joint proposal for strategic regional water resources in August 2019 proposed a total capacity for these two sources of 50 MI/d)
- Bournemouth Knapp Mill to Southern Water transfer (already in WRMP19 using existing licences) = 20 MI/d

The funding for the latter was not included in the SRO costs as that was already in Southern Water's WRMP and Business Plan and hence outside the SRO process - although it appears that the benefit was included in the FD. This particular scheme has been paused since the no deterioration study for the River Avon has suggested that, although there is water available within the abstraction licence, applying the Common Standards Monitoring Guidelines would mean the additional abstraction would fail the thresholds.

Our work under Gate 1 identified the two remaining potential sources that could provide water to a strategic transfer. These are Roadford Lake and Poole STW which were the costs included in the FD. Given the geographical separation of these sources they have been developed as two independent schemes across the two West Country South (WCS) SROs. Each source is estimated to provide a 1:200 year drought DO of 30 MI/d and hence the total deployable outout (DO) of the WCS Sources and Transfers SRO and the WCS Southern Water Transfer SRO is 60 MI/d. (more than the original FD estimate).

Query 2)

The Gate 1 DO estimate of Poole STW has been based on the historical flow record of the work's discharge. This identified a minimum flow of 30 MI/d and at this stage, it is assumed that the flow is driven by the minimum returns to the works which would not be impacted by drought severity and therefore this DO is assumed to be available in all drought scenarios.

The DO from Roadford Lake, available to the SRO is driven by the wider use of the reservoir by SWB and the increased filling of the reservoir from the winter abstraction on the river Tamar. Analyses have shown that 30 MI/d could be provided to the SRO in a 1:200 year drought, based on the synthetic drought sequences available.

The DO available to the SRO in a 1:500 year drought, and any other scenarios, will need to be determined as part of the Gate 2 programme, once the impact of potential environmental destination requirements across the West Country have been determined in the West Country Water Resources Group regional plan during 2021 and 2022.

This assessment will need to be modelled across the system as a whole because we need to evaluate what the overall DO for the West Country will be for meeting the 1 in 500 resilience requirement by 2039.

Query 3)

Opex costs have been derived for both full and minimum operation of both schemes. Full operation assumes continuous operation at 30 MI/d and minimum operation represents the requirement to maintain a continuous flow of 7.5MI/d (25% of capacity). Unlike the West Country North SRO, which was on the accelerated timeline for Gate 1 as an alternative strategic option for Southern Water's specific need in Hampshire, the actual requirement for the WCS SROs is unknown. The maximum and minimum scenarios have been provided to the WRSE regional modelling to enable the schemes to be equitably compared with others by WRSE.

The Opex NPV values provided in Table 12 of our submissions are for the full utilisation scenarios.

The opex estimates include both fixed and variable elements and therefore the ratio between full and minimum scenarios is less than four.

Date of response to RAPID	19/7/201
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Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS003
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Have you explored sub-options and if you have and rejected any could you explain why?
- 2) Please explain the extent to which wider resilience benefits have been explored and the approach to assessment.

Solution owner response

Query 1)

The SRO covers an extensive geographical range from Devon to Hampshire and consequently there were many potential options considered to treat and transfer water from Roadford Lake and potential recycled water sources across the Wessex Water (WSX) region. The first phase of this Gate 1 study was therefore to identify, investigate and appraise a long list of options such that a short list could be taken forward for concept design and associated cost, risk and environmental assessment. By screening options against associated criteria, a shortlist was taken forward for concept design development that represent the best value means of utilising the potential sources in providing additional resource to Southern Waters (SRN's) Hampshire region. This enables the SROs to be assessed in a consistent manner with the other options being considered in regional planning to determine whether they form part of an overall best value programme.

The screening process for the unconstrained options was undertaken using two stages, where the level of scrutiny increases from Level 1, high level assessment using key parameters to a Level 2 screening which delves into a greater level of detail.

Level 1 screening removes all the options from the list that have major technical, environmental constraints and/or through comparative rejection showing better, more feasible options. The outcome is a simple pass or fail with supporting audit trail for reasoning.

The criteria assessed at Level 1 included:

- Potential Yield, Superseded, Comparative Rejection (Cost v Benefit), Source Availability, Other Stakeholder Constraints, Major Environmental Impact, Major Planning/Site Constraints, Current Stakeholder Scheme, Constructability & Operability

Level 2 uses a RAG system (red/amber/green) to present the findings of the assessment and to demonstrate how the options perform against the assessment criteria. This covers all disciplines associated with delivery as detailed below.

The criteria at Level 2 included:

- Yield Expectancy, Supply/Demand Uncertainty, Resource Availability (Yield), Option Flexibility, Asset Infra Capability/Risk, Trade/Final Effluent Make Up, Constructability & Impact, Operational Complexity, Water Quality Risks, (Raw Water/ Potable/ DWSP), Stakeholder Acceptability, Customer Acceptability, Regulatory Approval, Planning Constraints, Environmental Impact (SEA/HRA Designations), Environmental Ambition, Water Framework/Wastewater Directives (Abstraction/Discharge), Carbon Impact, CAPEX/OPEX/WLC, Opportunities

An appraisal of a new River Tamar abstraction and Roadford Lake Utilisation by South West Water (SWB) assessing the available water for transfer to SRN from Roadford, identified 30 MI/d based on historical assumptions at PR19. This was the basis of Gate 1, with the statement that this will be reviewed following new regional modelling using an updated 1 in 500 horizon as well as taking account of new environmental and sustainability challenges.

An appraisal of all Wessex Water's STW's with a dry weather flow (DWF) greater than 10 MI/d was undertaken to assess their potential for providing a recycled water source. Through our screening stages and engagement with WSX staff, the EA, NE and DWI, of the ten STW's and an initial 38 No Unconstrained Options the diversion of up to 30 MI/d of Poole STW's effluent and its treatment and discharge to the river Stour was the only feasible option for an SRO to SRN's Hampshire area.

In terms of the potable transmission system elements of the project, given a total transfer distance of approximately 200 km from Roadford Lake to Hampshire and a relatively small source availability of 30 Ml/d, the construction and operation of an entirely new, dedicated pipeline would not provide an economic or sustainable water supply. Therefore, a key focus of this stage of the project has been to identify all options to use existing infrastructure to either accommodate the additional transfer flows or to be operated differently by using the new source to initiate a displacement of current sources west to east.

The lack of spare capacity in the existing pipelines combined with the current operation of the systems not allowing displacement of demand, it was concluded that there was very little opportunity to use existing networks to transfer the new sources westward to Hampshire. As a result, transmission system reinforcement options were developed that, mirrored the existing system where possible, were split into sensible system components and through component combinations options were identified and screened using the Level 1 and 2 screening criteria.

Query 2)

The SRO's will result in a number of resilience and integration benefits at local, regional and national levels. These benefits can be grouped into broad categories, including:

- Construction
- Operations
- Resilience
- Development.

The schemes will result in benefits both within and between regions, particularly with respect to resilience and integration of key water infrastructure networks. Given the breadth of the scheme and its interaction with the local environment and existing and planned development, different types and magnitudes of benefits will be experienced in different places.

As a proportionate approach at Gate 1 this analysis has focused on the identification of resilience and network integration benefits to the water sector and water users. At Gate 2 the analysis should be extended to be extended to consider a wider set of environmental and societal benefits (direct and indirect) from each functionally separate scheme being progressed through the WCS SROs.

Resilience

The Environment Agency's *Meeting our future water needs: a national framework for water resources* states that the case is clear that investment is required to reduce

demand and increase supplies to increase resilience to drought and make sure that the nation's water supplies and environment are able to cope with an uncertain future.

The WCS SROs comprise to extensive infrastructure schemes which span multiple local authorities in the South West of England. Given the scope and breadth of the schemes it is important to understand the potential range of intra- and inter-regional scheme level benefits.

The main benefit of the SRO will be resilience. There is an identified deficit of resilience within the water transfer infrastructure, and the deficit exists both in terms of demand, drought and general resilience. For demand and drought resilience there is a need to ensure that adequate water capture, storage, treatment and transfer infrastructure is in good operating order to be able to supply water to settlements.

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.

Between 2010 and 2018 Wessex Water implemented a programme of works to eliminate standalone sources, enabling alternative water supplies to be provided should there be a source failure which is unable to be restored within the period provided by service reservoir storage. However, there was one major exception where this added resilience is not yet sufficient - Wessex Water's largest treatment works at Maundown.

The Maundown treatment works has a peak capacity of 80 megalitres per day (MI/d) and typical output in the range of 50-60 MI/d, representing some 20% of Wessex Water's entire demand. At present it is possible to rezone a large part of the demand supplied by the facility, but not fully. It is estimated that between 30 to 40 MI/d of demand, equivalent to the supply of 60,000 homes, cannot be obtained through alternative sources. The Maundown site contains several single points of failure which pose significant risks to the continued supply of water to communities.

Over the period spanning 2020-2025 work is being undertaken to deal with immediate vulnerabilities at Maundown, where possible to do the work during overnight shutdowns. However, in the longer term it is recognised that longer shutdowns of up to six months may be required to replace the works' control system architecture and remove all single points of failure. During this period of downtime an alternate supply of approximately 30 MI/d would be required to meeting existing system demand.

The WCS SRO 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 Maundown 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.

Integration

Integration between the existing water storage and transfer network and the WCS SRO's is an important aspect of the scheme which will come with associated socio-economic benefits. However, following discussions with Wessex Water it is clear that full integration of the transmission options into SWW and/or WSX network is not viable due to a combination of:

- The volume of the additional flow
- The size and lack of excess capacity within the existing pipe network
- The operating strategy, particularly within the WCS area with the mode of operation changing depending on the time of year
- Potential for emergency resilience to be compromised. Integration would not be able to guarantee supply to both SWW and WSX customers at the same time in an emergency or significant interruption to supply.

In essence the current operational infrastructure was designed with a capacity to serve the needs of the localities within the water district, and consequently the existing infrastructure does not have the excess capacity to accommodate an additional 30 megalitres of water per day.

As a result of this reality, new infrastructure is required for both storage and transmission of water resources.

Because 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 SRO infrastructure will be designed to accommodate integration and interfacing with the future system, 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 as much as possible.

Construction Benefits

The socio-economic benefits associated with the construction of the West Country South SRO 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.

Operations Benefits

With the route of WCS 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.

Development Benefits

The SRO's may enable additional commercial and residential development to come forward. The extra water resource capture, storage and transfer infrastructure will increase the capacity of the network to supply commercial, industrial and residential properties, and where system supply constraints may have previously hindered additional development, the additional capacity resulting from the WCS SRO may overcome these barriers to development.

Alternatively, the WCS SRO infrastructure for capture, storage and transfer of water resources 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.

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS004
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Please clarify how your projected solution cost estimates have changed between those submitted in WRMP19 and the current Gate 1 submission, where possible providing a breakdown and comparison of the cost estimates. Please explain clearly any changes, added/eliminated cost items or activities, or developments that contributed to the difference.
- 2) Within Section 14 (Efficient spend of gate allowance):
 - a. Please provide further detail or breakdown on activities included in "technical consultancy, cost estimating, and assurance." Where activities are largely different, please provide separate line items for those costs (where possible, please provide breakdowns aligned with the following categories: Programme & Project Management (including Assurance), Preliminary Feasibility Concept Design, Water Resources Planning, Environmental Assessment (including all associated costs and regulator costs), Data Collection, Sampling, and Pilot Trials/Pre-feasibility Assessments, DPC & Procurement Strategy, Planning Strategy, Stakeholder Engagement, and Other. For costs that fall into the "Other" category, please provide a description of the activity.)
 - b. Please provide further information on what partner costs entail.
 - c. Please confirm actual spend per regulator.
 - d. Table 15 lists the total allowance for forecast Gate 2 costs. Please confirm whether there was a budget created for forecast spend to Gate 2.

Solution owner response

Query 1)

Neither of the schemes or SROs were included in WRMP19 and therefore there are no changes to explain.

Elements of the schemes were included in WRMP19 but with very different configurations and sizes. A treated water transfer from Knapp Mill to Southern Water of 20 MI/d was included in Southern Water's WRMP. But this particular scheme has been paused since the no deterioration study for the River Avon has suggested that, although there is water available within the abstraction licence, applying the Common Standards Monitoring Guidelines would mean the additional abstraction would fail the thresholds. The scheme proposed under the West Country South SRO is very different in that involves effluent reuse, the River Stour as an environmental buffer and a raw water transfer to Testwood, and it has a capacity of 30 MI/d – as described in the gate one report.

Roadford pumped storage. This scheme was included as a feasible option in South West Water's WRMP. The WRMP proposed that a high level feasibility study was undertaken in the period 2020-25, which has been fulfilled by this SRO gate one study. As noted in our gate one report this part of the project is now under implementation as part of the green recovery programme.

Query 2)

a. Breakdown of gate one costs

A breakdown of the gate one costs is included below.

Description	Cost £m @ 2017/18 prices		
	West Country South sources & transfers	West Country South – Southern Water Transfer	Total
Technical consultancy:			
Effluent re-use study	0.092	-	0.092
Roadford pumped storage study	0.070	-	0.070
Transmission study - Infrastructure improvements, intra-regional and inter-regional transmission	0.053	0.053	0.106
Environmental assessment (including planning)	0.075	0.075	0.149
Cost estimating	0.035	0.035	0.069
Programme technical lead (Including procurement)	0.023	0.023	0.047
Sub-total	0.348	0.186	0.534
Assurance	0.015	0.015	0.030
Partner costs including project management	0.109	0.069	0.178
Total	0.472	0.270	0.742
Additional costs for regulators:			
EA National appraisal unit & Area costs	0.044	0.029	0.073
NE Discretionary advice service	0.006	0.006	0.012
Sub-total	0.050	0.035	0.086
Grand total	0.522	0.306	0.827

b. Information on partner costs

Partner costs include the programme director/project manager, steering groups, internal reporting and governance, water company staff input for data collection,

review and attendance at workshops, water company procurement department input etc.

c. Actual spend per regulator

The table below provides a detailed breakdown of the costs that are recharged to the two SROs by the Environment Agency in current prices based on the offer letters from the EA.

EA National Assessment Unit 3 offer letters from EA									
				Costs in £					
Scheme	Offer letter	Gate	Description	2020/21 Q2	2020/21 Q3	2020/21 Q4	2021/22 Q1	2021/22 Q2	Total
West Country South - Southern Water transfer	26-Nov-20	Gate 1	NAU costs	1,512	1,512	2,619	2,945	2,945	11,533
		Gate 1	Area estimated costs*		4,500	4,500	4,500	4,500	18,000
		Gate 1	Total	1,512	6,012	7,119	7,445	7,445	29,533
West Country South sources & transfers	23-Nov-20	Gate 1	NAU costs	2,079	2,079	3,601	4,049	4,049	11,808
		Gate 1	Area estimated costs*		10,800	10,800	10,800	10,800	32,400
		Gate 1	Total	2,079	12,879	14,401	14,849	14,849	44,208
West Country South (2 schemes added together)		Gate 1	NAU costs	3,591	3,591	6,220	6,994	6,994	23,341
		Gate 1	Area estimated costs*	0	15,300	15,300	15,300	15,300	50,400
		Gate 1	Total	3,591	18,891	21,520	22,294	22,294	73,741

We are aware that the actual costs for the EA area teams may be slightly lower than reported. This was raised with the head of the EA's National appraisal unit in April, and we were advised to report on the basis of the offer letter amounts. At the time of submission of the gate one reports and at the time of writing this response we have not been provided with the actuals.

For Natural England two options have been proposed either a Service level agreement or use of their standard Discretionary Advice Service (DAS). Pending the setting up of a Service level agreement, the West Country Water Resources Group have put a Discretionary Advice Service agreement in place covering all the SROs in the West Country. The value included in the table above is the part of the overall DAS that relates to these projects.

d. Budget for Gate 2

A provisional budget for gate 2 is given below.

Description	Cost £m	
	West Country South sources & transfers	West Country South – Southern Water Transfer
Technical consultancy		
Engineering / water resources:		
Effluent re-use study	0.150	-
Roadford pumped storage study (see section 4.4 below)	0.100	-
Transmission study - Infrastructure improvements, intra-regional and inter-regional transmission	0.200	0.200
Environmental assessment (including planning)	0.100	0.100
Cost estimating	0.050	0.050
Programme technical lead	0.100	0.100
Sub-total	0.700	0.450
Assurance	0.020	0.020
Partner costs including project management	0.100	0.100
Total	0.820	0.570
Additional costs for regulators		
EA National appraisal unit & Area costs	0.074	0.037
NE Discretionary advice service	0.010	0.010
Sub-total	0.084	0.047
Grand total	0.820	0.570

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank Julian.welbank@wessexwater.co.uk

Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS005
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Please provide details of key data / information which has been provided on each SRO to inform the regional plans.
 - 2) On best value planning:
 - a. Have environmental and social metric scores been calculated? If so, please describe the metrics.
 - b. To what extent do social benefits explored include amenity value?
 - c. How will performance of the solution be assessed to ensure best value outcomes for customers and the environment?
 - d. Which of the solution options are considered to provide wider best value for customers beyond least cost?
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Solution owner response

Query 1)

In terms of the WRSE Regional Planning Data, we have adhered to their requests to complete the WRSE template detailing the Deployable Output, Asset Details, Dependancies, Cost and Carbon Information as well as providing shapefiles of the options developed to concept design to allow environmental assessment to be completed. WRSE have produced environmental and resilience metrics data to ensure consistency across all options in the regional programme appraisal of best value.

For the WCWRG Regional Planning, we have provided the same data to feed into their planning appraisal work.

Query 2a)

As part of the environmental assessment an initial Natural Capital (NCA) & Biodiversity Net Gain (BNG) assessment has been undertaken using relevant metrics to consider all likely effects on ecosystem services and natural capital changes. An initial Carbon Assessment has also been completed to understand the embodied and operational emissions of each scheme (and constituent infrastructure components) being progressed through the WCS SROs.

In line with the EA's WRPG Supplementary Guidance, the NCA & BNG assessment considered:

- Standard five metrics: biodiversity, climate regulation (carbon storage), water purification, water regulation; and natural hazard regulation;
- Additional metrics:
 - Food production ecosystem service metric due to the significance of agricultural production in the West Country region.
 - Recreation & tourism and air quality to support the assessment of social impacts (addressed further through the initial SEA carried out at Gate 1).

The output is a high-level view of the potential natural capital benefits of the SRO elements and schemes to inform Gate 1 decision making. The Gate 1 NCA & BNG assessment highlights which of the proposed schemes and options evaluated presents 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 BNG (opportunities for wider environmental net gain. At this conceptual design stage it is not feasible to provide a detailed quantified and/or monetised account for all Natural Capital metrics: instead at Gate 1 the assessment is focused on providing the foundations (i.e. data, mapping and summary metric values) on which to be able to complete more detailed monetisation at Gate 2.

Query 2b)

Assessment of social benefits and impacts from the schemes being progressed through the WCS SROs has considered potential changes in amenity value both at individual receptor and Study Area levels through the initial NCA & BNG assessment and the initial SEA carried out at Gate 1.

As noted above, the Gate 1 NCA & BNG assessment included recreation & tourism and air quality as additional metrics to support the assessment of social impacts. Such impacts were also addressed through the initial SEA carried out at Gate 1, which involved the development and application at component and scheme levels of a bespoke SEA Framework, including detailed assessment criteria, to identify likely

significant effects on a consistent basis. Of relevance to social impacts, the WCS SROs SEA Framework (appended to this response for reference) includes Core SEA Objectives regarding 2 - Population & Health, 7 - Landscape and 9 – Material Assets to capture social impacts, and for each of these specific criteria were applied to identify likely changes in amenity value at individual receptor level. This included 'Impact pathway analysis'; cross-matching potential environmental and socio-economic effect types associated with WCS component options with identified specific constraints and opportunities relevant to the the concept design of each scheme in order to generate a full set of likely environmental and socio-economic effects and key risks.

Query 2c)

The environmental assessments provide all the pertinent information in accordance with the Gate 1 appraisal criteria specified by RAPID. These criteria focus on establishing scheme feasibility, identification of key risks (including environmental risks) from initial concept designs and the preparation of mitigation and monitoring proposals for consideration through refined concept designs at Gate 2. Implementation of proposed mitigation and monitoring will inform more detailed environmental assessment at Gate 2 and in tandem best value assessments of options including the West Country SROs will be undertaken by WCWR to underpin the development of the emerging West Country Water Resources Regional Plan. Taken together, this will enable a proportionate assessment of whether each scheme delivers best value outcomes for customers and the environment to be reported at Gate 2.

Query 2d)

Following initial optioneering and screening, 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 from Poole Sewage Treatment Works (STW) via River Stour:
- 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:
- Component 3: Transmission System SWW to WSX comprising transfer pipeline sections and associated infrastructure (components 3a – 3i)
- Component 4: Transmission Systems to SRN (components 4a - 4b)
 - Summerslade to Testwood (partially utilises West Country North (WCN) Accelerated Gate 1 route)
 - River Stour Pre Treatment (Component 1f) to Testwood

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

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)

Both of the functionally separate long-distance water transfer scheme options have added value. As described in the gate one report, the Roadford scheme enables increased yield from an existing reservoir to provide water for transfer intra-regionally and inter-regionally. The Poole effluent re-use scheme assists with meeting conservation objectives in Poole Harbour, support low flows in the River Stour, and provide water for transfer intra-regionally and inter-regionally.

Determining the best value plan and which scheme provides best value will be carried out with the regional planning framework in parallel with development of the SRO.

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank

Appendix – WCS SROS SEA Framework

A suite of detailed assessment criteria was developed through a dedicated 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 1** below.

Table 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.	<ul style="list-style-type: none"> • 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: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Protect (and where possible enhance) nationally and internationally designated sites of ecological importance?</i> - <i>Protect (and where possible enhance) locally designated biodiversity sites?</i> <p>Mitigation development to address identified likely (significant) adverse effects</p>
	2. To avoid a net reduction, and where possible enhance, in non-monetised natural capital assets.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from HRA and WFD Compliance workstreams. • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Protect and enhance valued species and habitats?</i> - <i>Safeguard against habitat loss or fragmentation?</i> - <i>Protect or enhance protected trees or important woodland areas?</i> - <i>Lead to changes in ecological resources (habitats/species) due to changes in surface or groundwater water quantity or quality?</i> <p>Mitigation development to address identified likely (significant) adverse effects</p>
	4. To avoid and, where required, manage invasive and non-native species (INNS).	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from INNS Risk workstream (inc. mitigation options) • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Exacerbate or prevent the spread/introduction of INNS?</i>
	5. To meet WFD objectives relating to biodiversity.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from WFD Compliance workstream (inc. WFD status of waterbody receptors, likely effects and mitigation options) • Qualitative assessment via guide questions: <i>Will the SRO:</i>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		<ul style="list-style-type: none"> - <i>Support the achievement of good ecological status?</i>
2. Population and Human Health	1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Minimise noise emissions to sensitive receptors?</i> - <i>Protect air quality and prevent emissions of harmful pollutants?</i> - <i>Avoid conflicts with strategic scale land use (employment / industrial / housing / mixed use) planning allocations to meet identified population needs?</i> - <i>Avoid traffic congestion and delays?</i> - <i>Protect access to local services and facilities?</i> - <i>Minimise residential amenity impacts?</i> - <i>Minimise land take and sterilisation?</i> - <i>Minimise conflict with existing land uses and sensitive landowners (e.g. MOD)?</i> • Mitigation development to address identified likely (significant) adverse effects
	2. To maintain and enhance tourism and recreation.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Safeguard and improve opportunities for recreational activities?</i> - <i>Protect existing tourism activities and assets from adverse development impacts?</i> - <i>Protect public access to and the visitor attractiveness of designated recreational routes?</i> - <i>Improve access to nature?</i> • Mitigation development to address identified likely (significant) adverse effects
	3. To secure resilient water supplies for the health and wellbeing of customers.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Ensure continuity of a safe and secure drinking water supply?</i> - <i>Ensure adequate water infrastructure is in place to meet the health and wellbeing needs of current and future populations?</i> • Mitigation development to address identified likely (significant) adverse effects
	4. To increase access and connect customers to the natural environment, provide education or information resources for the public.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Improve access to nature?</i>

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		<ul style="list-style-type: none"> - Provide education or information resources for the public? <p>Mitigation development to address identified likely (significant) adverse effects</p>
3. Water	5. To reduce or manage flood risk, taking climate change into account.	<ul style="list-style-type: none"> • Impact pathway analysis • Review SRO infrastructure encroachments into Flood Zones 2 and 3 • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - 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
	6. To enhance or maintain groundwater quality and resources.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - Result in changes to groundwater levels? - Protect and improve groundwater quality? • Mitigation development to address identified likely (significant) adverse effects
	7. To enhance or maintain surface water quality, flows and quantity.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - Result in changes to abstraction or discharge levels? - Require changes to abstraction licences? - Result in changes to river flows? - Protect fish, invertebrates and macrophytes? - Safeguard waterbodies designated as protected areas? - Protect and improve surface water quality? • Mitigation development to address identified likely (significant) adverse effects
	8. To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from WFD Compliance workstream. • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - Protect or improve the quality of waterbodies, helping to WFD and RBMP objectives? • Mitigation development to address identified likely (significant) adverse effects
	9. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	<ul style="list-style-type: none"> • Findings from socio-economic analysis of non-resource benefits re network resilience and performance benefits • Comparison of cascade-based versus new transmission infrastructure approaches

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
		<ul style="list-style-type: none"> Mitigation and enhancement development to further improve resilience through SRO
4. Soil	10. To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	<ul style="list-style-type: none"> Impact pathway analysis Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> <i>Avoid (or help to remediate) contaminated land?</i> <i>With respect to areas proposed for permanent land use change, safeguard the best quality, most versatile and locally important agricultural land?</i> <i>Utilise brownfield / previously developed land?</i> Mitigation development to address identified likely (significant) adverse effects
5. Air	11. To reduce and minimise air and noise emissions during construction and operation.	<ul style="list-style-type: none"> Impact pathway analysis Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> <i>Minimise noise emissions to sensitive receptors?</i> <i>Protect air quality and prevent emissions of harmful pollutants</i> <i>Minimise residential amenity impacts?</i> Mitigation development to address identified likely (significant) adverse effects
6. Climatic Factors	12. To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	<ul style="list-style-type: none"> Impact pathway analysis Findings from Natural Capital Assessment workstream Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> <i>Reduce vulnerability to the effects of climate change through appropriate adaptation?</i> <i>Enhance climate resilience within the water network?</i> <i>Enhance ecosystem resilience (ability to adapt) to climate change?</i> Mitigation development to address identified likely (significant) adverse effects
	13. To reduce embodied and operational carbon emissions.	<ul style="list-style-type: none"> Impact pathway analysis Findings from Carbon Assessment workstream Findings from Natural Capital Assessment workstream Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> <i>Maximise energy efficiency?</i> <i>Minimise operational energy consumption?</i> <i>Minimise greenhouse gas release, including embodied and operational emissions?</i> <i>Support decarbonisation of the water sector?</i> <i>Support the delivery of renewable and low carbon energy?</i> Mitigation development to address identified likely (significant) adverse effects

SEA Topic	Core SEA Objective	WCS Gate 1 SEA Criteria
7. Landscape	14. To conserve/protect and enhance historic assets/cultural heritage and their setting, including archaeological important sites.	<ul style="list-style-type: none"> • Impact pathway analysis • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Avoid adverse effects on (and where possible enhance) protected/designated landscapes?</i> - <i>Protect (and where possible enhance) landscape and townscape character?</i> - <i>Minimise adverse visual impacts?</i> - <i>Provide opportunities to enhance visual amenity?</i> • Mitigation development to address identified likely (significant) adverse effects
8. Historic Environment	15. To conserve, protect and enhance landscape and townscape character and visual amenity.	<ul style="list-style-type: none"> • Impact pathway analysis • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Affect the integrity or setting of designated heritage assets?</i> - <i>Avoid or minimise damage to archaeologically important sites?</i> - <i>Affect public access to designated heritage assets?</i> • Mitigation development to address identified likely (significant) adverse effects
9. Material Assets	16. To minimise resource use and waste production.	<ul style="list-style-type: none"> • Impact pathway analysis • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Minimise the production of waste?</i> - <i>Promote the principles of circular economy?</i> - <i>Treat and process waste with minimal environmental impact?</i> - <i>Minimise the demand for raw materials and the need for minerals extraction?</i> - <i>Promote the use of local resources and minimise the importation of minerals?</i> • Mitigation development to address identified likely (significant) adverse effects
	17. To avoid negative effects on built assets / infrastructure.	<ul style="list-style-type: none"> • Impact pathway analysis • Findings from socio-economic analysis of non-resource benefits • Qualitative assessment via guide questions: <i>Will the SRO:</i> <ul style="list-style-type: none"> - <i>Avoid conflicts with existing, consented and proposed major transport infrastructure?</i> - <i>Avoid constraining the potential growth of existing settlements?</i> - <i>Avoid conflicts with existing or planned waste or minerals sites?</i> - <i>Minimise land take and sterilisation?</i> - <i>Integrate with existing or planned water infrastructure?</i> - <i>Ensure adequate infrastructure is in place to meet current and future population needs?</i> - <i>Require the provision of new or upgraded infrastructure?</i> • Mitigation development to address identified likely (significant) adverse effects



Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS006
Date sent to company	21/07/2021
Response due by	23/07/2021

Query

Section 6

Please provide the analysis underpinning discreteness test that you have carried out for the Roadford potable water option for eligibility with DPC.

Solution owner response

Section 6 page 23 of our gate one report notes that:

The DPC option has been rejected for the potable transfer from Roadford reservoir as it failed the discreteness test. The operation of the potable transfer, over more than 200 km, requires integration with SWB's and WSX's existing systems to ensure water quality over such a long distance and as such it fails the discreteness test. Furthermore, the note from RAPID to the ACWG on 7th May 2021 highlighted that a legal solution would be required to enable the DWI to use its powers and duties in regard to the operation and maintenance of water treatment assets by a Competitively Appointed Provider (CAP).

The principal reason that the scheme fails the discreteness test is the large degree of integration with existing and future day to day operational assets and systems. In addition the Roadford pumped storage scheme which is the source of the water for the scheme has been split out as a separate stand alone scheme to be delivered through the green recovery initiative.

Given the length and hence duration of the transfer, it is clear that a level of integration would be needed with the existing WSX and SWB systems. Discussions were held with WSX and SWB Asset Management and Operations staff, regarding how to ensure that the potable water transfer from Roadford to Testwood maintained water quality standards and could deliver resilience benefits. Two categories were considered:

- 1) The asset/source is a definitive shared/integrated component that needs to be used for SRO(s) as well as ongoing water company and regional requirements
- 2) The asset/source is a potential shared/integrated component with WSX and/or SWB's systems that could support both regional and SRO(s) requirements either demand, resilience, water quality management or to ensure SRO infrastructure turnover when not required for full operation.

The following table sets out the assessment of the key components against these requirements, with those in red being category 1 and those in blue being category 2.

Table 1 - Roadford Potable Transfer Existing Assets and Operations Interfaces									
Section	Water Type	Max flow (M/d)	Pipe Diameter (mm)	Pipe Material	Length (km)	Integrated WTWs	Integrated Pump stations	Integrated Storage	Integrated Conditioning Plants
River Tamar Abstraction at Gatherley to Roadford Lake	Raw	125	1200	ST	10	-	Gatherley Pumps	Gatherley Pumps Balance Tank and Roadford Lake	-
Roadford Lake to Northcombe WTW		82	900	DI	11	Northcombe WTW Upgrade	Roadford Raw Water Pumps	New Northcombe Raw Water Inlet Tank	-
Northcombe WTW to Pynes WTW	Potable	30	600	DI	66	Existing Pynes WTW (Connection Only)	Northcombe Pumps & Intermediate booster to Prewley WTW Intermediate Booster to Parsonage SR	Intermediate Booster Balance Tank-s Prewley and Parsonage Potable Water Storage Tanks	1No Condition Plant
River Exe Abstraction to Allers WTW	Raw		600	DI	3	-	River Exe Abstraction Pumps	Abstraction Pumps Balance Tank Allers New Raw Water Inlet Tank	-
Allers WTW to North of Taunton SR	Potable		600	DI	41	New Allers WTW Upgrade	Allers High Lift Pumps and 2No Intermediate Boosters	Allers & 2No Intermediate Booster Balance Tanks Pitt and Woodgate SR's New Storage	1No Condition Plant
North of Taunton SR to South of Warminster SR			600	DI	81	-	3No Intermediate Boosters	North of Taunton SR South of Warminster SR 3No Intermediate Booster Balance Tanks	1No Condition Plant
South of Warminster SR to Testwood WTW			600	DI	63	Existing/New Testwood WTW	2No Intermediate Boosters	2No Existing WSX SR's and 1No New SR 2No Intermediate Booster Balance Tanks Testwood Potable Storage	-

The table highlights that:

- three out of the four water treatment works are shared assets
- four pumping stations are shared assets
- four storage tanks are shared assets
- parts of the piped transfer have dual purposes.

Inevitably, the key interfaces are located at the water treatment works and service reservoirs where connection to existing assets are required and the operation of the new assets will need to be fully integrated with the existing to provide an efficient operation and greatest flexibility of how they are used.

Date of response to RAPID	26/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Sources South
Query number	WCS007
Date sent to company	02/08/2021
Response due by	04/08/2021

Query

- Please provide a brief outline of the method used to determine the carbon emissions of the project.
- Please provide a brief outline of how the carbon emissions of the project will be managed, highlighting how the approach will be guided by the commitments on carbon developed by the All Company Working Group.

Solution owner response

Both of these topics are covered in the supporting evidence used to prepare our gate one reports. The details are provided below.

Carbon Assessment Methodology

At Gate 1 a carbon assessment methodology has been developed and a high level carbon assessment undertaken in accordance with UKWIR guidance (2012)¹, which sets out how to calculate embodied and whole life carbon for water industry assets. This has been applied alongside BEIS (2019) guidance² 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 scheme* and *Poole STW raw water transfer scheme*.

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,

¹ UKWIR (2012) A framework for embodied carbon accounting in water industry assets.

² BEIS (2019) Valuation of energy use and greenhouse gas: Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government.

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 every 100 years

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.

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.

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.

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 year. Projections in the BEIS (2019) have been used to develop the whole life carbon assessments.

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.

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.

Indicative Carbon Mitigation Requirements

Given that 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 turbines 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.

Solar PV radiation has been taken as the average in the South East to estimate the area of PV.

The results for the two SROs, shown in **Table 1** and **Table 2**, 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 1 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 2 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

Similarly, **Table 3** and **Table 4**, although only indicative, illustrate the additional land required to meet the demand of the potable water and raw water transfer schemes.

Table 3 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 4 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

Date of response to RAPID	3/8/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country South Sources
Query number	WCS008
Date sent to company	25/08/2021
Response due by	31/08/2021

Query

In relation to the Roadford reservoir pumped storage scheme:

- 1) Please can the best available data for the DO under 1 in 500 drought resilience be provided.
 - 2) Please can further justification be provided around the recommendation to progress this scheme.
 - 3) Please can further evidence be provided to justify why 7.6% is an appropriate funding impact if the scheme were not to progress within the RAPID process.
-

Solution owner response

1) Roadford reservoir deployable output

Annex 2.1 of the gate one submission set out the hydrological analyses that have been undertaken to determine the impact of the Gatherley abstraction on the deployable output of the reservoir in a 1 in 200 year drought. Figure 3 in the report shows that the reservoir's natural recharge would see it refill to less than 60% of useable capacity during such events and that the pumped storage scheme would increase this by approximately 17,000MI of storage for drought

events. This additional water could be released from the Reservoir and abstracted from the River Tamar at Gunnerslake or taken direct from the Reservoir.

The water resource modelling showed that with the demands within the Roadford WRZ, the scheme would provide a net continuous 30MI/d of deployable output for a potential transfer in up to a 1:200 year drought. This has been adopted as the potential deployable output of the scheme for the SRO at gate one as the future needs of SWB, the WCWRG or WRSE regions is currently unknown and hence how the water is best used and under what operating regime are currently unclear.

Annex 2.1 highlights the WRMP19 forecast future supply demand changes and resulting deficits in the Roadford WRZ and the extent to which these would require use of the additional water stored in Roadford, reducing the potential daily water availability for a transfer, in a 1:500 year drought, by 12 to 20MI/d.

For the purposes of any comparative assessments we would suggest using 18MI/d annual average (i.e 30MI/d minus 12MI/d) for 1 in 500 return period. This is set out in more detail in the Annex 2.1 (see extract below). However, higher yields could be obtained for shorter time periods subject to any continuous sweetening flow requirements for transfers not excessively depleting the stored volume. This is because one is drawing from a bank of storage which if only required for peak summer periods could be used at a higher daily rate of 30MI/d or more.

Extract from appendix on Yield assessment (also in Green Recovery)

The table below show the WRMP19 forecast supply demand balance for Roadford and Wimbleball WRZs for specific future years in the WRMP19 and showing the impact on the supply demand balance of moving to 1 in 500 year drought resilience and with sustainability reductions.

Roadford WRZ:

Year	WRMP19 Final Strategy supply demand balance (MI/d)	Impact on supply demand balance of		Adjusted supply demand balance (MI/d)
		1 in 500 year drought (MI/d)	WRMP19 "most likely" sustainability reductions	
2020/21	+6	-19	-7	-20
2024/25	+17	-19	-7	-9
2029/30	+15	-19	-7	-11
2039/40	+14	-19	-7	-12

The move to 1 in 500 resilience reduces deployable output in Roadford by 19MI/d. Like for like this gives a net 1 in 500 Deployable Output of c10MI/d for the pumped storage scheme (i.e. 30 - 19).

The forecasts above show however the supply-demand balance might only be -12MI/d from 2025 onwards suggesting the 1 in 500 net yield equal to c18MI/d (i.e. 30-12).

2) Justification for recommendation to progress the scheme

The query heading relates to the Roadford reservoir pumped storage scheme, and asks for further justification around the recommendation to progress this scheme. However the Roadford reservoir pumped storage scheme has already been approved through the Green recovery programme, so we assume that the query actually relates to the potable transfer from Roadford scheme as shown in blue on Figure 1 and set out in Table 1 of our gate one report.

Table A below is a further development of Table 1 from our gate one report, explaining our understanding of the funding arrangements for each part of the scheme and clarifying the basis for recommending scheme progression.

Table A: Scheme summary -Potable transfer from Roadford reservoir

SRO	Scheme	Funding	Scheme progression recommendation
	Potable transfer from Roadford reservoir		
West Country South sources and transfers	<p><u>1. Roadford pumped storage scheme</u></p> <ul style="list-style-type: none"> Addition of pumped storage from the River Tamar to Roadford reservoir in SWB 	Separate funding through the Green recovery programme for consenting, design and construction	Already approved for progression through the Green recovery programme
	<p><u>2. Operation of Roadford reservoir, treatment and transmission in West Country region</u></p> <ul style="list-style-type: none"> Expansion of Northcombe water treatment works and network reinforcement enabling displacement of demand from Wimbleball reservoir New abstraction from the River Exe, new water treatment works Long distance transmission system and conditioning plants to a strategic service reservoir south of Warminster in the centre of WSX area 	PR19 allowances for gates 2 – 4 reduced by 7.6% as explained in our response to 3) below	<p>This part of the scheme is potentially beneficial for the West Country, and WRSE.</p> <p>It would also provide resilience benefits to South West Water and Wessex Water.</p> <p>The West Country regional water resources plan, which will be available for informal consultation in January 2022 after the reconciliation process in autumn 2021, will highlight that the main areas of supply-demand deficit are likely to be in the east of the region (Dorset, Wilts and Hants). This part of the scheme could contribute to meeting the deficit through an intra-regional transfer.</p>
West Country South - Southern Water transfer	<p><u>3. Inter-regional transfer</u></p> <ul style="list-style-type: none"> Potable transmission system from centre of WSX Reception at SRN's Testwood potable water tanks 	PR19 allowances for gates 2 – 4	<p>This part of the scheme is required in order to enable an inter-regional transfer to WRSE.</p> <p>It is completely dependent on the other parts.</p>

As shown in Table A the potable transfer from Roadford scheme to WRSE, which was the concept envisaged in the PR19 strategic resources appendix, comprises three parts:

- Part 1 the Roadford pumped storage scheme, which has already been approved. If only this part of the scheme proceeds wider benefits will not be realised.
- Part 2 relates to the operation of Roadford reservoir and the transmission of the water eastwards. This part is essential if wider benefits are to be delivered within the WCWRG region, and to the WRSE region.
- Part 3 is the part that delivers the water to WRSE, and it is entirely dependent on the other two parts.

In the conclusions of our gate one report we recognised that the transfer of water from Roadford to Testwood requires a very high investment for a relatively small resource benefit, and that there may be more cost beneficial uses of the water within the West Country region, with a key task for gate two being assessing the costs and benefits of individual components of the SRO. This conclusion can only be confirmed after the conclusion of the current round of regional plan reconciliation in 2022.

Therefore, pending a conclusion on whether the scheme is selected by WRSE and refinement of the need in the West Country, we recommended that the scheme progresses to gate two. The gate two studies will allow us to establish the most beneficial operation of Roadford reservoir and most favourable extent of the transmission system, in order to realise wider benefits.

3) Justification of 7.6% funding impact

The query relates to the Roadford reservoir pumped storage scheme and the justification for the 7.6% funding impact if the scheme were not to progress within the RAPID process. But the pumped storage part of the scheme has already been split off from the SRO through Green recovery programme, so this part of the scheme is progressing and not within the RAPID process anyway.

As explained in our gate one report (page 5), the pumped storage scheme enables the creation of additional water resources, but the best use of the resource will still need to be considered within the context of the Regional plans and WRMPs.

The operation of Roadford reservoir and the treatment and transmission requirements to transfer the water from Roadford reservoir so that it can be used to meet intra-regional or inter-regional needs will be part of the gate two studies and covered by the remaining gate two funding.

The Roadford pumped storage scheme is approved as a separate scheme under the Green recovery programme. This will provide the funding for securing permissions (abstraction licence and planning) and for further development of the design, which would otherwise have been covered by the allowances for Gates 2 to 4 of the SRO funding.

The PR19 development allowances were based on a fixed percentage of the capital cost of the scheme. Therefore, if the capital cost is reduced by splitting off part of the scheme, we envisaged that the development allowance would reduce proportionally.

Based on the capital cost estimates, the Roadford pumped storage component is approx. 7.6% of the total capital cost for the West Country South sources and transfers SRO. The table in the appendix overleaf provides the breakdown of the capital cost in percentage terms based on the detailed capital cost estimate carried out by our cost consultant (ChandlerKBS). For completeness we have also included the breakdown of the West Country South – Southern Water transfer SRO.

On this basis we estimated that the SRO allowances going forwards would be adjusted downwards by £0.378m, with the amount coming off SWB's contribution. This results in revised percentage funding allocations for each partner. The cost allocations would be fully reconciled at PR24.

The relevant values are shown in Tables B and C below.

Table B: Reduction due to Green recovery

West Country South sources and transfers	2017/18 prices
Gate 2 to 4 allowance	£4.968m
Roadford pumped storage capital costs as % of total capital cost	7.6%
Pro rata reduction Gate 2 to 4	£0.378
Adjusted Gate 2 allowance	£0.765m

Table C Revised partner shares

West Country South sources and transfers				
Gate 2 - 4 @ 2017-18 prices				
Description	South West Water	Wessex Water	Southern Water	Total
Current £m	2.349	1.310	1.310	4.968
Current %	47.3%	26.4%	26.4%	100.0%
Revised £m	1.971	1.310	1.310	4.590
Revised %	42.9%	28.5%	28.5%	100%

We trust this answers the queries satisfactorily.

Date of response to RAPID	31 st August 2021
Strategic solution contact / responsible person	Julian Welbank / Jon Darwent

Appendix

Breakdown of capex cost estimate

SRO	Scheme	Section	% of Total Capex
SOURCES	ROADFORD	River Tamar Abstraction	7.6%
SOURCES	ROADFORD	River Exe Abstraction	1.6%
SOURCES	ROADFORD	Northcombe WTW	6.7%
SOURCES	ROADFORD	Allers WTW	9.4%
SOURCES	ROADFORD	Lower Coombe Water Conditioning Plant	1.9%
SOURCES	ROADFORD	Penselwood Water Conditioning Plant	1.9%
SOURCES	ROADFORD	Northcombe WTW to Pynes WTW to Parsonage SR to Pynes WTW - non infra	6.1%
SOURCES	ROADFORD	River Exe to Allers WTW to Woodgate SR to Kingston St Mary Reservoir - non infra	6.3%
SOURCES	ROADFORD	Kingston St Mary SR to Summerslade SR - non infra	5.5%
SOURCES	ROADFORD	Potable Transmission - Northcombe WTW to Summerslade SR	40.4%
SOURCES	POOLE	Poole Water Recycling Centre (Effluent Re-use)	10.9%
SOURCES	POOLE	Raw Transmission - Poole STW to River Stour	1.8%
SOURCES	ROADFORD	ROADFORD SOURCES TOTAL	87.3%
SOURCES	POOLE	POOLE SOURCES TOTAL	12.7%
Grand Total			100.0%

Breakdown of capex cost estimate

SRO	Scheme	Section	% of Total Capex
TRANSFER	POOLE	River Stour Abstraction	2.6%
TRANSFER	POOLE	Stour Pre Treatment Works (PTW)	13.8%
TRANSFER	POOLE	River Stour to Testwood - non infra	12.1%
TRANSFER	ROADFORD	Kingston St Mary SR to Summerslade SR - non infra	11.6%
TRANSFER	POOLE	Raw Transmission - River Stour to Testwood Lakes	28.0%
TRANSFER	ROADFORD	Potable Transmission - Summerslade SR to Testwood Potable Storage	31.9%
TRANSFER	ROADFORD	ROADFORD TRANSFER TOTAL	43.4%
TRANSFER	POOLE	POOLE TRANSFER TOTAL	56.6%
Grand Total			100.0%

Gate 1 queries process

Strategic solution(s)	West Country to Southern Transfer
Query number	WCT001
Date sent to company	13/07/2021
Response due by	15/07/2021

Query

We request copies of the following documentation:-

Environmental Assessment

Strategic Environmental Assessment

Habitats Risk Assessment

Water Framework Directive Assessment

Natural Capital and Biodiversity Net Gain Assessment

Carbon Assessment

Invasive Non-Native Species Risk Assessment

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Solution owner response

Please refer to our response to query WCS001.

Date of response to RAPID	21/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT002
Date sent to company	16/07/2021
Response due by	20/07/2021

Query

- 1) *Please explain why the deployable output volume for a 1 in 200 year drought stated as 30 MI/d is less than that stated in the final determination of WRMP19 of 45 MI/d.*
- 2) *Please explain why a DO for 1:500 year drought has not been used.*
- 3) *Please explain what assumptions have been made regarding scheme utilisation to inform the Opex costs. Please explain the reasoning behind the utilisation value(s) used.*

Solution owner response

Query 1)

We refer you to our response to query WCS002.

The split of the schemes between SROs is set out in Table 1 on page 3 of our gate one report.

Each transfer component has a capacity of 30 MI/d, giving a total capacity for the West Country South – Southern water transfer of 60 MI/d.

Query 2)

This SRO does not include any sources and hence a deployable output (DO) assessment is not applicable. The basis of the DO assessments for the sources of the two schemes is provided in our response to query WCS002.

Query 3)

Opex costs have been derived for both full and minimum operation of both schemes. Full operation assumes continuous operation at 30 MI/d and minimum operation represents the requirement to

maintain a continuous flow of 7.5 MI/d (25% of capacity). Unlike the West Country North SRO, which was on the accelerated timeline for Gate 1 as an alternative strategic option for Southern Water's specific need in Hampshire, the actual requirement for the WCS SROs is unknown. The maximum and minimum scenarios have been provided to the WRSE regional modelling to enable the schemes to be equitably compared with others by WRSE.

The Opex NPV values provided in Table 12 of our submissions are for the full utilisation scenarios.

The opex estimates include both fixed and variable elements and therefore the ratio between full and minimum scenarios is less than four.

Date of response to RAPID	19/7/201
Strategic solution contact / responsible person	Julian Welbank Julian.welbank@wessexwater.co.uk

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT003
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Have you explored sub-options and if you have and rejected any could you explain why?
- 2) Please explain the extent to which wider resilience benefits have been explored and the approach to assessment.

Solution owner response

Please refer to our response to query WCS003.

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT004
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Please clarify how your projected solution cost estimates have changed between those submitted in WRMP19 and the current Gate 1 submission, where possible providing a breakdown and comparison of the cost estimates. Please explain clearly any changes, added/eliminated cost items or activities, or developments that contributed to the difference.
- 2) Within Section 14 (Efficient spend of gate allowance):
 - a. Please provide further detail or breakdown on activities included in "technical consultancy, cost estimating, and assurance." Where activities are largely different, please provide separate line items for those costs (where possible, please provide breakdowns aligned with the following categories: Programme & Project Management (including Assurance), Preliminary Feasibility Concept Design, Water Resources Planning, Environmental Assessment (including all associated costs and regulator costs), Data Collection, Sampling, and Pilot Trials/Pre-feasibility Assessments, DPC & Procurement Strategy, Planning Strategy, Stakeholder Engagement, and Other. For costs that fall into the "Other" category, please provide a description of the activity.)
 - b. Please provide further information on what partner costs entail.
 - c. Please confirm actual spend per regulator.
 - d. Table 15 lists the total allowance for forecast Gate 2 costs. Please confirm whether there was a budget created for forecast spend to Gate 2.

Solution owner response

Please refer to our response to query WCS004.

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT005
Date sent to company	20/07/2021
Response due by	22/07/2021

Query

- 1) Please provide details of key data / information which has been provided on each SRO to inform the regional plans.
- 2) On best value planning:
 - a. Have environmental and social metric scores been calculated? If so, please describe the metrics.
 - b. To what extent do social benefits explored include amenity value?
 - c. How will performance of the solution be assessed to ensure best value outcomes for customers and the environment?
 - d. Which of the solution options are considered to provide wider best value for customers beyond least cost?

Solution owner response

Please refer to our response to query WCS005.

Date of response to RAPID	22/7/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT006
Date sent to company	02/08/2021
Response due by	04/08/2021

Query

- Please provide a brief outline of the method used to determine the carbon emissions of the project.
- Please provide a brief outline of how the carbon emissions of the project will be managed, highlighting how the approach will be guided by the commitments on carbon developed by the All Company Working Group.

Solution owner response

Please refer to our response to query WCS007.

Date of response to RAPID	3/8/2021
Strategic solution contact / responsible person	Julian Welbank

Gate 1 queries process

Strategic solution(s)	West Country Southern Transfer
Query number	WCT007
Date sent to company	25/08/2021
Response due by	31/08/2021

Query

In relation to the potable transfer associated with the Roadford reservoir pumped storage scheme:

- 1) Please can the best available data for the DO under 1 in 500 drought resilience be provided.
 - 2) Please can further justification be provided around the recommendation to progress this scheme. Please clarify this recommendation in the case that the Roadford reservoir pumped storage scheme were not to progress.
 - 3) Please can the funding impact of the potable transfer not progressing be provided.
-

Solution owner response

1) Roadford reservoir deployable output

Please refer to our response to query WCS008.

2) Justification for recommendation to progress the scheme

The query asks for further justification provided around the recommendation to progress this scheme, and clarification of this recommendation in the case that the Roadford reservoir pumped storage scheme were not to progress.

Please refer to our detailed response to query WCS008.

We are not sure what you mean about the situation where the Roadford reservoir pumped storage scheme were not to progress, because this part of the scheme has already been approved.

If it was intended to clarify the dependencies between the schemes and SROs, the potable transfer link from the centre of WSX to Testwood (part 3 in Table A of query response WCS008) is entirely dependent on the other two parts.

The reasons for recommending scheme progression are set out in our gate one report and in query response WCS008.

3) Funding impact

If the potable transfer link from the centre of WSX to Testwood (part 3 in Table A of query response WCS008) were not to progress, the development allowance for the SRO would reduce using the same rationale as explained in query response WCS008.

The cost of this part of the SRO is 43.4% of the total, and therefore the allowance for the remaining gates would reduce by the same amount.

We trust this answers the queries satisfactorily.

Date of response to RAPID	31st August 2021
Strategic solution contact / responsible person	Julian Welbank / Jon Darwent