# STRATEGIC REGIONAL WATER RESOURCE SOLUTIONS:
## Preliminary Feasibility Assessment

**Standard Gate One Submission for West Country South | Sources and Transfers**

**JULY 2021**

Submitted to: RAPID

Submitted by:

South West Water | Southern Water | Wessex Water YTL GROUP

Produced by: Stantec

# Contents

# 1. Executive summary

There are two West Country South Strategic resources option (SRO) solutions following the standard gate one timeline:

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

This executive summary describes both projects and is repeated in both gate one reports. The content of the individual gate one reports is tailored to the separate SROs.

## Introduction

The West Country South sources and transfers solution and the West Country South - Southern Water transfer solution are two of the 17 SROs promoted by Ofwat in the PR19 final determination issued in December 2019. The sponsors for the solutions are Southern Water (SRN), South West Water (SWB) and Wessex Water (WSX).

The process is overseen by RAPID, an alliance of three regulators: Ofwat, the Environment Agency (EA) and the Drinking Water Inspectorate (DWI).

A third SRO, West Country North sources and transfers, followed the accelerated timeline and its deliverables were submitted in September 2020, with a final decision to proceed to the next gate from RAPID in January 2021. This SRO is now on the standard timeline for gate two in October 2022.

The three SROs are located in the West Country Water Resources Group (WCWRG) region. The neighbouring region to the east is Water Resources South East (WRSE).

## Objectives

The objectives of the gate one studies are to generate sufficient information for an initial assessment of the schemes for consideration in the new regional water resource plans and draft Water Resource Management Plans (WRMPs), and to determine whether the schemes are suitable for progression to the next gate. In particular, each initial feasibility study shall determine:

- Is the scheme feasible?
- Is the scheme deliverable?
- The range of costs (capital and operating costs)
- The potential water resource benefit.

The objectives of the West Country South SROs can be summarised as:

- To provide a water supply, resilient to a 1 in 500-year drought, to WRSE, specifically Southern Water's Hampshire region.
- To ensure system availability to meet peak demands.
- Compliance with drinking water quality requirements and customer acceptability.
- Support of wider planning objectives such as biodiversity net gain and carbon neutrality.

## Description of both SROs

Through a detailed options search and screening stage and the concept design phase, two schemes have been developed spanning the two SROs. Figure 1 shows the geographic extent of the project and key locations and Table 1 provides a high level description of each SRO.

The two SROs are dependent upon each other to provide an inter-region transfer, whereas the two schemes could independently provide a new water supply to SRN's Hampshire area.

| SRO | Source | Capacity Ml/d | Transfer route components |
|---|---|---|---|
| West Country South sources & transfer | Roadford reservoir pumped storage<br>Poole STW effluent reuse | 30 potable<br>30 raw | 1 2 3<br>5 |
| West Country South – Southern water transfer | Roadford reservoir pumped storage<br>Poole STW effluent reuse | 30 potable<br>30 raw | 4<br>6 |

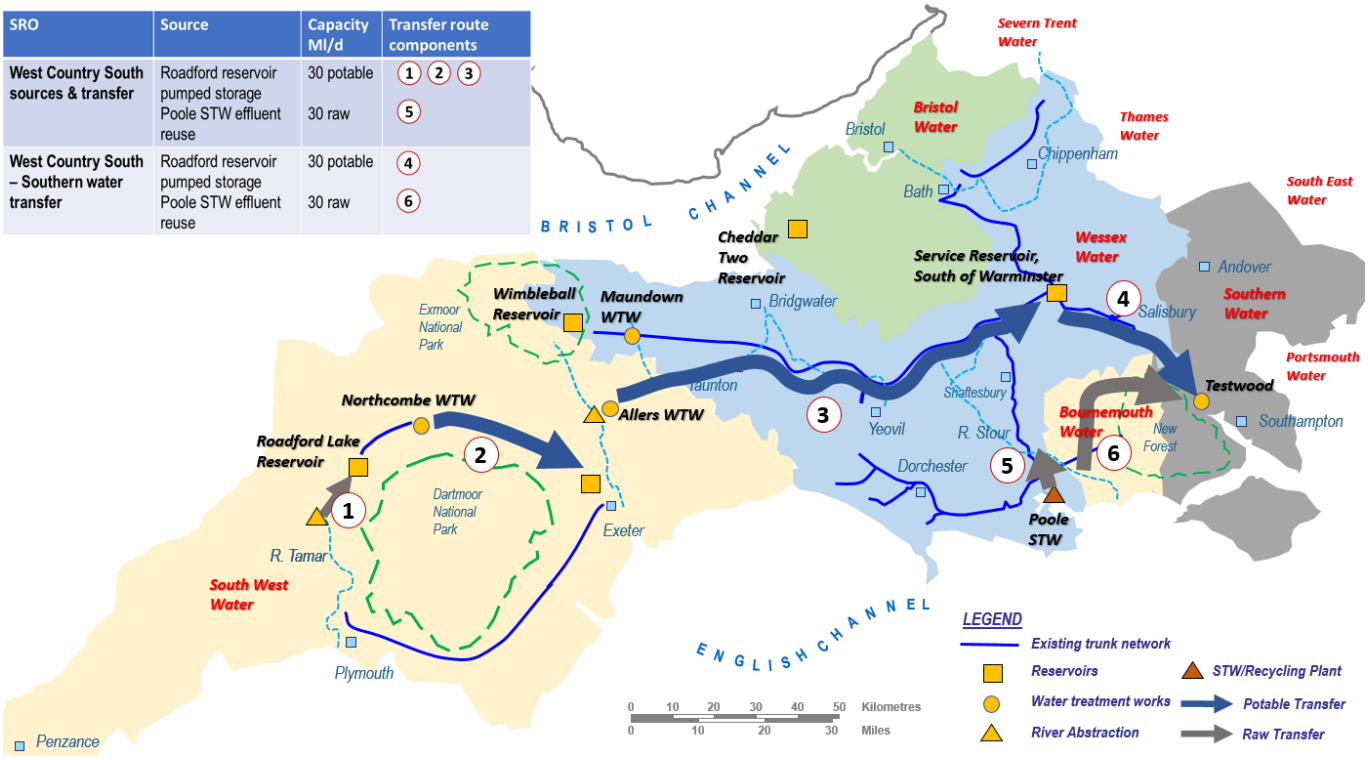


***Figure 1 West Country South SROs Overall Schematic***

***Table 1 SRO Split of Schemes***

| SRO | Scheme | |
|---|---|---|
| | **Potable transfer from Roadford reservoir** | **Raw transfer from Poole sewage treatment works** |
| West Country South sources and transfers | • Addition of pumped storage from the River Tamar to Roadford reservoir in SWB<br>• Expansion of Northcombe water treatment works and network reinforcement enabling displacement of demand from Wimbleball reservoir<br>• New abstraction from the River Exe, new water treatment works<br>• Long distance transmission system and conditioning plants to a strategic service reservoir south of Warminster in the centre of WSX area | • Effluent recycling from WSX's Poole sewage treatment works (STW), to recover water that otherwise flows to the sea<br>• Treatment and diversion to the River Stour<br>• 18 km reach of the River Stour used as an environmental buffer |
| West Country South - Southern Water transfer | • Potable transmission system from centre of WSX<br>• Reception at SRN's Testwood potable water tanks | • Abstraction from the River Stour<br>• Pre-treatment and transmission to SRN<br>• Reception at SRN's Testwood Lakes |
| Water resource benefit | 30 Ml/d peak and average | 30 Ml/d peak and average |

## Study findings

All aspects of this study have been carried out in accordance with relevant best practice and the methodologies produced under the guidance of the All Company Working Group (ACWG). Throughout the study, the EA and Natural England (NE) have been engaged to review the options screening and development of the key components of the schemes. The DWI have been consulted on the water quality risk assessments and treatment proposals.

From the concept design for each scheme, the scope of works required is as summarised in Table 2 below.

***Table 2 Summary scope of works***

| SRO | Scheme | Pipe length – new & reinforced (km) | Number of pumping stations | Number of storage tanks | Number of treatment & conditioning works |
|---|---|---|---|---|---|
| West Country South sources and transfers | Potable transfer from Roadford reservoir to WSX centre | 211 | 12 | 18 | 4 |
| | Raw transfer from Poole STW to River Stour | 7 | 2 | 3 | 1 |
| West Country South - Southern Water transfer | Potable transfer from WSX centre to Testwood | 63 | 2 | 3 | 0 |
| | Raw transfer from River Stour to Testwood | 55 | 4 | 5 | 1 |

Based on the feasibility assessment of each of the key areas, which are described in more detail in the following sections, the study findings are summarised in the Table 3 below.

***Table 3 Summary of study findings***

| Schemes/ SRO | Scheme | AIC (£/Ml) (full use) | Carbon impact (kgCO2e/Ml) at 25% utilisation | Duration to operation (years) | Environmental impact |
|---|---|---|---|---|---|
| Schemes | Potable transfer from Roadford reservoir to Testwood treatment works | 6,760 | 2,618 | 17 | Acceptable, No showstoppers |
| | Raw transfer from Poole STW to Testwood Lakes | 2,405 | 713 | 14 | Beneficial |
| SROs | West Country South sources and transfers | n/a | 2,797 | 17 | Acceptable, No showstoppers |
| | West Country South - Southern Water transfer | n/a | 534 | 14 | Acceptable, No showstoppers |

## Related plans and initiatives

The need for additional water resources is ultimately determined by the upcoming Regional plans and the companies' statutory WRMPs. The Roadford pumped storage scheme is also included in SWB's Green recovery proposals.

## a) Regional plans and WRMPs

Regional plans are due to be issued in draft in August 2021, with the final plans in August 2022. After the draft plans are available there will be a period of reconciliation to try to make sure that all the Regional plans are aligned i.e. that different regions don't both assume that a resource is available for their use, and that an overall "best value" plan is adopted. The agreed Regional plans will become the basis for companies' individual WRMPs.

Although the Regional plans are not yet available, resource position statement updates were published by each region in March 2021. These include:

- **West Country Water Resources Group (WCWRG)**. (link: wcwrg-rps). This showed that the decisions to be taken on the environmental destination in 2050, and the level of demand reduction that can be achieved have a big impact on the forecast supply demand balance in 2050. There could be a surplus of 64 Ml/d or a deficit of 64 Ml/d. If the challenging levels of demand reduction contained in the EA's National Framework are achieved, then it will be possible to make environmental improvements and have spare water available to transfer to other regions. But this may not be possible if the demand reductions are smaller than hoped for. Subsequent work indicates that the abstraction reductions required under the enhanced environmental ambition path maybe even higher, which would mean that available supply-side resource options in the West Country will be required within the region.

- **Water Resources South East (WRSE).** (link: future-water-resource-requirements-for-south-east-england-update-2021-final). The WRSE update shows a more severe situation, with all scenarios showing large deficits. The summer supply deficit is estimated to be 941 Ml/d in 2049, driven by population growth, climate change and drought resilience. This increases to over 1,800 Ml/d by 2050 when the "Business as Usual" environmental destination is taken into account, and there are even more severe scenarios with significantly greater deficits at 2050 and beyond.

Consequently, the strategic resource options assessed under this study may not be available as an inter-region transfer, depending on which need takes priority, an assessment of the risk around delivery of demand-side water savings and the other options available to WRSE. Pending the conclusion of this process the project will continue to assess the feasibility of the SRO as an inter-regional scheme as requested in the PR19 final determination.

## b) Green recovery initiative

In response to a request from government, SWB submitted a proposal for a green recovery initiative in February 2021 (link: greenrecovery), which included the Roadford pumped storage scheme. The purpose of the initiative is to bring forward investment, accelerate delivery of current plans, and develop new and innovative solutions, as well creating jobs for the local economy. On 17 May 2021 Ofwat published their draft decisions approving the proposals, with the final decisions to follow in July 2021.

Therefore, the decision on the need for Roadford reservoir pumped storage scheme has been made. The project will move from being part of this feasibility study into a scheme to be delivered. Under the proposals c. £13m of investment will be brought forward from AMP8 in order that a licence application can be made in 2023 and construction commenced before December 2024. The Green recovery proposal does not remove the need to develop the concept design further as well as carry out the environmental assessments.

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.

As agreed with RAPID the gate one proposals have not been revised, pending the final decisions. The impact on cost allocations and the timeline will need to be reconciled after the final decisions and at PR24. We estimate that the budgets for future gates of the West Country South sources and transfers SRO should be reduced by 7.6% to allow for this additional funding with some small changes to the partner share percentages.

# Key risks and uncertainties

The key risk for both options at this stage of their development is the availability of the resource for the intended mode of exploitation. Preliminary hydrological analyses indicate that the water is available and

the potential environmental and water quality impacts of these abstractions and discharges have been discussed with the EA, NE and DWI. No showstoppers have been identified at this stage. However, there is a need to undertake more detailed investigations of the potential impacts on the associated rivers and their ecology in the next phase. The investigation of these and other risks and uncertainties are proposed within the gate two work programme.

## Conclusions

The focus of gate one is to identify solutions that are technically feasible and can provide a sustainable water resources benefit without unacceptable environmental impact and without adversely impacting the achievement of companies' carbon and environmental targets.

Based on this initial feasibility study, it is concluded that:

- The addition of pumped storage for Roadford reservoir will make beneficial use of excess winter flows in the River Tamar, enabling up to an additional 12,500 Ml of water to be stored. This will increase the yield of the reservoir by 30 Ml/d.
- Recycling of effluent from Poole sewage treatment is also very beneficial as it will enable low flow improvements on the River Stour and divert effluent away from Poole Harbour thus contributing to meeting conservation targets for the SSSI.
- Transferring the water provided by the Roadford reservoir over 270 km to Testwood requires a very high investment, relative to the resource benefit, with very high operating costs and carbon emissions, and significant operational risks.
- Transferring the Poole raw water to Testwood is less costly but it is likely that the resource could be used at a lower cost to overcome potential deficits in the Bournemouth area.
- Both schemes are technically feasible with no significant unacceptable environmental impacts identified, albeit with operational risks and uncertainties yet to be fully resolved. Consideration of the in combination effects of each proposal on the environment, including designated sites, will be required in future phases of the project.
- Pending the conclusion of the Regional planning, it is expected that there may be more cost beneficial uses for both sources within the West Country region, with lower carbon impacts. A key task for gate two will be assessing the costs and benefits of individual components of the schemes.

## Recommendations

It is recommended that both solutions proceed to gate two, although it is recognised that regional planning in 2021 and 2022 is likely to conclude that a transfer to the WRSE region may not be cost beneficial. If this is the case the West Country South – Southern Water transfer SRO will stop at gate two.

## Report structure

This report is based on the template provided by RAPID. Whilst there are two separate SRO submissions, in line with their definitions and funding allocations, the following approach has been adopted for the reports:

- The executive summary, which is repeated in both SRO gate one summary reports, covers both SROs.
- Sections which are unique to each report: 4. Technical information, 9. Key risks and mitigation measures.
- Sections which are repeated in both reports because the topics are common to both SROs and cannot be easily divided: 2. Solution description, 3. Outline project plan, 5. Environmental and drinking water quality considerations, 10. Options costs/benefits comparison, 11. Impacts on current plan, 12. Assurance, 13. Solution or partner changes, 14. Efficient spend of gate allowance, 15. Proposed gate two activities and outcomes.
- In the interest of brevity three sections are only included in this report and not repeated in the report for the other SRO: 6. Initial outline of procurement and operation strategy, 7. Planning considerations, 8. Stakeholder engagement (incl. customer research).
- Appendix A includes a cross reference between the gate one activities listed in the final determination appendix and this report, as a checklist and in order to help the reader navigate the submission.
- Appendix B includes a letter from our external third-party assurer.

# 2. Solution description

This section outlines how the preferred options for this SRO were selected, their scope and benefits. Costs, social, environmental and economic impacts and water quality impacts are included in later sections of this report. It covers each scheme from source to reception in SRN's existing water supply system.

## Solution Outline

The West Country South SROs incorporate two discrete water supply schemes of:

- a pumped storage scheme from the River Tamar to Roadford reservoir and subsequent treatment and potable transfer across the WSX area to a reception point in SRN's existing water supply system
- Poole STW effluent treatment and discharge to the River Stour, downstream abstraction, preliminary treatment and raw water transfer to a reception point in SRN's existing raw water system.

### Roadford Potable Transfer

This scheme includes a new intake and pumping station on the River Tamar at Gatherley to abstract up to 125 Ml/d during the winter months and pump the water via a 10 km pipeline into Roadford Lake to ensure that the lake is at least 90% full going into the summer demand period each year. The lake does not have a large natural catchment and does not currently fill each winter and hence the additional pumped storage scheme is required to make full use of the lake's capacity. The additional stored water would enable a source of 30 Ml/d to be made permanently available to a strategic transfer, whilst enabling the reservoir to also meet its existing demands.

The raw water would be transferred using the existing pipeline to Northcombe water treatment works (WTW) where a new treatment side stream would treat the water for transfer via a new potable main and conditioning plant to support supplies to the Exeter area. This enables 30 Ml/d of the water currently abstracted from the River Exe at Pynes WTW, for Exeter, to be abstracted further upstream and treated at Allers WTW, neat Tiverton. This water would then be transferred via a new main across the WSX area and conditioned to overcome customer acceptability issues, to provide a potable supply to Testwood in SRN's Hampshire area.

By using the Roadford water to meet demands currently supplied from the Exe, the overall length of new pipelines required is reduced. It does however mean that a second treatment works expansion is required to treat the additional Exe water at Allers. The trade-off in costs has not been fully verified at this stage and the described scheme has been taken forward as it provides significant additional resilience benefits. WSX supplies are heavily dependent upon Maundown WTW and by providing alternative additional treatment capacity it will provide resilience to both planned and unplanned outages at Maundown.

The division point between the two SROs is WSX's strategic service reservoir south of Warminster in Wiltshire.

### Poole STW Water Recycling and Raw Water Transfer

This scheme is to divert the minimum available effluent discharge of 30 Ml/d, from Poole STW and transfer it via a new pipeline to the river Stour where it would be treated to the standard required to enable it to be discharged into the river. A new abstraction will then be taken, approximately 18 km downstream, where the water would be pre-treated to a quality to enable it to be transferred and discharged into SRN's lake at Testwood, without compromising the Testwood WTW drinking water safety plan (DWSP).

By diverting effluent from the current discharge location into Holes Bay and Poole Harbour, the scheme would provide an environmental benefit, reducing the impact the current discharge is having on an SSSI which is subject to a review of consent order from the EA. The River Stour also suffers from low flows and this scheme would provide a significant increase for a substantial reach of the river.

The division point between the two SROs is the new abstraction point on the River Stour.

## Options Appraisal

The two schemes that have been developed for this submission are the result of an options identification and appraisal process to determine suitable sources and transfer routes for a water supply to SRN's region.

The SROs cover an extensive geographical range from Devon to Hampshire and consequently there are many potential options that could be considered to treat and transfer water from Roadford Lake and potential recycled effluent sources across the WSX region. The first phase of this gate one 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 can be taken forward for concept design development that represent the best value means of utilising the potential sources in providing additional resource to SRN's Hampshire region. This enables the SROs to be assessed in a consistent manner with the other options being considered in WRSE's regional plan to determine whether they form part of an overall best value programme. The component options were then compared with their alternatives and as part of end-to-end schemes through a two-stage screening process and engagement with the partner companies and stakeholders.

The options identification, development and appraisal has been undertaken through three work packages investigating:

- the use of Roadford Lake
- the potential for WSX's STWs to provide a recycled water source
- transmission options to SRN's Hampshire area.

Given a transfer distance of approximately 270 km from Roadford Lake 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 opportunities 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 network investigations have found that existing pipelines are in the 200 mm to 700 mm diameter range, and a 30 Ml/d flow requires a pipe in the region of 300 mm. None of the existing pipelines have spare capacity, at peak flows, to meet current demands and transfer an additional 30 Ml/d.

WSX's strategic mains are used to send water eastwards from their key works at Maundown WTW and sites further east are much smaller, operating through local networks to meet demands. There are no significant flows east to west which the new source from the west could offset and enable existing sources to send more water east. It has therefore been concluded that there is very little opportunity to use existing pipelines to transfer the new source westwards. However, operating a potable transfer over such a long distance will require it to be integrated with the existing system to maintain water quality. This will provide significant resilience benefits across the network by enabling the additional source and assets to supplement or replace existing supplies during planned or emergency events.

An appraisal of all WSX's STW's, with a dry weather flow (DWF) greater than 10 Ml/d, has been 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, the diversion of up to 30 Ml/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.

The conclusion of the options appraisal process for the two SROs is that Roadford Lake can be used to enable 30 Ml/d to be abstracted from the river Exe for treatment and transfer to SRN's Testwood potable reservoir and diverting Poole STW effluent to the river Stour would enable a downstream abstraction and raw water transfer to Testwood Lake for treatment at Testwood WTW. These two schemes have been taken forward for concept design development and assessment at gate one.

## Resource benefits of the solutions and their potential conjunctive use benefits

The SROs are to provide a water supply to SRN's Hampshire region. However, they are being developed on the standard gate timeline as they could not be delivered in time to address the SRN's Section 20 Notice requirements. The resource benefit of the SRO therefore relates to the longer term regional requirements, reflecting the wider population growth, climate change impacts and environmental objectives. These drivers create a range of potential future needs of varying timescales and durations and consequently this SRO has been developed to provide the full resource as a permanent supply, whilst being able to operate at lower flows, if required.

As both schemes involve long distance transfers, they need to be continuously operated to avoid water quality risks.

For both schemes the annual average, peak and minimum period deployable outputs in up to a 1 in 200-year drought are all 30 Ml/d.

The potable transfer does not rely on treatment capacity at Testwood and could therefore support the works in meeting higher demands or demands in other areas.

The raw water transfer would be treated at Testwood and therefore the works would need expansion or support from an alternative potable source to meet higher demands. The raw water source could be used to replace Testwood's normal sources when in constraint, providing benefit without the need to expand the works. Consequently, the two sources could therefore operate together to provide a combined 60 Ml/d benefit, without the need for expanding Testwood.

The use of either source to meet demands greater than the current works output may need network upgrades to accommodate the increased output, however, this is common to all supply options and therefore not considered as part of this SRO.

# 3. Outline project plan

This section sets out an initial timeline for the delivery of the two schemes that have been taken forward for concept design development. Figure 2 below provides a summary schedule for the key activities and timescales for the delivery of either or both the potable and raw water transfer schemes, commencing with gate two activities from October 2021.

| | Yr1 | Yr2 | Yr3 | Yr4 | Yr5 | Yr6 | Yr7 | Yr8 | Yr9 | Yr10 | Yr11 | Yr12 | Yr13 | Yr14 | Yr15 | Yr16 | Yr17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 |
| Gate 1 - Feasibility | | | | | | | | | | | | | | | | | |
| Gate 2 - Detailed Feasibility, Concept Design | | | | | | | | | | | | | | | | | |
| Gate 3 - Outline Design & Planning Support | | | | | | | | | | | | | | | | | |
| Gate 4 - Planning, Procurement, Land Acquisition | | | | | | | | | | | | | | | | | |
| Gate 5 - Planning Approval & Procurement | | | | | | | | | | | | | | | | | |
| **Gate 6 - Poole Raw Option** | | | | | | | | | | | | | | | | | |
| Detailed Design, Construction & Commissioning | | | | | | | | | | | | | | | | | |
| Final Full System Commissioing & Testing Period | | | | | | | | | | | | | | | | | |
| Final Handover (Deployable Output) | | | | | | | | | | | | | | | | | |
| Programme Optimism Bias | | | | | | | | | | | | | | | | | |
| **Gate 6 - Roadford Potable Option** | | | | | | | | | | | | | | | | | |
| Detailed Design, Construction & Commissioning | | | | | | | | | | | | | | | | | |
| Final Full System Commissioing & Testing Period | | | | | | | | | | | | | | | | | |
| Final Handover (Deployable Output) | | | | | | | | | | | | | | | | | |
| Programme Optimism Bias | | | | | | | | | | | | | | | | | |

***Figure 2 Summary delivery Programme***

Realistic durations for activities have been derived, based on experience and engineering judgement, and along with identified dependencies, used to develop the programme. At this stage, there is a high level of uncertainty due to the assumptions and technical and environmental challenges that have been identified in this preliminary feasibility assessment.

A high level review of the programme risks using a standard risk register developed by the ACWG has been completed for the two schemes, indicating that the overall duration of the project could potentially increase by up to 5+ years, given the risks with planning approvals, procurement approach and the overall scale of the project and associated range of potential programme and construction risks.

For the Roadford potable transfer scheme we have included a central, 50% level of risk of 2 ½ years based on the types of risk, likelihoods, the fact that many of the risks would occur concurrently, and that many will be under the project team's control and would have mitigation actions. Thus, the central estimate for the overall durations for this scheme is 17 years with the earliest achievement of beneficial use of October 2037.

For the Poole raw water transfer scheme we have included a lower, 25% level of risk of 1 year on the same basis as above. Thus, the central estimate for the overall durations for this scheme is 14 years with the earliest achievement of beneficial use of October 2034.

All the prompts in the Gate 1 template report have been considered, as summarised below:

- *Timing of solutions being required (based on company and regional plans, as appropriate), and any updates if this changes.* These SROs do not align with any specific need and their selection within the WRSE regional plan would determine timings, however, at this stage it could be assumed that the schemes could support achieving 1:500 year drought resilience by 2040 or the agreed environmental destination post 2050.
- *Assumptions and dependencies.* A total of 73 assumptions have been used to inform the programmes.
- *Pre-construction activities (such as scoping, detailed design, planning and procurement*. Key assumptions include:
    - The decision on the preferred scheme(s) will be frozen at the end of gate two
    - DPC has been assumed as the preferred procurement method for the Poole raw water option. Standard water company framework /design and construct procurement has been assumed for the Roadford potable water option due to the lack of compatibility with DPC because of the multiple interfaces with the existing SWB, WSX and SRN networks and the DWI requirement for a licenced undertaker for provision of treated water.
    - There were two possible principal consent routes: DCO vs TCPA (plus Permitted Development). Given our knowledge of the DCO planning principles we are assuming that TCPA (Permitted Development) planning applications route will be required as both schemes are not seen as infrastructure projects for DCO and would require a change of legislation to progress as DCO.
    - To ensure sufficient level of detail is available for the planning submission and remove the risk of potential changes post approval, design will be progressed to outline design level, designing to limits of deviation to allow for minor changes following consent and during detailed design and construction.
    - It has been assumed that Permitted Development rights will be approved for the pipelines and that full TCPA application to each local planning authority would only be required for the above ground non infrastructure assets (pumps, tanks, plants, treatment).
- *Planned construction start date*. Potable option mobilisation in summer 2028, main construction would start in autumn/winter 2028. Raw option mobilisation early 2029, main construction commencing spring 2029.
- *Earliest possible deployable output date.* The central estimate of earliest possible deployment date for the potable option is April 2035 + 2 ½ years risk allowance, for the raw option is October 2033 + 1 year risk allowance.
- *Identify whether the programme is still on track*. Gate one was impacted by COVID19 but generally the programme is on track.
- *Include an estimate of overall project delivery timescales for subsequent gates*. Development of the programme has identified that the gate three and four activities will need to run in conjunction with one another as both influence each other.
- *Missing information – outline what is missing/delayed, and how this will be addressed before gate two. What are the reasons for any missed milestones? Have delays had an impact on the overall programme?* There are a number of planning assumptions and risks that need to be addressed during gate two.
- *For solutions on the standard timetable, comment on whether the option(s) will be moving into the design and construction phase by 2025*. It is not possible to deliver a solution that is ready for detailed

design and construction by the 2025 deadline. The scale of the project and timelines for outline design and planning requirements mean that the earliest construction start date would be 2028 for the potable option and 2029 for the raw option.

# 4. Technical information

*For West Country South sources and transfers SRO*

This section sets out the concept design of the source, treatment and transfer components for the SRO. Cost estimates are included in Section 10.

## Roadford pumped storage and transfer scheme

The scheme overview is provided in Figure 3 below, showing the treatment, pipeline and booster station components and their allocation across the two SROs.

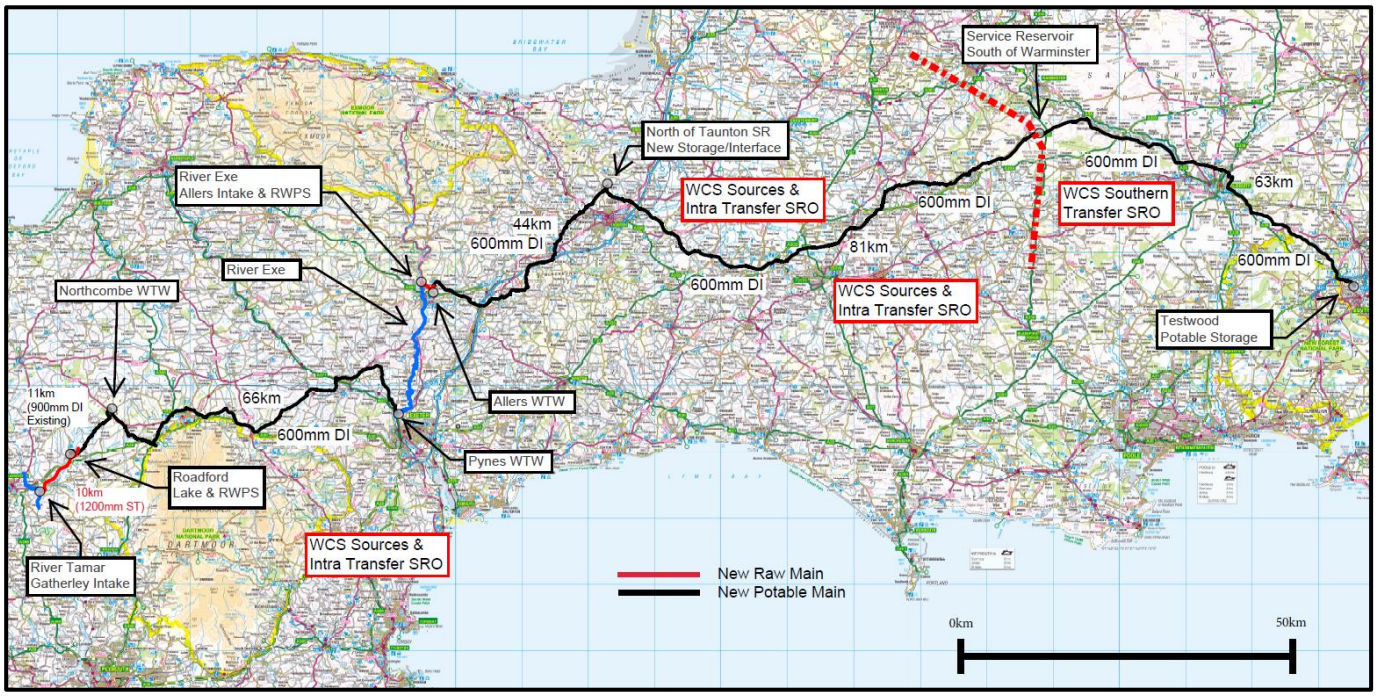


***Figure 3 Roadford potable transfer scheme***

Table 4 below summarises the components of the scheme that fall under the West Country sources and transfers SRO.

***Table 4 WCS Sources SRO Potable Transfer Components***

| Section | Water Type | Max flow (Ml/d) | Pipe Diameter (mm) | Pipe Material | Length (km) | Pump stations (nr) | Storage Tanks (nr) | WTWs/ Conditioning Plants (nr) |
|---|---|---|---|---|---|---|---|---|
| River Tamar Abstraction at Gatherley to Roadford Lake | Raw | 125 | 1200 | ST | 10 | 1 | 1 | - |
| Roadford Lake to Northcombe WTW | | 82 | 900 | DI | 11 | 1 | 1 | 1 |
| Northcombe WTW to Pynes WTW | Potable | 30 | 600 | DI | 66 | 3 | 5 | 1 |
| River Exe Abstraction to Allers WTW | Raw | | 600 | DI | 3 | 1 | 2 | - |

| Section | Water Type | Max flow (Ml/d) | Pipe Diameter (mm) | Pipe Material | Length (km) | Pump stations (nr) | Storage Tanks (nr) | WTWs/ Conditioning Plants (nr) |
|---|---|---|---|---|---|---|---|---|
| Allers WTW to North of Taunton SR | Potable | | 600 | DI | 41 | 3 | 5 | 1 |
| North SR to South of Warminster SR | | | 600 | DI | 81 | 3 | 4 | 1 |
| Totals | | | | | 211 | 12 | 18 | 4 |

Note: numbers may not add up due to rounding

## Water Resources Benefit

Deployable output analysis to determine the benefit of the Gatherley pumped storage scheme was undertaken by incorporating the Gatherley pumped storage scheme into SWB's water resources network optimisation model. Infrastructure constraints were removed so that the full potential deployable output benefit could be determined.

The water resources model was run against historic daily naturalised flows and WRMP19 deployable output demand. The model was run under the following two scenarios, with no demand or supply side drought actions, to determine the storage benefit and hence potential SRO resource benefit of the proposal:

- Baseline - No Gatherley pumped storage, no additional abstraction
- Proposal - With Gatherley pumped storage and 30 Ml/d additional abstraction from Roadford Reservoir

Figure 4 shows that the additional abstraction from Roadford of up to 30 Ml/d can be sustained without causing Roadford water resource zone (WRZ) to go into supply demand deficit due to water resource availability. The constraining factor is the drought of 1975/76 (return period of 1 in 200 years). The chart shows that the system could sustain this level of additional abstraction without drawing the reservoir down into the Level 4 zone, hence giving a Deployable Output of the scheme of 30 Ml/d (for a 1 in 200 year return period).

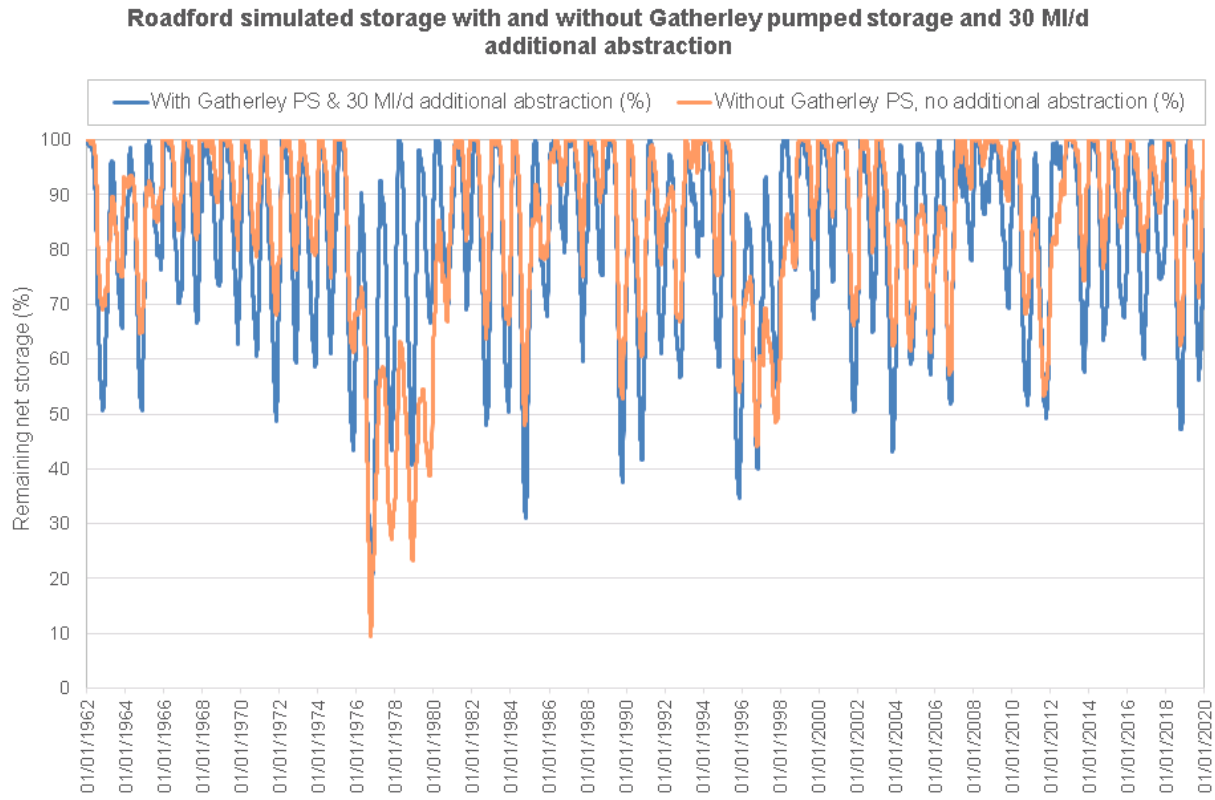


**Figure 4 Reservoir benefit of pumped storage scheme**

The chart also shows that even with a constant 30 Ml/d additional abstraction from Roadford Reservoir throughout the year, the Gatherley pumped storage scheme enables the reservoir storage to recover to at least 90% in all historic years in the analysis, except one.

For the full simulation period (1962 – 2019), the average simulated winter period pumped storage abstraction is 7,643 Ml increasing to nearly 17,000 Ml at peak times. This is equivalent to a 20% increase in available reservoir storage on average or nearly 50% at peak.

## Abstraction and storage

This scheme involves abstracting from the River Tamar at Gatherley between November and March inclusive and transferring the abstracted water into Roadford Reservoir to supplement the natural inflow. This provides extra water in Roadford Reservoir in the following year which is available for use in Roadford and Wimbleball WRZs and/or for export to the east as an SRO.

The abstraction is limited to 125 Ml/d, however during the winter months, flows in the river are typically between 1,000 and 10,000 Ml/d and therefore the abstraction is a very small proportion with little hydraulic or environmental impact on the river.

The current maximum abstraction from Roadford Reservoir to Northcombe is 50 Ml/d which is the capacity of Northcombe WTW. However, the Roadford Reservoir abstraction licence daily limit is 81.5 Ml/d so there is potentially 31.5 Ml/d spare licence available within which the additional 30 Ml/d can be abstracted.

The abstraction and pump station location at Gatherley and the transfer pipeline to the reservoir have been finalised through assessment of alternatives by consideration of their length, complexity, cost, operability and environmental impacts, resulting in a 10 km, 1200 mm diameter pipeline.

The raw water transfer from the reservoir to Northcombe was designed to transfer the licenced quantity and hydraulic checks have confirmed that the pumps and pipeline do not need upgrading.

## Treatment and Transmission

The water from the reservoir will be treated at Northcombe before being transferred via a new main to Pynes service reservoir from where it will supply customers in the Exeter area. The water has a different alkalinity from the River Exe water treated at Pynes WTW with which it will be blending and therefore a conditioning plant will be required.

The Roadford supply to Exeter reduces the need to supply water from the river Exe. The scheme will abstract the surplus from the Exe, approximately 18 km upstream, for treatment at Allers WTW before transfer eastwards.

For gate one the proposed locations of the transmission storage/break tanks and pumping stations is based on a high level assessment of topography, site access/egress, constructability and proximity to existing development and infrastructure. At gate two more complex site selection process will be undertaken to confirm suitability, risks and provide updated cost data.

Other key considerations with regards to the route corridor alignment include:

- Where possible and appropriate routes should follow existing pipe alignments to provide some additional level of assurance of feasibility
- Always minimise impacts to third parties
- Always consider environmental, carbon, constructability, hydraulics, operability, and cost when looking at the route.

## Operation and Maintenance

The scheme has been designed as a potable system to enable integration with existing assets and operations thereby providing resilience benefits en route and mitigating the water quality risks associated with long distance pipelines.

# Poole STW Water Recycling and Transfer

The overall scheme concept design is shown in Figure 5 Poole raw transfer schemebelow. Diverting the effluent from Holes Bay to the Corfe Mullen area of the River Stour addresses concerns regarding nutrients (phosphorus and nitrogen) within Poole Harbour and improves flow compliance on a stretch of the Dorset Stour as well as enabling the river to provide an 18 km environmental buffer before water is abstracted just upstream of Kinson STW for preliminary treatment prior to transfer to Testwood Lake.

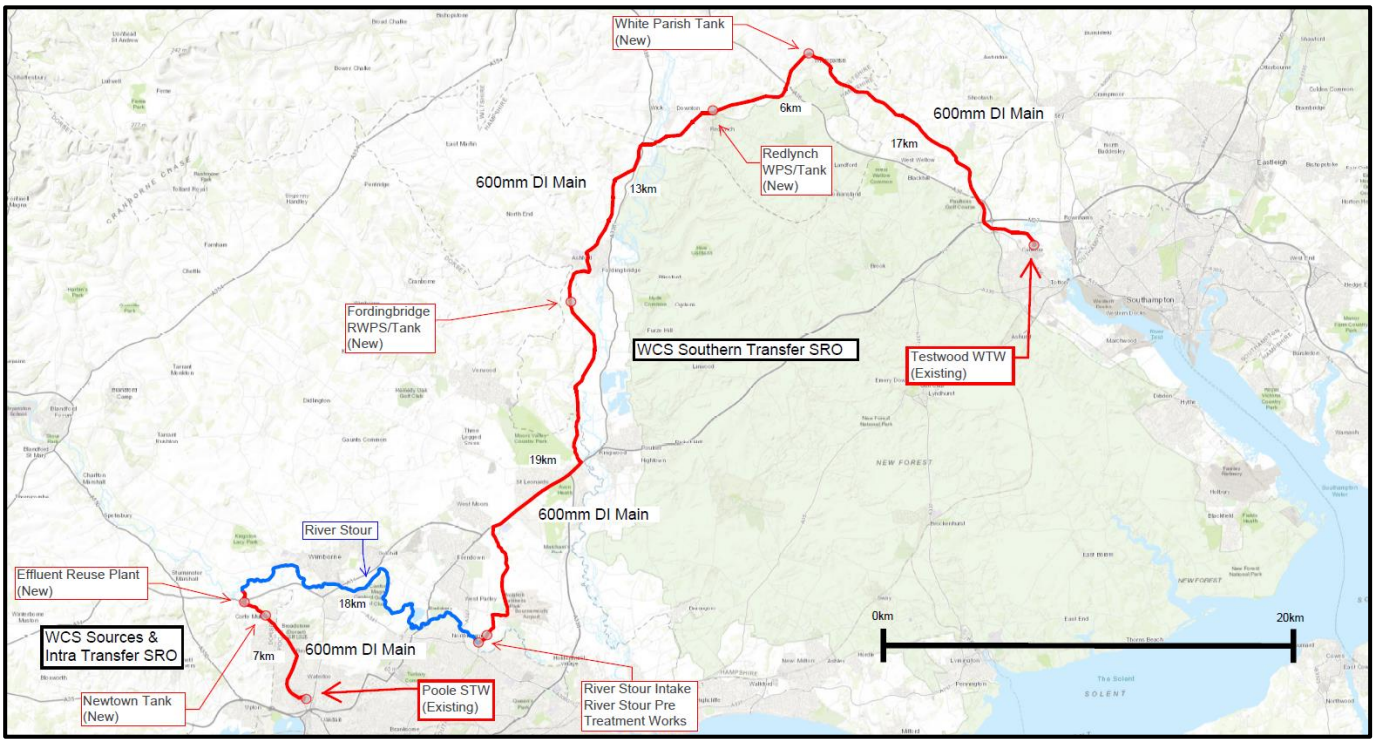


***Figure 5 Poole raw transfer scheme***

The scheme components are covered under this SRO are summarised in Table 5.

***Table 5 Raw transfer scheme components***

| Section | Water Type | Max flow (Ml/d) | Pipe Diameter (mm) | Pipe Material | Length (km) | Pump stations (nr) | Storage Tanks (nr) | WTWs/ Conditioning Plants (nr) |
|---|---|---|---|---|---|---|---|---|
| Poole STW to the River Stour | Raw | 30 | 600 | DI | 7 | 2 | 3 | 1 |

## Water Resource Benefit

To provide a resource resilient to a 1 in 500 year drought the historical discharge record from Poole STW has been analysed and a source of 30 Ml/d has been determined. Further detailed analysis, surveying and design will be required to determine the final deployable output, considering losses in effluent treatment, from the River Stour and potable water treatment and how these may be offset within the wider abstraction regime of the Stour.

## Treatment and Transmission

A main will be constructed from Poole STW to the River Stour, approximately 7 km away. The general arrangement of the transfer is firstly, raw effluent is collected on site in a contact tank to be pumped to a raw water break tank at Newtown with both tanks providing diurnal effluent flow buffering.

The new water recycling plant will be situated at Newtown due to site limitations at Poole STW. Once treated, the water is then pumped into the river via low lift pumps.

## Water Recycling Plant

Based on the effluent water quality data available for gate one, the following treatment configuration is proposed, built around Advanced Oxidation (AOP), summarised in the bullets below:

- Chemical Conditioning: Chemical precipitation and flocculation will be provided to precipitate orthophosphate in line with WFD target requirements.
- Clarification: Actiflo ballasted clarification will be provided to remove particulate phosphorus and protect the downstream filtration process.
- Filtration: Rapid Gravity Filters, with upstream coagulation and flocculation, will be provided to minimize turbidity, Total Inorganic Carbon loading on the downstream processes and maximise UV transmissivity.
- Advanced Oxidation: An AOP system, comprising hydrogen peroxide dosing and UV irradiation, will remove trace chemical constituents (e.g. pharmaceuticals and personal care products), as well as providing significant reduction in pathogenic microbiology levels.
- Granular Activated Carbon (GAC) filtration: GAC contactors will remove any disinfection by-products associated with the AOP process, and provide an additional barrier for trace chemicals.

# 5. Environmental and drinking water quality considerations

## Environmental assessment

High level analysis of the environmental feasibility of the two schemes (and their constituent components) has been completed in line with stakeholder expectations and best practice. This included development and application of an integrated environmental assessment (IEA) methodology and associated technical assessment methodologies to inform the initial concept design of each scheme, identification of key environmental risks and development of mitigation and monitoring proposals for consideration through refined concept designs at gate two. The IEA at gate one focused on the efficient application of established principles to prioritise environmental risks from multi-disciplinary perspectives, collation of pertinent information for decision-makers, effective stakeholder engagement, methodological rigour, and the avoidance of duplication.

The IEA has been completed through the development and application of technical assessment methodologies covering:

- **Strategic Environment Assessment (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
- **Habitats Regulation Assessment (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 two
- **Water Framework Directive (WFD) compliance assessment** - initial analysis of WFD compliance risks at component and scheme levels
- **Natural Capital and Biodiversity Net Gain (BNG) assessment** – initial analysis of likely Natural Capital impacts (e.g. changes to ecosystem services) and BNG opportunities arising at scheme level
- **Carbon assessment** – initial analysis of likely embodied and operational carbon impacts at scheme level. The carbon values are included in a table in Section 10
- **Invasive Non-Native Species (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.

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

- Monthly progress meetings with the Environment Agency (EA) and Natural England (NE) to review design and environmental assessment work, discuss environmental issues associated with each scheme (e.g. implications of proposed abstractions) and agree assessment scope
- Provision of draft environmental reporting for review, followed by meetings to discuss risks identified at component and scheme levels. At the time of submission, pertinent comments received from the EA and NE have been addressed, including confirming assessment and engagement expectations for gate two, and
- Briefing notes issued and meetings offered to three Local Planning Authorities hosting major infrastructure components to outline the relevant scheme, discuss how planning and environmental issues are being addressed and to inform an initial consenting strategy (refer to Section 7 below).

### Initial environmental findings

As major infrastructure projects involving new river abstractions, discharge points and pipelines spanning over 200 km, the construction and operation of the two schemes (and constituent components) being considered through the SROs have the potential to generate a very wide range of effects on a wide range of different environmental, social and economic receptors.

The high level findings can be summarised as:

- No immediate "Show stoppers" have been identified
- There are numerous direct interactions with designated sites which will require design changes

- The key environmental risk to the feasibility of the schemes is the acceptability of the proposed abstractions and discharge.

The findings of the gate one integrated environmental assessment will be used at gate two to identify environmentally sensitive areas where potential design refinements will be considered, taking account of engineering constraints and wider viability considerations. All identified interactions between each scheme and relevant environmental receptors which at gate one 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 two, 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.

## Environmental net gain

The assessment undertaken at gate one indicates that, despite consideration of environmental constraints within component level screening and significant environmental inputs to initial concept design work, each scheme 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.

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 two as part of development of the preferred design for each scheme.

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).

A further factor in considering environmental gain is whether the project is compatible with other environmental plans within the donor region, in particular the proposals for long term environmental ambition with respect to water resources within the West Country. The scope, timing and details of the environmental ambition needs are not yet fully formulated, and may take several iterations to fully emerge. However initial analysis indicates that:

- the Roadford pumped storage scheme and parts of the transfer is compatible with environmental ambition proposals for the emerging WCWRG regional plan
- No impacts on the achievement of catchment level environmental ambitions are presently predicted from the Poole effluent re-use scheme.

## Initial SEA Findings

The following tables summarise the likely significant effects and risks arising under each of the SEA topic headings for the two schemes.

***Table 6 Likely significant effects and key risks from the Roadford potable transfer scheme***

| SEA Topic | Likely Significant Effects and Key Risks |
|---|---|
| 1. Biodiversity | Scheme Level SEA - Likely Significant Effects:<br>• Major Negative (--):<br>○ Core SEA Objective 1.1. To protect designated sites and their qualifying features.<br>○ Core SEA Objective 1.3. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.<br>○ Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS).<br>Identified Key Risks (Component and Scheme level):<br>• Encroachment of important ecological features resulting in direct and indirect:<br>- Habitat loss or fragmentation<br>- Habitat degradation (including to downstream Plymouth Sound & Estuaries SAC and Tamar Estuaries Complex SPA from River Tamar abstraction)<br>- Species disturbance<br>- Species loss or harm. |
| 2. Population and Human Health | Scheme Level SEA - Likely Significant Effects:<br>• Major Negative (--):<br>○ Core SEA Objective: 2.1. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing<br>Identified Key Risks (Component and Scheme level):<br>• Temporary severance and accessibility impacts during construction<br>Identified Benefits (Component and Scheme level):<br>• Enhanced network resilience<br>• Local non-resource social and economic benefits |
| 3. Water | Scheme Level SEA - Likely Significant Effects:<br>• Major Positive (++):<br>○ Core SEA Objective: 3.5. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.<br>Identified Key Risks (Component and Scheme level):<br>• Development within flood risk zones (2 and 3) and areas at High and Medium risk of flooding, resulting in:<br>- Loss or reduction of flood plains (natural storage),<br>- Increased flood risks resulting from temporary and permanent changes to ground conditions and/or drainage patterns.<br>• Changes to river flow, water chemistry and geomorphology<br>• Watercourse crossings, resulting in potential pollution risks during construction (HDD installation technique proposed)<br>• Earthworks in proximity to safeguarding zones, resulting in pollution risks |
| 4. Soil | No component or scheme level likely significant effects.<br>Identified Key Risks (Component and Scheme level):<br>• Encroachment of Grades 1-5 (inc. BMV) ALC, resulting in:<br>- Temporary reduction in productive land and yields<br>- Pollution risks with the potential to degrade soil quality |
| 5. Air | No likely significant effects. |

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

***Table 7 Likely significant effects and key risks from Poole STW raw transfer scheme***

| SEA Topic | Likely Significant Effects and Key Risks |
|---|---|
| 1. Biodiversity | Scheme Level SEA - Likely Significant Effects:<br>• Major Negative (--):<br>  ○ Core SEA Objective 1.1. To protect designated sites and their qualifying features<br>  ○ Core SEA Objective 1.3: To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.<br>  ○ Core SEA Objective 1.4. To avoid and, where required, manage invasive and non-native species (INNS).<br>Identified Key Risks (Component and Scheme level):<br>• Encroachment of important ecological features resulting in direct and indirect:<br>  - Habitat loss or fragmentation<br>  - Habitat degradation<br>  - Species disturbance<br>  - 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. |
| 6. Climatic Factors | No likely significant effects. |
| 7. Landscape | No likely significant effects. |
| 8. Historic Environment | Scheme Level SEA - Likely Significant Effects:<br>• Major Negative (--):<br>  ○ Core SEA Objective: 8.1. To conserve, protect and enhance landscape and townscape character and visual amenity<br>Identified Key Risks (Component and Scheme level):<br>• Effects (temporary or permanent) on the setting of heritage assets<br>• Risk of removal or disturbance of known or currently unrecorded archaeological assets |
| 9. Material Assets | No likely significant effects. |

## Initial drinking water quality considerations and risk assessments

For both potable and raw transfers, it is feasible to meet all drinking water quality requirements and meet customer acceptability expectations subject to appropriate management and interventions in the downstream network.

**The Roadford pumped storage and potable transfer scheme** uses spare capacity in the River Tamar before transferring the water eastwards to Testwood.

The All Company Working Group (ACWG) Water Quality Risk Framework was used as a basis for risk assessments of water quality risks throughout the water supply. Consideration of water quality and risks related to customer acceptability led to the design of two water treatment works, one at Northcombe WTW and one at Allers WTW. Both are side streams which operate alongside existing water treatment works. Consideration of the consequences of treated water blending and displacement of water in the network led to the design of two conditioning plants, one at Parsonage Service Reservoir and one at Monkton Deverill. Conditioning of the treated water is needed to mitigate against the risk of blending and displacing a hard water by a soft water.

Water quality risks remaining are the need for booster chlorination, development of disinfection by-products, taste and odour and risks related to changes in water supplies and operational changes. There are existing red risks in the Drinking Water Safety Plan for the treated water from Testwood WTW.

**The Poole Recycling and Raw Transfer scheme** takes treated effluent from Poole STW and further treats the water before discharge to the River Stour. Water is then abstracted from the River Stour before further treatment and onward pumping to Testwood Lakes.

The approach taken to assess the water quality risks for the potable reuse scheme was based on two risk assessments:

- **Water Framework Directive** risk assessment - evaluating the potential implications of Indirect Potable Reuse (IPR) on the quality status of environmental buffers
- **Drinking Water Safety Planning** risk assessment - evaluating the potential implications of IPR on the catchment and treatment elements of impacted water treatment works' Drinking Water Safety Plans (DWSPs).

Re-evaluating WFD status and DWSPs in the context of the additional final effluent flow from Poole STW identified the key risks posed by the scheme and the corresponding treatment objectives which will allow them to be mitigated.

Evaluating the risks to water quality of the potable reuse scheme led to the design of an advanced wastewater treatment works and partial treatment of the River Stour water before transmission to Testwood Lakes. The water quality risk assessment starts with an understanding of the quality and quantity of effluent from Poole STW. It then considers the conditions in the receiving water, River Stour, in terms of the relative flow of the effluent under various scenarios. The WFD requirements for the River Stour were then considered to establish the treatment required to maintain its WFD status.

The drinking water safety plan for Testwood was then reviewed to understand the requirements for no deterioration in terms of water quality, treatability or consumer acceptability. Finally, these requirements were drawn together to develop the two concept designs for the scheme.

Risks, opportunities and associated actions across the various components of the two schemes are provided in Table 8 below.

***Table 8 Water quality risks and actions***

| Ref. | Type | Component | Description | Implications | Investigation Action |
|---|---|---|---|---|---|
| 1 | Risk | Treated Water Transfer | River Tamar has a significant negative impact on water quality in Roadford Reservoir and algae blooms occur and taste and odour compounds form at high levels in the water transferred to Northcombe WTW | The existing mitigation methods for algae are insufficient and the performance of the existing water treatment works is compromised and the proposed new works is insufficient<br>An additional treatment stage will be required at Northcombe WTW to remove taste and odour compounds, geosmin and MIB | Extend the sampling programme for the River Tamar and model its impact on the Roadford Reservoir<br>Investigate and develop new mitigation for algae in Roadford Reservoir |
| 2 | Risk | Treated Water Transfer | Conditioning of the water does not prevent water quality risks associated with the blending of treated water | Water quality risks in the distribution system deteriorates where waters are blended and the customers do not accept the water | Carry out blending calculations and assess the blended water qualities with reference to discolouration risks |
| 3 | Risk | Treated Water Transfer | Water from South of Warminster Reservoir distribution system requires treatment before blending with Testwood treated water | Additional cost of treatment | Carry out blending calculations and assess the blended water qualities with reference to discolouration risks |
| 4 | Opportunity | Treated Water Transfer | Conditioning of water from Northcombe WTW is not required | Reduced cost of scheme | Carry out blending calculations and assess the blended water qualities with reference to discolouration risks |
| 5 | Opportunity | Treated Water Transfer | Headroom at Allers WTW can be used to partially supply the additional 30 Ml/d treatment capacity | Reduced cost of scheme | Assess if the existing works at Allers WTW has additional capacity through investigation of hydraulic and design limits of the process units |
| 6 | Risk | Water recycling | Salinity levels in Poole STW effluent are unacceptable | Part or all of the design flow will require cost and carbon intensive Reverse Osmosis or Ion Exchange treatment, dependent on salinity levels - or root cause analysis and network remediation could be undertaken to prevent saline intrusion. | Assess TDS levels in Poole STW final effluent as soon as possible. |
| 7 | Risk | Water recycling | Insufficient dilution is available to manage ammonia concentrations | Additional ammonia removal will be required – either through a biological system, likely requiring a supplementary carbon source and alkalinity, or Ion Exchange | Undertake more detailed analysis of River Stour flows |
| 8 | Risk | Water recycling | Water from the River Stour requires additional treatment at Testwood WTW | Additional treatment required at Testwood WTW | Undertake sampling of the River Stour at point of abstraction and model blending with treated effluent |

| Ref. | Type | Component | Description | Implications | Investigation Action |
|---|---|---|---|---|---|
| 9 | Opportunity | Potable Reuse | Assess how proposed tightening of Poole STW permit may change treatment needs | This may eliminate the need for additional Phosphorus removal | Liaise with Wessex Water and Stantec design team |
| 10 | Opportunity | Potable Reuse | Consider whether longer term local reuse via Longham Lakes could benefit regional resources | More permanent use of the scheme could reduce nutrient loading on Holes Bay and add resilience to local water supply | Liaise with Wessex Water and wider regional stakeholders |

The investigation actions have been developed in more detail for inclusion in the gate two programme.

### DWI and Company Drinking Water Quality Teams Engagement

The water quality risk assessments and treatment proposals for both schemes have been discussed with both the DWI and the Water Quality Managers from SWB and WSX at meeting in April and June 2021. In developing the water treatment specifications, we engaged with the process scientists for each area, in particular to address the issues with mixing water qualities in the distribution systems for both Northcombe and Allers WTWs. Feedback from the DWI indicated that they did not have any further comments at this stage and the assessments to date were adequate for this submission.

# 6. Initial outline of procurement and operation strategy

## Initial Procurement Strategy

A range of potential procurement options (including all sub-options of the Direct Procurement for Customers (DPC) model) have been considered for the two schemes. Due to the current, early stage of scheme development, a definitive recommendation for a single procurement option has not been made, but an initial appraisal has been completed and recommended next steps have been provided as to how this should be concluded at gate two.

The evaluation of the procurement routes has assessed their ability to ensure value for money, cost and delivery certainty and considered of the scope of the schemes, operation and interfaces with the partner companies' existing assets and operations.

The schemes are complex with multiple assets to be constructed across a wide geographical area covering the operational areas of all three partner companies. Several procurement options have been identified as being viable to deliver each scheme and it is proposed that these could be adopted as either a single procurement option strategy or as a mixed programme procurement model to suit the risk parameters and level of required asset owner involvement. The options considered as suitable are:

- Direct Procurement for Customers (DPC) option – reuse option only.
- External market tender engagement options.
- The use of existing Water Company framework supply chains.

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 Poole Recycling scheme meets the preliminary DPC criteria of project value and potential discreteness of construction and operation. As a major infrastructure project it can anticipate receiving a positive market appetite, however the final operating regime will determine whether it efficiently provides a secure, long-term revenue stream. Further analysis is recommended for gate two to investigate in detail the appropriate 'tender model' and 'value for money' assessment requirements of the model. It is likely however that the scheme would fall into the 'Late' category of the DPC tender model allowing the client to be involved actively in the front-end aspects of design and planning and thereby allowing the risk in these areas to be closely managed.

The external market tender option could comprise the following sub-options i) lump sum tender actions, either traditional fixed price or incentivised models ii) early contractor involvement under a two-stage mechanism, or iii) engineer, procure and construct mechanisms. This procurement option potentially provides the greater level of programme delivery control and transparency for the owner together with the ability to manage risk at an individual project or sub-programme level across the programme.

The use of the water company's own framework supply chains provides a further procurement option matching capability and capacity to appropriate project elements within the scheme. The potential to draw upon these pre-selected supply chains provides distinct advantages in respect of known capability together with savings in procurement timescales. The drawback being the potential impact that the draw on contractor's resources may have on the AMP delivery programme requirements. Consideration would need to be given to any framework restrictions under this option. The option would also link to the adoption of lump sum or incentivised options potentially drawing the supply chain into early contractor involvement arrangements.

### Operation and funding

The option to either retain or outsource the operation of assets that are to be used intermittently is potentially influenced by the procurement option. For the DPC option an integrated build and operate solution rests more cleanly whereas the other procurement options lean towards a more traditional owner-based delivery, ownership and operational model.

The DPC option is for a CAP to build, finance and operate the scheme. Value for money can be achieved through efficient delivery, operation and/or financing and the CAP receives a revenue stream for the water supply provided. The viability of such an arrangement is highly dependent upon the forecast revenue which, should the water only be required during drought years, may require the beneficiary to purchase expensive water when not required. However, the need to operate the scheme is not a function of the ownership model and therefore the anticipated cost streams would need to be considered in a value for money appraisal of the DPC route versus the more traditional alternatives.

### Risk

The ownership and management of risk varies between the procurement options. The more traditional procurement options lend towards more known project risk management measures. DPC however places a different type of risk onto the owner, where one of the greatest risks to be managed is the avoidance of failure of a lengthy programme level DPC procurement event and the associated severe timescale implications this would create to the 'construction ready' date.

## Utilisation and Operation

Both schemes have been developed to make best use of their underpinning resources. With work ongoing regarding environmental destination, moving to a 1 in 500 year drought resilience and producing best value regional plans, the needs that transfers from the West Country could support are unclear. Given the overall size of potential deficit in the south east, it has been assumed that the schemes would be called upon as bulk supplies during summer months each year. In order to manage water quality risks both schemes would need to operate continuously with a minimum through put of 25% of capacity. This set of assumptions cover the range of feasible operating scenarios against which the schemes have been designed. Preliminary modelling has shown that Roadford Lake and Poole STW could each provide a reliable source of 30 Ml/d.

The option of using the water stored in Roadford Lake as a peak source has been considered, however, with a transfer of approximately 270 km, installing a larger main to accommodate a higher peak output would require a larger sweetening flow such that the resource would not be available during the peak period. The potable transfer from Devon to Hampshire will be integrated with SWB and WSX systems along its route. This provides a resilience benefit, providing an alternative means of supply in response to failures in the companies' systems or when outages are required for planned maintenance works.

The distance between Roadford and Hampshire means that there is a low Drought Coincidence Index (DCI) between the two locations such that the resource could potentially provide a drought benefit in both regions. This also means that the reservoir is likely to be able to supply its design output when sources in the south east region are in a severe drought and at their lowest.

How both schemes would be best used, delivering value in both the donor and receiving areas, will need to be determined through reconciliation of the regional plans and should inform the schemes' development for gate two.

# 7. Planning considerations

This section summarises our assessment of planning approval options for the two schemes.

At gate one an initial consenting strategy has been developed for the two functionally separate transfer schemes. Each scheme is inter-regional and includes source, transmission and reception related infrastructure components. However, for the purposes of gate one submissions, the schemes are split between the two SROs corresponding with the scope originally assigned to each SRO as defined by RAPID / Ofwat.

Irrespective of which consenting route is selected it will be important to clearly define the spatial extent and scope of development for which any authorisation is sought. As different consenting route options may apply to specific components within each scheme and SRO and since relevant Environmental Impact Assessment (EIA) regulations require the design of "the whole development" (i.e. each scheme) to be considered, the split between the two SROs at subsequent gates will need to be carefully reviewed to align with how the scheme(s) are to be progressed through design and consenting (inc. environmental assessment). For practical reasons and to avoid either duplication or delivery gaps, this may require reconfiguration of the split of intended scheme outcomes and funding allocated between the SROs at subsequent gates in consultation with RAPID.

Both schemes interface with different water companies (i.e. statutory undertaker assets) and involves different development types, environmental impacts and local planning authority areas. It is therefore very unlikely that all components of the two SROs would be subject to a single consenting process, not least due the challenges of undertaking a robust EIA for such a complex and geographically diverse project and as any consent granted would likely be subject to a very extensive suite of (potentially overlapping or conflicting) conditions and requirements.

Splitting the two SROs *within* functionally separate schemes is however also potentially problematic from a consenting perspective, especially at future appraisal gates when increased design inputs and stakeholder engagement will be required. Any application(s) for development forming part or all of a proposed effluent re-use transfer from Poole to Testwood, or forming part or all of a proposed River Tamar to Testwood water transfer (including discrete Tamar to Pynes and Exe to Testwood elements), will be required to demonstrate a clear 'needs case' for both the extent of development proposed within the application and the relevant scheme as a whole in order to demonstrate policy compliance and the acceptability of environmental impacts. This means that:

- If one scheme is subject to multiple planning applications and split geographically between two SROs, it may be challenging to evidence the need for the extent of development within each application to different local planning authorities (LPAs). Each planning application would not be able to point to SRO summary report as providing a succinct statement of the needs case for the extent of development proposed within their area as part of a wider transfer scheme. Inclusion of the scheme within relevant WRMP24 as a means of demonstrating the project needs case would also not be able to rely upon a single SRO summary report or RAPID appraisal.
- If one scheme is subject to a single DCO but split geographically between two SROs this could undermine the ability to demonstrate appropriate stakeholder engagement and the accordance of the whole development with the statement of need in the National Planning Statement (NPS), once finalised. Whilst technical issues can be addressed through a common suite of annexes, stakeholder engagement and summary reporting for RAPID regarding each SRO is not likely to yield a clear needs case for a scheme split across two SROs.

To address these challenges, at gate two it will be essential for a single Statement of Need, consenting strategy and stakeholder engagement strategy to be produced for each scheme.

## Suitability for a Development Consent Order

If a project falls within the threshold to qualify as an Nationally Significant Infrastructure Project (NSIP), consent must be sought for a Development Consent Order (DCO) under the Planning Act (PA) 2008. The Infrastructure Planning (Water Resources) (England) Order 2019 Order introduces the concept of 'deployable output' (DO) which is the annual average volume of water that can be produced per day from a facility under drought conditions. The qualifying thresholds for a water resources infrastructure NSIP are set at:

1. New or altered dam or reservoir
   - DO in excess of 80 Ml/d; or
   - alteration of a dam or reservoir to hold back greater than 30 million additional cubic metres of water (30,000 Ml)

2. Transfer of water resources
   - DO from new "facility to be constructed as a result of the development" in excess of 80 Ml/d
   - additional DO from altered facility in excess of 80 Ml/d

A potentially qualifying NSIP must also satisfy a suite of conditions, of which the following are most relevant:

- will enable the transfer of water resources between English river basis or water undertakers' areas
- not relate to the transfer of drinking water.

As the DO of each of the schemes is 30 Ml/d and since the storage volume of Roadford Lake (existing and with proposed additional intake) falls below 30,000 Ml, both schemes fail the quantitative thresholds. Additionally, at Northcombe WTW 30 Ml/d of raw water abstracted from Roadford Lake (pumped storage) would be treated to drinking water standard and thereafter enter a new long-distance potable mains transfer system until reaching SRN's reception point at Testwood WTW, whereas the 2019 amendments to the PA 2008 only make provision for raw water transfers. The proposed Poole to Testwood Effluent Re-Use scheme is not of an infrastructure type directly covered under the water resource NSIP categories. For these reasons it is clear that the schemes will not automatically qualify as NSIPs.

A request for a direction under Section 35 of the PA 2008 is therefore likely to be required in order for either scheme to be consented under the DCO route. Any direction would be decided by the Secretary of State on a case by case basis and in the absence of the finalised Water Resources NPS no directly relevant precedents for water resources projects are yet available to consider. However, in addition to demonstrating a direct contribution to the national need established within the NPS (once finalised) and justifying NSIP status for infrastructure of a scale well below relevant thresholds, the River Tamar to Testwood transfer scheme would also need to overcome the challenge of explaining why the explicit restriction on drinking water transfer projects being NSIPs as introduced by the 2019 Order should, on this specific occasion, be over-ruled.

## Town and Country Planning Act (TCPA) 1990

In the absence of being a qualifying NSIP or obtaining a Section 35 direction, which as discussed above is likely to be challenging, consent for the schemes (or any part thereof not benefitting from permitted development rights (PDR)) would need to be sought under the TCPA 1990 route. Under the TCPA route the scheme promoter would have to apply to each relevant LPA and separately for all other consents and licences associated with the scheme. Failure to secure planning permission for any component of the scheme would result in a need to follow the Planning Inspectorate appeals and inquiries process.

In addition to securing planning permission, the TCPA 1990 route would present a programme risk in respect of compulsorily securing land rights and obtaining other consents and licences such as affected public rights of way, diversion of watercourses, land drainage, water abstraction sources and habitats, trees and hedgerows which may be affected. To address this risk a land acquisition strategy should be prepared at gate two.

At the outset the application(s) could be at risk of being 'called-in' under s77 of the TCPA 1990 and considered at a public inquiry, if, for example, planning issues of more than local importance are involved. Although the draft NPS, once approved, would carry weight in the decision as a material consideration, the decision would primarily be made against statutory local policy which may not address the form of

infrastructure proposed in detail or at all. In this situation local policy support for both the extent of development required within an individual LPA area and for the overall scheme may be less evident.

# Initial consenting strategy proposal - Hybrid application

Any TCPA application is likely to be a 'hybrid' covering all major components of the scheme. A hybrid application is one in which consent for elements of scheme are submitted in 'full' while others are submitted in 'outline'. In the case of the latter, it will be necessary for the applicant to submit reserved matters applications at a later date to confirm the details of the scheme. The five 'matters' relating to a development scheme which can be submitted either in full detail or in outline are defined in planning law as:

- Layout
- Access
- Landscaping
- Scale of Buildings, and
- Appearance.

Some of the principal benefits of a hybrid application, one which does not seek to fix details of all aspects of the scheme design, are as follows:

- Design flexibility - the approach to setting out parameters (incl. limits of deviation) for the alignment of the scheme and associated works is important. For example, detailed ground investigations will be required before the engineering design of the pipeline is finalised and proceeding with these and detailed design work without a consent in place presents a financial risk. In addition, even when the engineering design has been completed, it is possible that ground conditions encountered during construction of the pipeline could result in a variation to the pipeline alignment or surface strengthening works (e.g. grouting) being required. Retaining a reasonable degree of flexibility in relation to the alignment and proposed works is therefore important.
- Environmental impact assessment (EIA) robustness - the specification of parameters for those elements of the scheme where change may occur will provide for a robust assessment of the proposals in relation to, for example, biodiversity and visual impacts.
- Flexibility in scheme implementation – the scheme has a long implementation programme and it is expected that design preferences and regulations relating to design will change over the course of the scheme design and implementation. Therefore, it may be appropriate that the detailed design of, for example, structures is delayed until closer to the time of construction.
- Shorter pre-application programme and likely lower upfront costs.

Given the scale and potential complexity of the scheme, it is likely that the scope and content of the hybrid application would need to be agreed with the determining LPAs prior to submission.

## Timeframe

Assuming the application is not called-in, typical timescales for the submission and determination of applications under the TCPA 1990 for a major infrastructure project are:

- Pre-application stage 12-18 months
- Determination of hybrid applications 16 weeks (minimum period)
- Reserved matters applications and additional consents 6-18 months
- Compulsory purchase order inquiry (if required) 8-12 months.

# 8. Stakeholder engagement

This section summarises the stakeholder engagement and customer research that has been carried out for gate one. It is applicable to both schemes: West Country South sources & transfers and West Country South – Southern Water transfer.

Stakeholder engagement on the project includes:

- Environment Agency. Monthly meetings and technical workshops
- Natural England. Monthly meetings and technical workshops
- Drinking Water Inspectorate. Project specific meetings in April and June 2021
- West Country Water Resources Group (Regional Group attended by the scheme partners, Environment Agency, Natural England with affiliates including Southern Water, Water Resources South East and others). Regular briefings on progress at steering group and Board meetings
- West Country Water Resources Group engagement days.

## Customer research

There is a need to understand customer attitudes to the new schemes and inter-region water transfers. This has been achieved by participating in a research programme coordinated by Water Resources South East (WRSE), in collaboration with the sponsor companies for other SRO schemes. The aim of the research was to frame customer views in the broader context of the long-term objectives for improving the resilience of the water system to drought and other disruptive events, along with the associated outcomes such as reducing the use of drought measures, improving the environment, and delivering wider social value". This was delivered through an evidence review and qualitative and quantitative research, whilst ensuring feedback was comparable across regions and cost efficient.

The evidence review considered insights from companies WRMPs, PR19 and ongoing research including Southern Water's major customer engagement exercise 'Water for Life – Hampshire' (running since November 2019), which focussed on the attitudes of their customers, the recipients of the water from the Strategic resource options. For previous WRMPs the sponsor water companies have carried out various customer research projects, mostly aimed at the attitudes of customers to schemes within area and within the region.

The main findings of the research, undertaken by eftec / ICS, and publicly available at Customer_Preferences_Summary_Report and SRO_Summary_West_Country_Sources_Transfer are summarised below:

- Overall, the initial response from customers to SROs has been positive. Customers understand the rationale for sharing water – but it is evident that more detailed context and information is required for the West Country Sources transfer for customers to determine whether it is best choice for them.
- Customers have an established and similar views that transfer options rank towards the lower end of the scale of options. This is consistent with the expectation that self-reliance will be targeted over a perceived riskier strategy of long-term dependency on transfers into the region.
- The deliberative and quantitative research shows that there are limits to customer support. Customers are more willing to see transfers when there is a lower potential impact on themselves and less willing to see water transferred out of the region if the recipients (companies and customers) are more wasteful in their water use.
- In terms of scheme design, previous research by companies has found that transfer via river or canal to be more appealing than pipeline options, because it is perceived by customers to have wider benefits and fewer negative impacts. Previous research also showed that customers have various concerns about transfers, including cost, disruption from construction, leaks, environmental impacts, energy use, lack of benefits to local communities, and deteriorated service levels for donor customers. Broadly SRN's customers were supportive of the outline proposal for the West Country Source transfer since they would directly benefit. SWB's customers were also broadly supportive if helping others involved little detriment to themselves. Both groups expressed concerns about possible environmental impacts from transfers and around which region would pay for the water and infrastructure.
- Re-use schemes draw mixed views from customers. The more informed customers become, the more they recognise the benefits of water re-use. But even with a positive framing around recycling water, customers can have concerns over water quality and the environmental impact of recycling schemes.

Thus, there is a strong requirement to provide appropriate information and assurances that these issues will be fully addressed.

- A key learning point is that engagement will be more meaningful if schemes are framed in the context of the current situation. Customers wanted to understand how the SROs fitted with the choices faced in terms of the combinations of source(s) and transfers and how they substitute for each other as well as the consequences of no action. If presented in isolation customers' ability to provide a considered viewpoint will be compromised, which may mean that water sharing schemes are seen as less acceptable. A further requirement is to understand customer views about specific design details. Necessarily this can only happen as the proposals are developed for subsequent gates.
- In addition, the research carried out by WSX using their online customer panel in 2020 for the West Country North SRO is also relevant to this scheme. Generally, customers were broadly supportive of the concept of water sharing and transferring surplus water to neighbouring regions. The results of the research are included in the gate one submission for West Country North.

The next stage of research will be broader qualitative and quantitative research and it will be tied in with customer research for the regional plan.

# 9. Key risks and mitigation measures

*For West Country South sources and transfers SRO*

Undertaking this preliminary feasibility assessment has inevitably required expert judgement to arrive at appropriate assumptions regarding certain aspects of the schemes. These uncertainties as well as the longer list of typical risks associated with delivering and operating major infrastructure schemes have been collated within the ACWG risk spreadsheet to assess their programme and cost impacts as summarised in Sections 3 and 10 respectively. The investigations, necessary to confirm or amend these assumptions, will be a key component of the proposed programme for gate two, as outlined in Section 15.

The following tables summarise the key cost and schedule risks for the components of the two schemes covered under this SRO. The guidance on scoring of probabilities and impacts is provided in Table 11.

***Table 9 Key Cost Risks***

| Description | Consequence | Probability score | Cost score | Score |
|---|---|---|---|---|
| Land Compensation | Additional costs due to design constraints for location of sites, value of land or constraints with alignment make alternate route costly | 4 | 3 | **12** |
| Existing Asset Connections/Locations | Location, layout and condition of existing assets combined with potential unknowns at existing sites for new connection arrangements cause additional cost, construction delay, redesign, betterment issues | 4 | 3 | **12** |
| Requirement for onerous environmental mitigation measures (non-resource based) during construction and/or operation. | Increased infrastructure complexity (in design and delivery), cost and potential delay to operational start date (e.g. due to seasonal working restrictions). | 3 | 3 | **9** |
| Weather Delays | Delay to construction due to poor weather conditions. Working within the flood plains | 3 | 3 | **9** |
| Rise in cost of materials above inflation due to market forces | Increase in material costs | 3 | 3 | **9** |
| Water Recycling - Salinity levels in Poole STW effluent are unacceptable | Part or all of the design flow will require cost and carbon intensive Reverse Osmosis or Ion Exchange treatment, dependent on salinity levels - or remediation within the upstream network to prevent saline intrusion | 2 | 4 | **8** |

The majority of the cost risks are due to current uncertainties and hence the initial mitigation will be to investigate these further in subsequent phases. Following such investigations, the need, scope and extent of mitigation measures can be determined to provide a more robust risk management plan.

***Table 10 Key Schedule Risks***

| Description | Consequence | Probability score | Schedule score | Score |
|---|---|---|---|---|
| Construction at Multiple Sites | Unable to construct at multiple sites in parallel. Some sites need to be done in sequence due to third party or construction constraints | 3 | 5 | **15** |
| River Tamar has a significant impact on water quality in Roadford Reservoir and algae blooms occur and taste and odour compounds form at high levels in the water transferred to Northcombe WTW | The existing mitigation methods for algae are insufficient and the performance of the existing water treatment works is compromised and the proposed new works is insufficient<br><br>An additional treatment stage will be required at Northcombe WTW to remove taste and odour compounds, geosmin and MIB | 4 | 3 | **12** |
| TCPA with Permitted Development not approved. All pipelines to be put through planning application as well as above ground infrastructure. | There is a risk that the timescales involved in approving each scheme are much greater than assumed in the schedule, leading to key milestones being missed. | 3 | 4 | **12** |
| Existing Asset Connections/Locations | Location, layout and condition of existing assets combined with potential unknowns at existing sites for new connection arrangements cause additional cost, construction delay, redesign, betterment issues | 4 | 3 | **12** |
| Requirement for onerous environmental mitigation measures (non-resource based) during construction and/or operation. (Natural Capital) | Increased infrastructure complexity (in design and delivery), cost and potential delay to operational start date (e.g. due to seasonal working restrictions). | 3 | 4 | **12** |
| Archaeology | Archaeological finds at sites and along pipe routes. Potential realignment. Cost of investigations could be substantial | 5 | 2 | **10** |

***Table 11 ACWG Risk Scoring Guide***

| Description | Probability | Cost impact | Schedule Impact |
|---|---|---|---|
| 1 - Very Low | Improbable (1-10%) | Minimal (<1%) effect on project cost | No delay to project delivery |
| 2 - Low | Remote (11-30%) | Small (1-2%) effect on project cost | Minimal (1-2%) effect on project delivery |
| 3 - Medium | Possible - Likely (31-50%) | Moderate (2.1-5%) increase in project cost | Small (2.1 - 5%) delay to project delivery |
| 4 - High | Probable (51-70%) | Significant (5.1-15%) increase on project cost | Significant (5.1-15%) delay to project delivery |
| 5 - Very High | Almost certain (71-99%) | Major (>15%) increase in project cost | Major (>15%) delays to project delivery |

# 10. Option cost/benefits comparison

Both schemes have been put forward for consideration in the WRSE programme appraisal, where they will be compared with other options in developing least cost and best value programmes to meet the regional forecast water resources needs.

They have been costed using industry historical costs and associated databases. The cost estimates have been benchmarked against similar, recently delivered schemes where information was available and checked by the other company partners, against their cost rates.

The ACWG uncertainty and optimism bias methodology has been used, along with the risk assessment spreadsheet, to derive the overall capital cost estimate, including specific risk items and optimism bias (in accordance with the Green Book).

The following table summarises the cost and benefits of the two schemes. Net present values (NPV) are calculated over 80 years. The cost estimates exclude any work or payments to make the schemes carbon neutral.

***Table 12 Cost estimates (at 2017/18 prices)***

| SRO | Scheme | Water resources benefit (Ml/d) | NPV (£m) | | | Average unit costs – AIC (£/Ml) | | Carbon impact | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Capex | Opex | Total | Full Utilisation (30Ml/d) | Minimum Utilisation (7.5Ml/d) | Whole life carbon (tonnes CO2e) | Carbon intensity (kgCO2e/Ml) |
| West Country South sources and transfers | Potable transfer from Roadford reservoir to WSX centre | 30 | 630.3 | 336.7 | 967.0 | 5,756 | 18,199 | - | - |
| | Raw transfer from Poole STW to R Stour | 30 | 106.9 | 67.3 | 174.2 | 928 | 2,932 | - | - |
| West Country South - Southern Water transfer | Potable transfer from WSX centre to Testwood | - | 125.5 | 43.2 | 168.6 | 1,004 | 3,403 | - | - |
| | Raw transfer from R Stour to Testwood | - | 187.4 | 89.6 | 277.0 | 1,477 | 4,845 | - | - |
| Scheme totals | Potable transfer from Roadford reservoir to Testwood | 30 | 755.8 | 379.9 | 1,135.7 | 6,760 | 21,602 | 1,021,180 | 1,554 |
| | Raw transfer from Poole STW to Testwood | 30 | 294.3 | 156.9 | 451.2 | 2,405 | 7,777 | 280,847 | 427 |
| SRO totals | West Country South sources and transfers | 60 | 737.2 | 404.0 | 1,141.2 | - | - | 1,106,220 | 1,684 |
| | West Country South - Southern Water transfer | - | 312.9 | 132.7 | 445.6 | - | - | 195,806 | 298 |

The distances associated with these transfers, and especially the Roadford potable scheme, mean that they have both a high capital cost and ongoing operating cost. As they both only yield up to 30 Ml/d, the cost per megalitre is many times greater than historical WRMP scheme unit costs. However, it is important to recognise that the lower cost solutions within the WRSE region have already been implemented and hence meeting the region's overall long-term needs will require selection of schemes far more expensive than those historically implemented. The WRSE regional modelling will determine whether these schemes represent good value and should form part of the future solution.

# 11. Impacts on current plan

The timescales for delivering either of these schemes do not enable them to be used as part of Southern Water's plan to meet their Section 20 Notice requirements in the Hampshire area. They are therefore provided as longer-term options to meet growth, 1:500 year resilience and/or future environmental ambition for consideration as part of the WRSE regional planning as well as SRN's WRMP24. Consequently the SROs do not impact current plans.

# 12. Board statement and assurance

## Board statements

The Boards of each of the solution owners assure that they:

- support the recommendations for solution and/ or option progression made in this submission
- are satisfied that progress on the solution is commensurate with the solution being "construction-ready" in the period 2025 to 2030
- are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage in its development
- are satisfied that expenditure has been incurred on activities that are appropriate for gate one and is efficient.

The Boards of each of the solution owners noted that this solution is in the early stages of development and delivery is more than ten years in the future. The maturity of the information reflects this early stage development, and that it may change as the solution is developed further.

## Assurance

The final determination and the report template provided by RAPID calls for external assurance of the quality and consistency of data and approaches used in preparation of the submission, as well as evidence of efficient cost expenditure (refer to section 14 below). Based on feedback and lessons learnt from the accelerated gate one submissions in 2020 the assurance requirements have been revised so that they focus on the desired outcomes rather than being a check on how well the submission templates have been completed.

In addition to internal review and sign-off by the team responsible for each workstream, members of the wider programme team and internal experts from the companies have reviewed the key deliverables.

Mott MacDonald, as independent third party external assurers, have reviewed the gate one report and the key supporting data and information. For gate one the extent and depth of the reviews are proportionate given the very early stage of the scheme development. A letter summarising their findings is included in Appendix B. Table 13 summarises the assurance used to support the Board statement.

***Table 13 Board statement and supporting assurance***

| Board statement | Assurance |
|---|---|
| The Board support the recommendations for solution and/or option progression made in this submission. | • The recommendations about scheme progression have been agreed by all the scheme partners and discussed with RAPID in advance of submission.<br>• The Executive directors have been briefed on the conclusions and approved the recommendations.<br>• Third party assurance by Mott MacDonald. |
| The Board are satisfied that progress on the solution is commensurate with the solution being "construction-ready" in the period 2025 to 2030. | • The supporting information and analysis set outs the data used to carry out the assessment.<br>• A detailed project plan has been prepared and reviewed.<br>• Third party assurance by Mott MacDonald. |
| The Board are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure | • Preparation of initial concept design and feasibility assessment by industry leading engineering consultancy company with their own internal review |

| Board statement | Assurance |
|---|---|
| scheme of this nature at this stage in its development. | • Peer review of documents by representatives of the partner companies.<br>• Third party assurance by Mott MacDonald. |
| The Board are satisfied that expenditure has been incurred on activities that are appropriate for gate one and is efficient. | • Evidence of efficient cost expenditure has been reviewed by Mott MacDonald.<br>• This follows an approach consistent with the successful submission of the West Country North scheme in 2020. |

# 13. Solution or partner changes

The key roles of the solution partners are summarised in Table 14 below.

***Table 14 Roles of solution partners***

| Partner | SWB | SRN | WSX |
|---|---|---|---|
| **Funding allocation:** | | | |
| **West Country South sources & transfers**<br>**Current**<br>**Revised for gate two** | <br>47.3%<br>43.0% | <br>26.4%<br>28.5% | <br>26.4%<br>28.5% |
| **West Country South – Southern Water Transfer** | 33.3% | 33.3% | 33.3% |
| **Role** | Water resource from Roadford<br>Treatment and transmission to WSX | Recipient of the water<br>Mitigation measures in the downstream treatment works and distribution system | Transmission across WSX including water conditioning<br>Effluent re-use from Poole<br>Project manager for the gate one feasibility study |

As noted in the executive summary, the Roadford pumped storage scheme is provisionally 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 two to four of the SRO funding. Based on the capital cost estimates, the Roadford component is approx. 7.6% of the total. Therefore, subject to the final decisions on the SRO and the Green recovery, the SRO allowances going forwards would be adjusted downwards by £0.378m, with the amount coming off SWB's contribution. The revised percentage funding allocations for each partner in the table above reflect this change. The cost allocations would be fully reconciled at PR24.

# 14. Efficient spend of gate allowance

Expenditure on the gate one feasibility study has been delivered efficiently, because:

- Work has only been undertaken on activities included in the list of gate activities in the PR19 final determination appendix
- The largest packages of work have been based on defined scopes of services awarded through competitive tenders or framework agreements that were competitively tendered and cross-checked against similar commissions. All packages have defined deliverables and key dates.
- Project management and scheme partner in-house staff costs are based on actual and forecast staff time (hours) and rates, with defined scopes and budgets which are subject to regular reviews.
- Efficiencies have been realised by running the two schemes as a single programme and from the work done and lessons learnt on the accelerated gate one submission for West Country North sources & transfers SRO.

A summary of the costs is given in Table 15 below. Allowances are included for the contribution to the EA's National appraisal unit (NAU) and area costs and for the Discretionary Advice Service (DAS) agreement with the Natural England, which were not expected at the time of the final determination but have subsequently been advised to be part of the gate one costs.

***Table 15 Efficient costs (both SROs)***

| Description | Cost £m @ 2017/18 prices | | Comments |
|---|---|---|---|
| | West Country South sources & transfers | West Country South – Southern Water Transfer | |
| Gate one allowances | 0.552 | 0.396 | 10% of total allowance |
| Forecast gate one costs: | | | |
| Technical consultancy, cost estimating and assurance | 0.363 | 0.201 | Based on actuals to the time of writing plus a forecast to July 2021 |
| Partner costs including project management | 0.109 | 0.069 | |
| Total | 0.472 | 0.270 | |
| Variance | 0.080 | 0.126 | In aggregate forecast expenditure is 22% less than the allowance on a like for like basis |
| Additional costs for regulators: | | | |
| EA National appraisal unit & Area costs | 0.044 | 0.029 | Based on budgets in offer letters from EA; actuals may differ slightly |
| NE Discretionary advice service (DAS) | 0.006 | 0.006 | Based on agreed DAS |
| Total | 0.050 | 0.036 | c. 10% of the total |
| **Total gate one cost forecast** | **0.522** | **0.306** | |
| Variance | 0.030 | 0.090 | 6% and 23% less than the allowance respectively |
| Forecast gate two costs: | | | |
| Based on PR19 allowances | 0.820 | 0.594 | 15% of the total allowance |
| Adjusted for Roadford pumped storage funding under Green recovery | 0.765 | n/a | Reduced by 7.6% as explained in Section 13 |

In the executive summary we explain that the sources identified in this study may be required within the West Country as part of an intra-regional sources and transfer project rather than inter-regional transfer to WRSE. If this is the case the West Country South – Southern Water transfer SRO will stop at gate two. This would make the gate three and four funding allocations available to be recycled for the investigation of new solutions.

## Penalty scale and assessment criteria

We have no objection to retaining the maximum penalty of 30% of the gate one costs provided that the level of penalties takes into account of the maturity of the solution and our plans to redress any shortfalls.

We consider that it would be appropriate to apportion the penalty scale across the assessment elements, but we note RAPID's desire to retain flexibility and apply penalties on a case by case basis.

The PR19 final determination appendix mentions that the penalty would apply to each company's total efficient spend. We do not consider that this is proportionate and would request that any penalty is only applied to the expenditure of the particular scheme.

# 15. Proposed gate two activities and outcomes

Further work to resolve issues that have been identified during this initial feasibility study have been collated into the gate two work programme. A summary of priority gate two activities is given in Table 16 below.

***Table 16 Gate 2 Key Activities***

| Workstream | Component | Further analysis |
|---|---|---|
| Water Resources | Roadford | River Tamar and Roadford Lake deployable output and SWB's Forecast Utilisation |
| Water Resources | Recycling Scheme | Integrated deployable output assessment covering source availability and river and treatment works impacts |
| Water Quality | Poole STW Effluent | Effluent quality analysis and treatment requirement |
| Water Quality | DWSP | Optioneering for Water treatment works<br>Development of Drinking water Safety Plans |
| Transmission | Displacement using River Exe | Determine whether current displacement proposal is best value versus a direct pipeline. |
| Transmission | General | Concept design<br>Operation and Sweetening flow arrangements |
| Environmental assessment | General | SEA+ - Assess likely effects<br>HRA incl. in combination effects<br>Natural capital and net environmental gain. Net benefit assessment |
| Consenting | DCO and Permitted Development | Assessment of legal potential for either scheme to be consented via a DCO and assess need, likelihood and risks to using PDR.<br>Engagement with planning authorities |
| Procurement | DPC | Determine whether DPC would be best value procurement approach for the recycling scheme. |
| Stakeholder engagement and customer research | General | Detailed engagement<br>Qualitative and quantitative customer research |

The outcome of the gate two activities is anticipated to deliver all of RAPID's requirements without any quality or delay penalties.

# 16. Conclusions and recommendations

Our conclusions and recommendations are included in Section1 Executive summary.

# 17. Appendix A: Gate one deliverables checklist and navigation

| Ref. | Gate one activities | Relevant section in gate one report |
|---|---|---|
| 1 | Preliminary solution feasibility and data collection presented in a conceptual design report, using comparable methodologies and consistent assumptions: | Sections 2 and 4 |
| 1.1 | Initial configuration/sub-option solution designs | Section 2 |
| 1.2 | Initial costing and estimating report supported by benchmarking evidence | Section 10 |
| 1.3 | Initial water resource benefit | Section 2 |
| 1.4 | Initial data available and provided to regional groups to support high-level assessment of regional water resource benefit | Section 10 |
| 1.5 | Initial option-level Strategic environmental Assessment and Habitat Risks Assessment, including consideration of in-combination effects and identification of environmental risk that need mitigating through solution design and costing | Section 5 |
| 1.6 | Initial environmental, social and economic valuations (or metric benefits) consistent with principles in the National Planning Statement and Water Resource Planning Guidelines | Section 5 |
| 1.7 | Initial drinking water quality considerations | Section 5 |
| 2 | Initial outline of the solution procurement strategy | Section 6 |
| 3 | Initial considerations of the planning application route (high level review of process and timelines) | Section 7 |
| 4 | Initial comparison of solutions' costs and benefits in early draft regional plans with consideration given to inter-regional supply options and system impacts | Section 10 |
| 5 | External assurance of data and approaches supported by Board statement | Section 12 |
| 6 | Regional stakeholder engagement including customer preferences to identify any issues that need further investigation | Section 8 |
| 7 | Details of efficient spend to gate submission on gate one activities, including a breakdown of coast against activities, evidence of efficiency of spend (benchmarking or tenders and assurance | Section 14 |
| 8 | Assessment of key risks to identify potential regulatory barriers, guidance or changes required for the solution to progress | Section 9 |
| 9 | Identify impacts on current supply-demand balance delivery plan with simple comparisons to current programme solutions | Section 11 |
| 10 | Identification of any changes in solution partner (other water company) or solution substitutions | Section 13 |
| 11 | Develop solution programme plan to determine activities that need to be undertaken prior to each subsequent gate | Section 3 |
| 12 | Proposals for gate two activity and outcomes, and penalty scale, assessment criteria and contributions | Section 15 |

# 18. Appendix B: Assurance letter

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**Your Reference**
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**Southern Strategic Resource Options**

30 June 2021

Dear Julian,

You asked us to review West Country South strategic regional water resource options produced for your RAPID Gate One submission. We were commissioned by Wessex Water although the options are jointly sponsored by Wessex Water, South West Water, and Southern Water.

## Scope

We reviewed the following aspects of your Gate One submission:

- Executive summary
- Solution description
- Outline project plan
- Technical information
- Environmental and drinking water quality considerations
- Key risks and mitigation measures
- Option cost/benefit comparison
- Efficient spend of gate allowance
- Proposed Gate Two activities and milestones

We considered the method followed in developing the options, the data and information used and the extent to which risk and uncertainty have been taken into account.

## Conclusions

Whilst the need for brevity meant that you had to take strict editorial decisions in compiling the report, we concluded that your summary report is a fair representation of the work carried out and the main conclusions, and that the Gate One summary reports are supported by and consistent with the underlying data and analysis.

Our concluding opinions are summarised below, based on our understanding of your draft Gate One report.

*West Country South sources and transfer SRO:*

The options for new sources at Roadford and Poole appear to be feasible:

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- We understand that South West Water is progressing the Roadford source as Green Recovery project. The final decision on whether to deploy the additional water in the South West Water region – or to make it available for transfer to the east – depends on further consideration in the West Country Water Resources regional planning and water resource management plans.
- Owing to the overall transmission distance and relatively small scale of the resource benefit (30MLd) we conclude that the full 211km transfer of the Roadford water such that it connects with the Southern Water transfer SRO (see below) is unlikely to represent good value for money. Comparative work to be undertaken in the regional planning will be useful in identifying whether shorter transfers between South West Water and Wessex Water are beneficial for addressing more local challenges.
- We agree that the raw water transfer from Poole WWTW to the river Stour will reduce nutrient inputs to Poole Harbour and improve the flow in the river Stour. We observe that the 7km of pumping and additional water treatment will lead to an increase in carbon footprint which would further increase the challenge of meeting national carbon reduction targets.

*West Country South - Southern Water transfer SRO:*

We concluded that the options for pumping to Southern Water appear to be relatively expensive and to have a high carbon footprint. However, if options local to Testwood were not available, these transfer options appear to be technically feasible:

- The 63km transfer from the Wessex Water region to Testwood means that the total transfer distance would be ~274km. Although this option is at concept stage it is clear that it will always be expensive compared with similar options that may be available closer to the demand.
- The 56km transfer from an abstraction on the river Stour to Testwood is also likely to be expensive compared with similar options that may be available closer to Testwood.

*Risk and uncertainty:*

You showed us that you had identified the likely major risks and uncertainties but at this stage not all are fully quantified. Your summary report includes tables of significant cost and schedule risks, scored according to the All Company Working Group (ACWG) methodology. Your Gate Two plan includes activities to improve the quantification of the major risks. We suggest that in preparing for Gate Two it may be beneficial to 'visualise' operation of the schemes to check for risks that could be mitigated during design and construction.

*Efficient expenditure of the Gate One allowance:*

You showed how you have taken the same approach to developing the West Country South SROs as you did for your West Country North SRO. We observed that your forecast overall cost for the West Country South SROs together is some 12.7% less than the Gate One allowance, split as 5.5% efficiency for the Sources and Transfers SRO, and 22.8% for the Southern Water transfer SRO.

Whilst we do not have comparative data, we were satisfied that the Gate One allowance has been used efficiently.

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*Proposed Gate Two activities:*

You have a summary of priority Gate Two activities which address issues identified in your Gate One work. We have also provided feedback on some technical issues, for consideration in your Gate Two work. Some key suggestions are:

- Visualise the operation of water conditioning, including practical considerations of the treatment materials flow and operating regime.
- Consider the balance between smaller pipe sizes and increased pumping head to optimise construction cost, which could reduce sweetening flows but increase operating costs during droughts. We recognise that this optimisation work requires a full understanding the future operating regime which is not currently available.
- Consider whether pauses in the programme after future Gate submissions are still required, in the light of RAPID's commitment to support ongoing work during the assessment process.

**Assurance statement**

I refer to my review of technical aspects of West Country Strategic Resource Options Gate One submission to RAPID, covering the West Country South sources and transfer SRO and the West Country South - Southern Water transfer SRO, which have been audited under my direction. We were given free access to people and information as necessary to complete our work.

In my professional opinion, based on and to the extent disclosed by sampling carried out and as described above:

1. The Gate One preliminary feasibility assessment report is fair representation of the key features of the underlying method and evidence available, and that the options have been developed to an appropriate standard for an initial assessment.
2. Reasonable plans are in place for Gate Two activities to address the issues that have been identified in preparing for Gate One, and that progress to date is commensurate with the solution being construction ready within the required timeframe.
3. The Gate One activities appear to have been delivered efficiently within the Gate One funding allowance.
4. We provided technical feedback to the Gate One submission compilers, for consideration in finalising the submission and in ongoing work as necessary.

**Dr Andrew Heather**
Mott MacDonald Ltd

**Document record**

| Issue | Date | Author | Checker | Approver | Purpose |
|---|---|---|---|---|---|
| 1 | 14 Jun 21 | AIJ Heather | AN Bujnowicz | AIJ Heather | First issue. |
| 2 | 15 Jun 21 | AIJ Heather | AN Bujnowicz | AIJ Heather | Minor corrections. |
| 3 | 29 Jun 21 | AIJ Heather | AN Bujnowicz | AIJ Heather | Updated cost data. |