Strategic regional water resource solutions: detailed feasibility and concept design

Standard gate two submission for Severn Trent Sources SRO

Date: 14 November 2022

This document has been written in line with the requirements of the RAPID gate two guidance and to comply with the regulatory process pursuant to Severn Trent Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solution presented in this document be taken forward, Severn Trent Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

WONDERFUL ON TAP

SEVERN TRENT

Attention: Mr Paul Hickey
Managing Director
Regulators' Alliance for Progressing Infrastructure Development
Ofwat
City Centre Tower
7 Hill Street
Birmingham
B5 4UA

14 November 2022

Severn Trent Sources SRO Gate 2 Submission

Dear Paul

We are pleased to submit our gate-2 report for the Severn Trent Sources Strategic Resources Option (SRO). The report outlines how we have developed this SRO since its approval at gate-1, and the key steps we intend to take in gate-3.

As recommended in in our gate-1 submission, the Severn Trent Sources SRO proposes to transfer water to support customers in the South East of England in times of need. The water will be supplied from a single Severn Trent site: Netheridge Wastewater Treatment Works (requiring additional wastewater treatment processes, a pumping station, and a pipeline in order to transfer 35Ml/d). As we've discussed previously, Mythe is no longer providing support to the Severn to Thames Transfer SRO as it is required 'in region'.

Our team has been delighted to make this contribution to strengthening the UK's water infrastructure and creating a legacy of resilient water resources for future generations.

The Severn Trent Water Board confirms its support for this SRO with the supporting board statement attached.

We have aimed to create a gate-2 report that meets RAPID's requirements at this stage in the process. If there are elements you would like to discuss with the team, please contact justin.bailey@severntrent.co.uk and STSources@severntrent.co.uk; we would welcome the opportunity to provide further clarity where needed.

Yours sincerely

Liv Garfield
Chief Executive

Gate 2: Detailed feasibility, concept design and multi-solution decision making

Severn Trent Sources Strategic Resource Option Board Assurance Statement

This Board Assurance Statement is provided by Severn Trent Water. In support of this statement the company has undertaken internal assurance and due diligence.

The board is satisfied that the data and approaches used to develop the concept design and decision-making information included within the Gate 2 submission:

- meets the requirements set out in Ofwat's Final Determination, and subsequent additional feedback from Ofwat;
- have been subject to sufficient processes and internal systems of control to ensure that the information on design, costs and benefits contained in this submission are reliable;
- have been appropriately assured to give our stakeholders, including customers, trust and confidence in this gate two submission; and
- have appropriately considered the feedback and opinion of independent external assurance partners.

The board confirm that they understand their role in this submission as suppliers of the water

The board support the recommendation for the solution progression made in this submission and are satisfied that the:

- support the recommendation for the solution progression made in this submission and the recommendations for which options with the solution should be progressed;
- are satisfied that progress on the solution is commensurate with the solution being "construction-ready" for 2025-2030
- 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.
- are satisfied that expenditure has been incurred on activities that are appropriate for gate two and is efficient.

On Behalf of:	**Name and position:**	**Date:**	**Signature:**
Severn Trent Water	John Coghlan Independent Non-Executive Director and Chair of the Audit and Risk Committee	14 November 2022	[redacted]

Board Assurance

The following table provides details the main factors the Board have taken into account in support this Board Assurance Statement.

Statements	Considerations
It **supports the recommendations** for solution progression made in this submission and the recommendations for which options with the solution should be progressed.	The recommendations and methodology regarding scheme progress for the solution have been agreed by the scheme partners and discussed with RAPID.
	The Executive Programme Board and Board reviewed and discussed the conclusions and approved the recommendations for the solution.
	Independent external assurance was completed on behalf of the SRO with findings reported to the Board.
It is satisfied that progress on solution is commensurate with the solution being **"construction-ready"** for 2025-2030	The Executive Programme Board reviewed the project plan and the sources of data used to carry out the assessment
	The project plan showing when the solution will be construction ready is in place and has been reported to the Board
	Independent external assurance was completed on behalf of the SRO with findings reported to the Board.
It is 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.	Technical teams drafted Concept Design Reports and the key findings which were reviewed and approved by the Executive Programme Board
	Peer review of documents focused on scope, detail and quality was completed with findings reported to the Executive Programme Board
	Independent external assurance was completed on behalf of the SRO with findings reported to the Board.
The Board is satisfied that **expenditure** has been incurred on activities that are appropriate for gate two and **is efficient**.	A review on activity expenditure has been shared and reviewed at Executive Programme Board with key findings reported to the Board.
	A separate document providing evidence of efficient cost expenditure was drafted and approved by finance teams and reported to the Board.
	Independent external assurance was completed on behalf of the SRO with findings reported to the Board.

Glossary

Abbreviation	Explanation	Abbreviation	Explanation
ACWG	All Company Working Group	**NPV**	Net Present Value
ADO	Average Deployable Output	**NSIP**	Nationally Significant Infrastructure Project
AfW	Affinity Water	**O&M**	Operations & Maintenance
AIC	Average Incremental Costs	**OB**	Optimism Bias
BAU	Business As Usual	**OPEX**	Operating Expenditure
BNG	Biodiversity Net Gain	**PAS**	Publicly Available Specification
BSA	Bulk Supply Agreement	**PEIR**	Preliminary Environmental Information Report
CAP	Competitively Appointed Provider	**PFOA**	Perfluorooctanoic Acid
CAPEX	Capital Expenditure	**PFOS**	Perfluorooctane Sulfonate
CCG	Customer Challenge Group	**PQQ**	Pre-Qualification Questionnaire
CCW	Consumer Council for Water	**PR24**	2024 Price Review
CDR	Conceptual Design Report	**PRoW**	Public Rights of Way
CPO	Compulsory Purchase Order	**RAPID**	Regulators' Alliance for Progressing Infrastructure Development
CPRE	Campaign to Protect Rural England	**RO**	Reverse Osmosis
CTC	Cotswold Canals Trust	**RSPB**	Royal Society for the Protection of Birds
D&B	Design & Build	**s.35**	Section 35 of the Planning Act 2008
DBFOM	Design, Build, Finance, Operate & Maintain	**SAC**	Special Area of Conservation
DBOM	Design, Build, Operate and Maintain	**SCADA**	Supervisory Control and Data Acquisition
DCO	Development Consent Order	**SCL**	Special Category Land
DO	Deployable Output	**SEA**	Strategic Environmental Assessment
DPC	Direct Procurement for Customers	**SECR**	Streamlined Energy and Carbon Reporting
DWI	Drinking Water Inspectorate	**SIPR**	Specified Infrastructure Projects Regulations
DWPA	Drinking Water Protected Area	**SLR**	South Lincolnshire Reservoir
DWSP	Drinking Water Safety Plan	**SOC**	Strategic Outline Case
EA	Environment Agency	**SoCC**	Statement of Community Consultation
EAR	Environmental Appraisal Report	**SoS**	Secretary of State
EIA	Environmental Impact Assessment	**SPA**	Special Protection Area
ENG	Environmental Net Gain	**SPP**	Special Parliamentary Procedure
ES	Environmental Statement	**SR**	Service Reservoir
ESOS	Energy Saving Opportunity Scheme	**SRO**	Strategic Resource Option
FD	Final Determination	**SSSI**	Site of Special Scientific Interest
FRA	Flood Risk Assessment	**STS**	Severn Trent Sources
GLNP	Gloucestershire Local Nature Partnership	**STT**	Severn to Thames Transfer
GHG	Greenhouse Gas	**STW**	Severn Trent Water
GUC	Grand Union Canal	**SuDS**	Sustainable Drainage Systems
GWT	Gloucestershire Wildlife Trust	**SVP**	Stroud Valley Projects
HE	Historic England	**SWQRA**	Strategic Water Quality Risk Assessment
HoF	Hands-off Flow	**tCO_2e**	tonnes CO_2 equivalent
HRA	Habitats Regulations Assessment	**TCPA**	Town and Country Planning Act 1990
INNS	Invasive Non-Native Species	**The Trust**	The Canal & River Trust
ITT	Invitation to Tender	**TTT**	Thames Tideway Tunnel
LCWIP	Local Cycling and Walking and Infrastructure Plan	**WBS**	Work Breakdown Structure
M&E	Mechanical & Engineering	**WFD**	Water Framework Directive
Ml/d	Megalitres per day	**WIA**	Water Industry Act
MRS	Market Research Society	**WRMP**	Water Resources Management Plan
NAU	National Appraisal Unit	**WRSE**	Water Resources South East
NE	Natural England	**WRW**	Water Resources West
NFU	National Farmers' Union	**WRZ**	Water Resource Zone
NGO	Non-Governmental Organisation	**WTW**	Water Treatment Works
NIC	National Infrastructure Commission	**WwTW**	Wastewater Treatment Works
NPS	National Policy Statement		

Contents

1. Executive Summary

Opening Statement

1.1. Severn Trent Sources (STS) Strategic Resource Option (SRO) is a viable solution that offers a robust and reliable source of raw water support to the Severn to Thames Transfer (STT) SRO. STS SRO will be construction ready in AMP8. The earliest construction start date is 2029, to achieve an earliest deployable output (DO) date of 2031.

1.2. The earliest DO date of 2031 is driven by the timescales attached to the Development Consent Order (DCO) planning and consenting route, with STS SRO being considered "associated development" to the STT SRO. This date is in advance of the earliest STT SRO pipeline completion date of 2033; however, the guidance given by Water Resources South East (WRSE) in Autumn 2022 is that the STT SRO will not be required until 2050.

1.3. In gate one, we outlined the option of utilising the Mythe Water Treatment Works (WTW) 15 Megalitres per day (Ml/d) licence transfer for STS SRO. During gate two, and as part of the Regional Plan reconciliation exercise, this was not accepted and therefore withdrawn from the STS SRO. As a result of this, the latest Water Resources Management Plan (WRMP) now reflects the 15 Ml/d now being utilised "in region". The work undertaken in gate two and subsequent removal of Mythe from STS SRO was a paper exercise: no material costs have been incurred on the project and it does not impact on the allowable gate three funding, as there is no change in scope. Note that the 35 Ml/d yield flow available from Netheridge Wastewater Treatment Works (WwTW) is sufficient for the requirements of the STT SRO sweetening flow.

1.4. We have delivered our gate two submission at 23% below the gate two Final Determination allowance (inclusive of gate one carry-over), ensuring efficiency via competitive tendering (49%) and by collaborative procurement with other SROs. 27% of the gate 2 costs could not be competitively tendered, for example STW leadership costs and the costs of regulators such as the EA/NAU, Natural England and WRE.

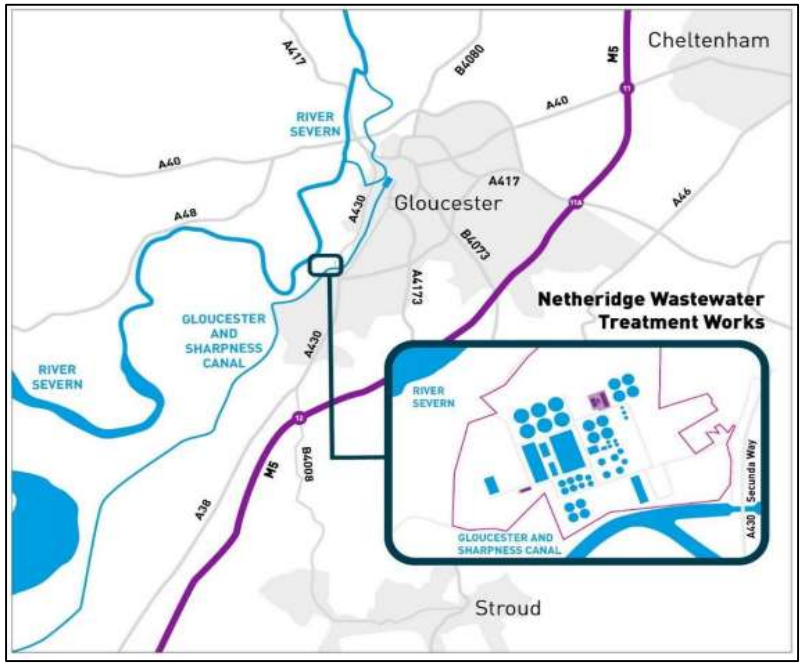
1.5. We have not discovered any showstoppers, and therefore recommend this SRO proceeds to gate three.

Key Facts

1.6. STS SRO utilises treated final effluent from Netheridge WwTW – which would normally be discharged to the River Severn – to provide raw water support to STT SRO. In terms of raw water support to the wider STW region, Netheridge WwTW is of limited value, due to its location close to the southern boundary of the region and at the foot of the River Severn catchment. STS SRO will discharge a volume of treated final effluent to a location near to Deerhurst, currently identified as Haw Bridge. The STT SRO will abstract the same volume of water and transfer it to the River Thames.

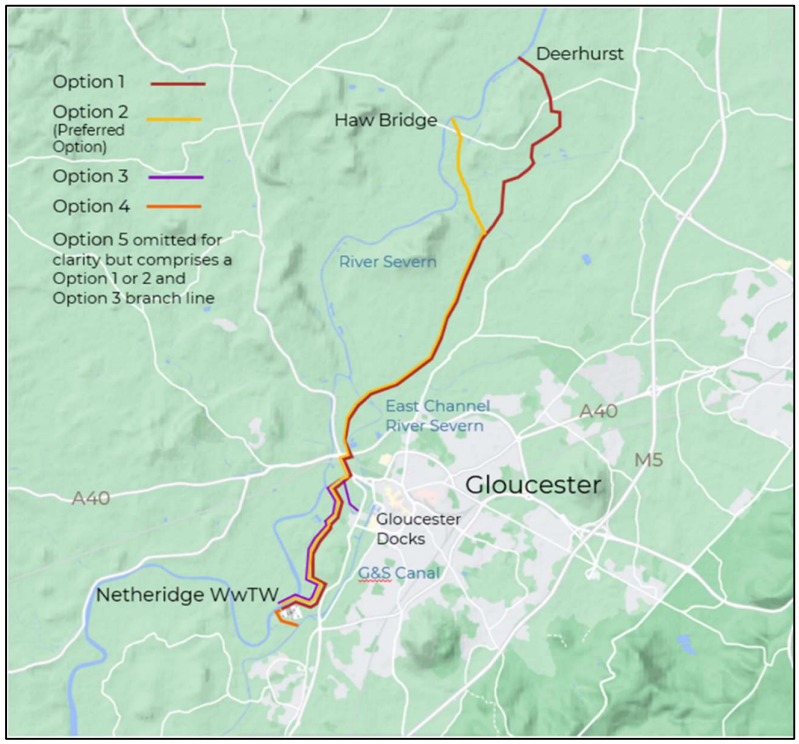
1.7. Netheridge WwTW is shown in Figure 1-1, representing the Put component of the Put & Take arrangement agreed in principle with the Environment Agency (EA) to support abstraction by the STT SRO.

Figure 1-1: Netheridge WwTW



1.8. The route of the proposed pipeline to convey flows from Netheridge WwTW to the River Severn discharge point is shown in Figure 1-2; note that the preferred Haw Bridge discharge location for STS SRO is downstream of the STT SRO Deerhurst abstraction point. The STT SRO is reported separately to the Regulators' Alliance for Progressing Infrastructure Development (RAPID) under its own gate two submission.

Figure 1-2: STS SRO pipeline route



1.9. WRSE has confirmed that its water resource modelling selected the Netheridge WwTW component under all scenarios in which STT SRO was selected. The full 35 Ml/d yield capacity is required during operation of STT SRO. At other times, a reduced flow of 20 Ml/d is required as a sweetening flow for the STT SRO transfer pipeline, when unsupported abstraction at Deerhurst WTW is restricted by the River Severn hands-off flow (HoF).

1.10. We have established a range of costs covering different treatment scenarios at Netheridge WwTW, relative to water quality requirements at point of discharge, which will be confirmed during gate three.

1.11. Stakeholder research undertaken by Water Resources West (WRW) confirms that stakeholders are supportive of water transfers and see them as a key part of future water resource options.

1.12. Our work in gate two shows that the key environmental consideration for this SRO is the proposed Netheridge WwTW discharge location. We have investigated several discharge locations and have confirmed to RAPID and the EA the benefits of discharging at Haw Bridge.

1.13. Netheridge WwTW will be construction ready in AMP8, subject to all necessary consents being secured. This is in line with the Final Determination requirement, with an earliest DO of Q3 2031.

1.14. The guidance given by WRSE in Autumn 2022 states that the STT SRO flow will not be required until 2050. The new assets required at Netheridge WwTW are therefore capable of being delivered in advance of the STT SRO that they support.

1.15. The key benefit of using Netheridge WwTW as a source for another SRO transfer is that wastewater is produced and fed into Netheridge WwTW for treatment under all

conditions. It is therefore very resilient to drought, improving the resilience of the subsequent transfer SRO.

1.16. Tests for the suitability of Direct Procurement for Customers (DPC) have been completed during gate two. These have concluded that DPC is not suitable for this SRO.

1.17. Further work is required to refine the proposal for gate three and, in particular, confirm:

- The level of additional treatment required for discharge to the receiving waterbodies.
- The exact discharge location for each STT SRO interconnector option.

2. Background and Objectives

Background

2.1. Water UK's water resource long-term planning framework, published in 2016, highlighted the "significant and growing risk of severe drought impacts, arising from climate change, population growth and environmental drivers" in England. The report concluded that a portfolio of strategic supply side resources and transfers would be needed by 2065.

2.2. In 2018, the National Infrastructure Commission (NIC) agreed with this conclusion, recommending an action to "improve infrastructure through a national transfer network in England and new infrastructure, such as reservoirs and water re-use systems"[1].

2.3. In 2020, the EA published its national framework for water resources[2], which delved deeper into the regions' supply-demand balance and noted in particular that water companies "should explore the potential for transfer to neighbouring regions" as part of the national agenda on water resilience.

2.4. STS SRO is one of several SROs currently being considered under the RAPID gated process. The scheme is under consideration as part of a portfolio of solutions to ensure that a reliable and resilient water supply is provided to water-stressed areas; in particular, the south east of England.

2.5. As a water transfer from an area of surplus to an area of deficit, STS SRO takes a step towards the national transfer network first highlighted in the NIC report. STS SRO offers a source of treated final effluent from Netheridge WwTW, providing raw water support to STT SRO as a sweetening flow.

Objective

2.6. The objective of STS SRO is to provide support to the water deficits assessed by the regional planning groups. Through the RAPID gated process, to ensure the solution is fit for purpose, an assessment has been conducted to establish key benefits, risks and opportunities. This has been completed through investigation engineering and environmental investigations, analysis and feasibility design, coupled with associated planning and procurement considerations.

[1] 'Preparing for a drier future: England's water infrastructure needs', National Infrastructure Commission, 2018

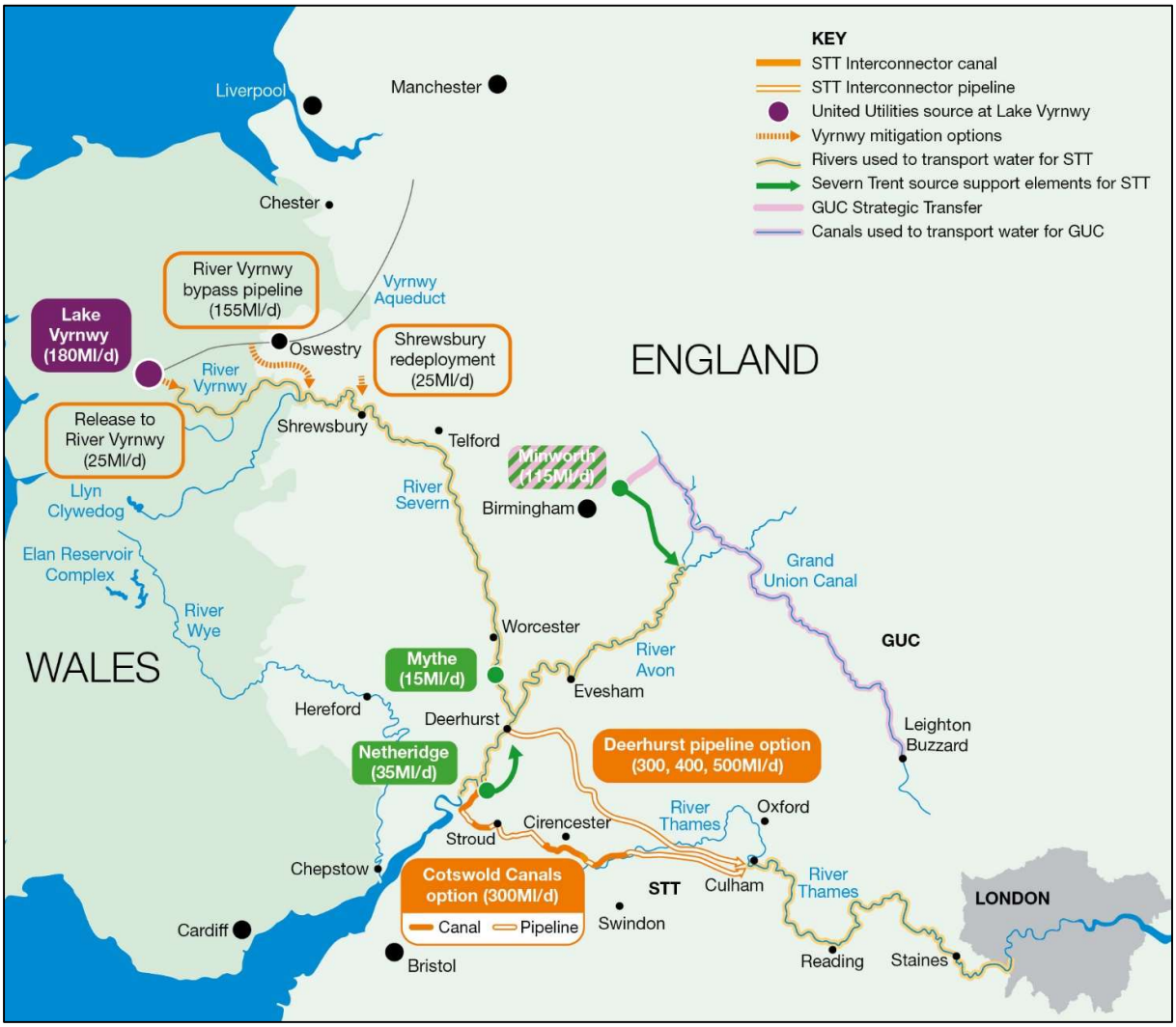
[2] 'Meeting our future needs: a national framework for water resources', Environment Agency, 2020

3. Solution Design, Options and Sub-options

Outline of the Solution

3.1. At gate one, STS SRO comprised two sources of raw water to provide support for inter-regional transfers to the WRSE area as part of the STT SRO system. Figure 3-1 shows the relation between the STS and STT SROs.

Figure 3-1: STS SRO relation to STT SRO system



3.2. During gate two, and as part of the Regional Plan reconciliation exercise, the Mythe WTW 15 Ml/d licence transfer was not accepted and therefore withdrawn from the STS SRO. As a result of this, the latest Water Resources Management Plan (WRMP) now reflects the 15 Ml/d now being utilised "in region".

3.3. The work undertaken in gate two and subsequent removal of Mythe from STS SRO was a paper exercise: no material costs have been incurred on the project and it does not impact on the allowable gate three funding, as there is no change in scope.

3.4. The regional reconciliation between WRW and WRSE is based on Mythe WTW spare licence being utilised within the WRW region. It is therefore unavailable for trading as part of an inter-regional transfer.

3.5. During gate two, West Country Water Resources (WCWR) published its draft Regional Plan, which confirmed that Netheridge WwTW, as part of the STT SRO system, could potentially provide a benefit to the area when not needed by STT SRO, and should be investigated further. If progressed, this would increase the utilisation of STS SRO.

3.6. Consequently, we have continued to investigate options that could transfer treated wastewater to the Gloucester & Sharpness Canal for WRSE (via the STT SRO canal interconnector), or for WCWR (using Bristol Water's existing abstraction). The additional treatment processes differ for each inter-regional transfer route, and are described below:

- Netheridge WwTW discharges final effluent to the tidal reaches of the River Severn. New assets would allow up to 35 Ml/d to be diverted into additional treatment processes, providing the additional level of treatment required to meet the likely discharge standard for the receiving watercourses.
- The treated wastewater will then be transferred via a new pumping station and pipeline to a location that allows for a new or increased abstraction from the non-tidal reaches of the River Severn, or the Gloucester & Sharpness Canal. Refer to paragraph 3.6 for details of discharge locations.
- STS SRO would form part of the Put & Take arrangement agreed in principle with the EA as part of the STT SRO permitting workstream. It is assumed that a similar arrangement could be developed for the benefit of the WCWR area, if required.

Options and Configurations

3.7. Options have been developed through the application of the ACWG Design Principles described in Section 2.3 and Appendix F of Annex A1, Engineering CDR, to take account of the support requirements of the inter-regional transfer and the environmental impacts on the existing and proposed receiving watercourses. We have also undertaken an options appraisal for the route of the transfer pipelines to the various discharge locations. We have considered configurations for the following inter-regional transfer options:

- **Transfer and discharge to the River Severn for WRSE:** This option allows water to be abstracted at Deerhurst for transfer to the River Thames via the STT Pipeline interconnector. At gate one, the proposed discharge location was located immediately downstream of the Deerhurst abstraction point. During gate two, the discharge location has changed to Haw Bridge, reducing the transfer pipe length and pumping head, which reduces the scheme's carbon, OPEX and CAPEX impacts. This change was made possible through ongoing dialogue with the EA, which enabled us to challenge our thinking on the requirement to discharge near the point of abstraction. The final preferred option saves a total of 5,654 tonnes of carbon dioxide equivalent (tCO_2e), and £5.974m net present value (NPV), over an 80-year period.
- **Transfer and discharge to the River Severn East Channel for WRSE or WCWR:** This option allows water to be abstracted either at the existing Canal & River Trust (the Trust) abstraction point, or the proposed abstraction point for the STT SRO canal interconnector. Water would then be transferred to the Gloucester & Sharpness

Canal, making it available to abstract at Bristol Water's existing abstraction point, or for transfer along the restored Cotswolds Canal to the River Thames.

- **Transfer and discharge to the Gloucester & Sharpness Canal for WRSE or WCWR:** This option discharges treated wastewater directly to the Gloucester & Sharpness Canal, to be used as described in the option above. The option benefits from reduced carbon, CAPEX and OPEX, as Netheridge WwTW is located immediately adjacent to the canal. However, the option requires additional levels of treatment due to the direct/indirect effluent reuse nature of the option, which negates the above savings. We have discussed this option with the Drinking Water Inspectorate (DWI) and acknowledge that, if it were to proceed, it would require significant additional investigation to understand the impact on existing Drinking Water Safety Plans (DWSP), as well as additional customer engagement.

3.8. The last two options have not been developed to the same level of maturity as they are dependent on the STT SRO canal transfer being the preferred option for the WRSE inter-regional transfer, which is currently not the case.

3.9. The WCWR Regional Plan has not selected the Netheridge WwTW option, and the pipeline interconnector has been identified as the preferred transfer option by STT SRO rather than the canal transfer. We therefore propose to concentrate on the first option during gate three. This decision will be reviewed if the above decisions are revisited in the future.

3.10. All options are based on the maximum sustainable final effluent discharge produced by Netheridge WwTW. Support for the transfers is therefore limited to a maximum of 35 Ml/d, with the treatment plant sized for an average diurnal flow profile. This has been discussed with the STT SRO project team, which has confirmed that our proposal meets the SRO's operational requirements.

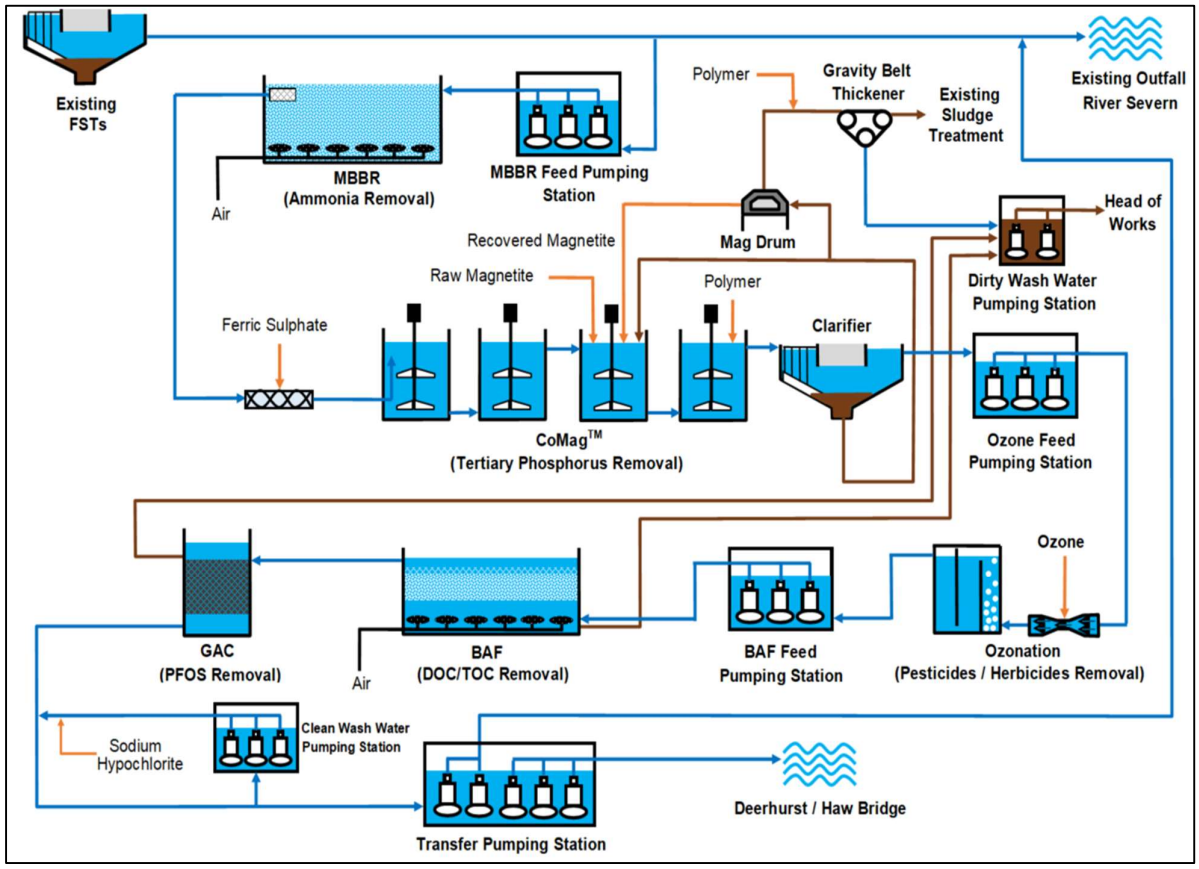
3.11. WRSE has confirmed that its water resource modelling selected the Netheridge WwTW component under all scenarios in which STT SRO was selected. The full 35 Ml/d capacity is required during operation of STT SRO. At other times, a reduced flow of 20 Ml/d is required as a sweetening flow for the STT SRO transfer pipeline, when unsupported abstraction at Deerhurst WTW is restricted by the River Severn HoF.

3.12. Following discussions with the EA, alternative options avoiding the need for additional treatment processes at Netheridge WwTW are currently being investigated. These could reduce carbon by up to 64,328 tCO2e and NPV by up to £163.642m, and will be considered in more detail during gate three. Refer to Annex A1.1 (Alternative Options Addendum) for details of the alternative options.

Description of the Key Assets to be Constructed

3.13. The current preferred option consists of additional treatment processes at Netheridge WwTW, and a pumping station and pipeline to transfer the treated wastewater to the River Severn at Haw Bridge. The proposed treatment process is shown in Figure 3-2. Refer to Annex A3 (Treatment Basis of Design Report) for details of the two non-preferred options, both of which require additional levels of treatment.

Figure 3-2: Proposed treatment process flow diagram



3.14. The new treatment plant for discharge to the Water Framework Directive (WFD) reaches of the River Severn has been designed to remove, as far as the best available technology will allow, substances which would cause a deterioration in the receiving waterbodies, or create an impediment to achieving their target WFD status. Refer to Annex A3 (Netheridge Treatment Basis of Design Report) for details of the analysis undertaken to determine the required level of treatment[3].

3.15. As detailed in our gate one submission, the Netheridge WwTW submitted as part of STW's PR19 submission was based on the diversion of 35 Ml/d treated wastewater for discharge directly to the proposed STT SRO WTW at Deerhurst. The scheme did not include additional treatment processes at Netheridge WwTW. STW assumed the STT SRO WTW would be designed to treat a 35:65 treated wastewater / River Severn water blend to a standard allowing discharge to the River Thames.

3.16. It became apparent that the option to discharge directly to the STT SRO WTW was unacceptable to Thames Water. This was due to the potential connection from the Deerhurst WTW pipeline into their Swindon & Oxfordshire WRZ.

3.17. STW then assumed a discharge to the River Severn would require the addition of tertiary treatment to reduce the total phosphorus concentration to 0.2 mg/l.

[3] The analysis is based on the following EA documents: 'Surface Water Pollution Risk Assessment for your Environmental Permit' (published in February 2016 and updated in February 2022); 'Permitting of Hazardous Chemicals and Elements in discharges to surface waters LIT 13134' (published in December 2019).

3.18. As more detailed water quality monitoring results became available in gate two, we undertook further analysis to comply with the guidance detailed above. This has resulted in the proposed treatment plant providing a significantly higher level of treatment for the diverted treated wastewater, compared to other WwTWs with existing discharges to the same watercourse.

3.19. By way of comparison, we have undertaken sensitivity analysis to demonstrate the additional carbon and cost impact of complying with the guidance detailed in section 3.19. This analysis shows that an additional 16,116 tCO2e will be generated, and £102m NPV expended, over the 80-year life cycle.

3.20. At the time of writing, we have yet to commence detailed permitting discussions with the EA. These will commence shortly and continue through gate three. We have, however, flagged our concern with the National Appraisal Unit (NAU) about the appropriateness of requiring the SROs to meet discharge standards in excess of existing discharges to the same watercourses.

3.21. We recognise that a future policy decision to progressively reduce discharges of priority substances, and to cease and phase out discharges of priority hazardous substances, is being considered, which would significantly increase treatment requirements for all discharges. However, we consider it more appropriate that this is addressed at an industry level rather than at the level of individual SRO projects, particularly as the SROs are not discharging for the majority of the time.

Operation of the New Assets

3.22. As a raw water support to the STT transfer SRO, STS SRO will be operated to ensure support is available in line with the operational strategy developed by the STT SRO project team. We have worked closely with the team to develop modes of operation that meet this fundamental requirement.

3.23. The driver for the transfer SRO is to provide resilience in drought scenarios in the WRSE region. As a resilient source of raw water, STS SRO will be available for use throughout the year, and will be capable of deployment within the timescales specified by STT SRO.

3.24. We have developed a hot standby operational mode for the additional treatment processes, which will allow the plant to be returned to either sweetening flow or peak flow mode as required. This will require constant operation of some elements of the plant to ensure viability of the biological processes.

3.25. When raw water support is not required for either sweetening or peak flow, the transfer pipeline will be drained to avoid the risk of septicity. The notification of need duration agreed with STT SRO allows sufficient time for the pipeline to be recommissioned.

3.26. OPEX costs have been developed based on the proposed modes of operation.

4. Water Resource Assessment

Utilisation

4.1. As a raw water source to support an inter-regional transfer SRO, STS SRO will be utilised to meet the need of STT SRO, for the benefit of the WRSE region.

4.2. STT SRO has developed a drought utilisation profile based on water resource modelling covering the receiving water company's areas. Refer to the STT SRO gate two submission for this profile.

4.3. STT SRO undertook further water resource modelling to improve understanding of the utilisation profile. At gate one, this was stated as 14% across the historical flow records for the period 1920 to 2010. A stochastic time series of River Severn flow has now been developed. Refer to STT SRO gate two submission for details of this modelling.

4.4. STT SRO has a range of raw water support options to call upon, which can be varied to address the severity of the drought scenario in the WRSE region. Table 4.1 shows that the utilisation profile has a range of 6.2% to 22.6%, depending on the nature of the raw water support deployed.

Table 4.1: Summary of utilisation over historic and stochastic time series of River Severn flow

Aspect	October 2020 historical (1920–2010)	April 2021 stochastic (climate drivers from 1950–97)
Overall utilisation throughout the complete time series – unsupported transfer	6.20%	7.80%
Overall utilisation throughout the complete time series – all types of support	22.30%	22.60%
Period of support in key droughts[4]	Top 5 historical	1 in 500-year droughts (as highlighted by WRSE)
	244 days (1944)	230 days (realisation 66, 1976)
	234 days (1921-22)	232 days (realisation 152, 1976)
	226 days (1976)	194 days (realisation 209, 1992)
	214 days (1990-91)	209 days (realisation 302, 1976)
	197 days (1945)	189 days (realisation 348, 1992)

Water Resource Benefit

4.5. As a raw water source to support an inter-regional transfer, STS SRO has no direct DO benefit.

4.6. A variable yield of up to 35 Ml/d will be available at the point of discharge to the STT SRO canal or pipeline / river transfer networks. STT SRO has assumed no raw water losses in the transfer networks before determining the DO benefit to the WRSE region.

4.7. Based on the available yield of 35 Ml/d and no transfer losses, STS SRO can deliver a DO benefit of 24 Ml/d within the WRSE region (refer to the STT SRO gate two submission for details of the water resource modelling).

[4] Note that the realisation number represents one version of the stochastic sequence.

4.8. STT SRO DO benefits have been demonstrated to improve the forecast supply-demand balance in the WRSE region, and have been used to derive the Regional Plan.

Long-term Opportunities and Scalability

4.9. Our assessments have demonstrated that the option presented represents the maximum yield benefit available from Netheridge WwTW. There are no opportunities to increase the available yield from this source.

4.10. The option to deploy the additional yield to WCWR remains a potential benefit that could be explored in gate three if WCWR modelling demonstrates a DO benefit.

Infrastructure Resilience to the Risk of Flooding and Coastal Erosion

4.11. As a raw water source for inland transfer schemes, STS SRO has no impact on coastal erosion.

4.12. We have undertaken an initial Flood Risk Assessment (FRA) for both the new treatment processes at Netheridge WwTW and the transfer pipeline route for STT SRO. The proposed location for the new treatment plant is in Flood Zone 1, an area at very low risk of flooding from rivers or surface water. A detailed flood risk assessment will be undertaken in gate three to review the requirement for flood protection measures.

4.13. The proposed route for the pipeline is in an area at risk of flooding from rivers or surface water, which is likely to require groundwater control during the installation phase. Covers at shaft installations for trenchless crossings will be raised above the floodplain level.

5. Drinking Water Quality Considerations

5.1. As a source SRO, STS SRO does not serve customers directly, and is represented as an input to the catchment within the risk assessment of STT SRO (also note that Netheridge water is not transferred directly to STT). Throughout gate two, we have engaged regularly with the DWI and agreed that source SROs do not need to complete the All Company Working Group (ACWG) treated water methodology. Similarly, the STT SRO has monitored "emerging substances" for the River Severn catchment, and further monitoring will take place based on outcomes of this workstream.

5.2. The STT SRO Strategic Water Quality Risk Assessment (SWQRA) provides a high-level risk assessment, based on a drinking water safety approach, to identify limiting hazards and assessing their risks across the water supply system for SROs. Key conclusions from the STT SRO gate two assessment include:

- New limiting hazards have been added at gate two, including Perfluorooctane sulfonate (PFOS), Perfluorooctanoic acid (PFOA) and 1,4-Dioxane, which are defined as "contaminants of emerging concern".
- The pre-mitigated risk scores at catchment for all but one of the limiting hazards are high (red) or medium (amber). The exception is conductivity, with a low (green) risk score at catchment.
- For most of the limiting hazards, the residual risks posed to consumers are low (green). There are, however, some limiting hazards for which the residual risks to consumer remain high (red) or medium (amber). These are described, and mitigation outlined, in the STT SRO gate two submission.

5.3. The collaborative, catchment-to-consumer approach of the SWQRA process is aligned with the objectives of the Drinking Water Protected Areas (DWPA). This meets the requirements of the Water Supply (Water Quality) Regulations 2016: "protection of the supply by avoiding deterioration in water quality to reduce the level of purification treatment required and, for groundwater, to meet good chemical status and to reverse upward trends in pollution". Reducing pollution at source is more cost effective than removing pollutants or blending with clean water.

6. Environmental Assessment

6.1. Environmental investigations through gate two have found no major issues that would prevent STT SRO from progressing to gate three. Environmental monitoring (completed as part of the STT SRO, which encompasses the River Severn catchment) has been maintained throughout gate two. This collaborative approach was agreed with RAPID as the most efficient way to undertake the environmental assessments for these SROs. As our knowledge of the assets and the environment around these assets improves, so does our understanding of the data we still require.

6.2. This chapter outlines the conclusions of the environmental assessments completed to facilitate the STS SRO gate two submission, in conjunction with RAPID gate two guidance.

Habitats Regulations Assessment (HRA)

6.3. An "informal" HRA has been undertaken at gate two in order to inform any likely impediments to the practicality or deliverability of the scheme. This follows the methodology of a HRA to identify the risk of any non-compliances at the decision-making stage, but is not part of a statutory plan or programme. It delivers the duties of Statutory Undertaker with regard to ensuring that the works comply with the requirements of the regulations. This ensures that the potential effects of the scheme are fully considered at each gate.

6.4. The informal HRA screening identified a risk of "likely significant effects" for the Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site, as well as the Walmore Common SPA and Ramsar site, and the need for an appropriate assessment based on the following pathways:

- Netheridge WwTW effluent transfer pipeline/outfall construction-related impacts, including the impacts on supporting habitat for migratory fish and the designated bird communities.
- Netheridge WwTW effluent transfer operation and impacts on water quality, downstream of Haw Bridge. This includes impacts on supporting habitats for migratory fish, impacts on migratory cues, and impacts on habitats within the Severn Estuary European Marine Site that supports the designated birds and fish.
- (The joint Mythe WTW licence transfer and Netheridge WwTW effluent transfer were assessed prior to the Mythe WTW licence transfer being taken out of the project scope.) Operation and impacts on hydrology associated with the abstraction of 50 Ml/d at Deerhurst and consequent augmentation of 35 Ml/d at Haw Bridge, with net 15 Ml/d reduction downstream of the discharge of treated effluent affecting the River Severn downstream and into the Severn Estuary. This includes impacts on supporting habitats for fish, migratory cues, and the designated bird communities.

6.5. The informal assessment concluded that, based on the current information and the proposed mitigation measures, there would be no adverse effects on the site integrity of the Severn Estuary SAC, SPA and Ramsar site, or the Walmore SPA and Ramsar site.

Invasive Non-Native Species (INNS)

6.6. An INNS assessment has been undertaken through the application of the EA's standardised risk assessment tool (SAI-RAT) for use by all SROs at gate two. The

inputs provided for the scheme risk assessment provide a risk score of 38.0%, which is considered low. Key aspects of STS SRO that contribute to this score include:

- A lack of recreation or external INNS pathways at source or along the transfer route (i.e. the pipeline is a closed transfer mechanism) (reducing the score).
- Unmitigated movements of large water volumes (increasing the score).
- The presence of priority habitats along the transfer route and at the receptor (increasing the score).

6.7. The activity of transferring water from the WwTW to the River Severn is intrinsic to the STS SRO, and further design mitigation is therefore likely to be the key to reducing INNS transfer risk, where applicable.

6.8. The risk assessment can be utilised to identify potential biosecurity measure types from a defined list of 30 options. Within the appraisal of INNS mitigation measures, it has been considered that Netheridge WwTW already treats all final effluent to a high standard, which will be upgraded further with the addition of further treatment. The proposed treatments will effectively kill all INNS propagules, meaning there is limited need for additional INNS mitigation measures.

Water Framework Directive (WFD)

6.9. STS SRO has been assessed using the ACWG guidelines and spreadsheet for WFD compliance assessments. The assessment is supported by bespoke hydrological and water quality modelling of the scheme. Following these assessments, the SRO has been deemed compliant with WFD requirements in both Level 1 and Level 2 assessments.

6.10. We draw the following conclusions with respect to the WFD assessment objectives:

- At this stage, the scheme would not lead to deterioration in WFD status of any waterbody.
- At this stage, the scheme would not create any impediments to waterbodies achieving their target WFD status.
- At this stage, the scheme would not compromise any mitigation measures to protect and enhance waterbodies.

6.11. Water quality modelling undertaken for STS SRO identifies that modelled ammoniacal nitrogen, dissolved oxygen saturation, water temperature and soluble reactive phosphate changes are very low, as is also identified for the river reach from Haw Bridge to the tidal limit. There are also benefits associated with the enhanced water quality of flows reaching the Upper Severn Estuary that are linked to the tertiary treatment plan for the diverted Netheridge WwTW effluent, discharged further upstream at Haw Bridge.

Biodiversity Net Gain (BNG)

6.12. The Biodiversity Metric 3.0 has been applied to the scheme, based on the route option provided for gate two assessment, including its connection to Netheridge WwTW, and its expansion to accommodate additional tertiary treatment. As there were no land cover changes associated with the Mythe WTW licence transfer, no BNG assessment was required. The SRO will use Biodiversity Metric 3.1 for gate three.

6.13. Excluding any off-site habitat interventions, the scheme is predicted to result in:

- A net loss of 193.34 habitat units, with a total net change of -54.92%.
- A net loss of 2.83 hedgerow units, with a total net change of -16.32%.

- A net loss of 1.90 river units, with a total net change of -44.30%.

6.14. STW is committed to the project achieving a 10% net gain as a minimum, following the requirements of the Environment Act 2021. To achieve this, the BNG assessment determined that the following units are required to reach no net loss and then provide ≥10% net gain:

- For habitat areas, a net gain in value of 229.01 units would need to be delivered on 90.29ha.
- For hedgerows, 4.62 units would need to be delivered (e.g. by planting 0.6km of species-rich native hedgerow).
- For watercourses, 2.1km of river would need to be enhanced.

6.15. Through good design principles, particularly those to reduce losses and build habitat enhancement into the gate three proposals, these requirements can be reduced.

Natural Capital

6.16. STS SRO's natural capital assessment was based on the land cover changes between the current baseline and two post-scheme scenarios:

- **Scenario 1 (without off-site habitat creation to deliver BNG):** There is a decrease in the overall ecosystem services value of around £24k per year, due to expansion of the WwTW area. This is primarily driven by the likely decrease in recreation and tourism from loss of this area; however, all ecosystem services quantified show a disbenefit under this scenario.
- **Scenario 2 (with delivery of BNG through off-site habitat creation):** There is a decrease in the net ecosystem services value of around £31k per year. This is mainly due to the replacement of the off-site cropland with other habitats for BNG habitat creation, with a resultant loss of food provisioning services. If the impacts on food provisioning services are excluded, the overall benefit to ecosystem services is an estimated £40k per year.

6.17. STS SRO will work alongside STT SRO to deliver benefits to the wider river system, which will be considered within future natural capital assessments.

Environmental Appraisal

6.18. Major and moderate negative and positive effects have been identified for the Netheridge WwTW discharge diversion, Haw Bridge pipeline component:

- Negative effects are dependent on the specific geographical setting of the option and its proximity (or otherwise) to sensitive environmental, human and built receptors. Some of the negative effects identified are temporary in nature, and largely unavoidable while construction works take place. Some exist because of the scale of the proposed works, whilst others may be able to be mitigated with investigation of further measures.
- Beneficial effects have been identified in respect of providing additional water resource, contributing to a more resilient water supply, helping to support a sustainable economy, reducing vulnerability to drought, and improving resilience to the likely effects of climate change.

6.19. The Mythe WTW abstraction licence transfer component (no longer included in the scope of the SRO) would not have any major or moderate positive or negative effects associated with it.

Mitigation

6.20. The environmental assessments outlined above identified a number of potential mitigation measures which will need to be secured during permitting. These will be investigated further at gate three, and implemented within the scheme design where appropriate.

6.21. Best practice/further surveys:

- Site of Special Scientific Interest (SSSI), priority habitat, and ancient woodland protection measures.
- Habitat surveys along the route of the pipeline. The detail of the working areas (and, in some cases, construction areas and pipeline itself) will be reviewed as part of the further detailed design of the scheme.
- Soils to be stored, and reinstated following construction.
- Site-specific ecological assessments to identify any impacts to protected species or habitats associated with the construction work.
- Tunnelling for all sections of the route where it crosses main rivers.
- Where possible, use of renewable energy during construction and operation, and use of materials with lower embodied carbon.
- Minimise the extent of construction works in proximity of the greenbelt.
- Trench tunnelling for all rail and A-road crossings.
- Construction compounds to be sited sensitively and away from residential areas and, where possible, next to a main road, to cause least disturbance to local traffic.
- Hours of working (associated with the construction of the treatment works, other sites and pipeline route) limited to minimise amenity and environmental impacts.
- Waste minimisation measures where practicable.
- Where possible, materials to be sourced locally, and excavated materials to be reinstated.

6.22. SRO-specific mitigations:

- Delivery of required BNG to offset construction losses (conversion of cropland to grassland, scrub and woodland).
- Careful siting and use of screening where work locations are in proximity to public rights of way.
- Re-routing the pipeline away from the landfill. Investigations/remediation for land contamination.

6.23. As STS SRO progresses through gate three, it is envisaged that further option refinement will negate the need for some of the mitigation above.

Carbon and Greenhouse Gases (GHG)

6.24. STW is committed to achieving net zero GHG emissions by 2050, in line with its social responsibility as a FTSE100 company, Water UK's Net Zero 2030 Routemap, and the UK Government's policy expectations for water companies. STW's Triple Carbon Pledge comprises net zero operational carbon emissions, energy from 100% renewable sources and an all-electric fleet (where available) by 2030. Additionally, STW has set Science Based Targets to drive down Scope 1, 2 and 3 emissions.

6.25. Our solutions will be designed in line with Ofwat's net zero principles, and will align with UK Government net zero targets, encompassing both operational and embedded

emissions. Solutions will follow the "carbon hierarchy", prioritising the reduction of GHG emissions before utilising offsets.

6.26. We recognise that once a strategic decision has been made to construct an asset through the WRMP process, design decisions make the next most impactful contribution to reducing carbon and GHG emissions. Our approach to carbon at gate two has been to calculate and monetise embodied, operational and whole-life carbon emissions for each "unmitigated" option (i.e. assuming today's technology and techniques). The project teams have used STW's optioneering carbon tool, which considers materials and applies emissions factors from Defra, the Civil Engineering Standard Method Measurement, and the Bath Inventory of Carbon and Energy.

6.27. Carbon and GHG reduction design opportunities have been identified using the principles of Publicly Available Specification (PAS) 2080, allowing us to create a "mitigated" design. We have considered the timing of each SRO when looking at emissions reduction opportunities – so, for example, SROs with a DO planned for 2032 have different expectations of available technology, industry ambition and legislative context than SROs required in 2050.

6.28. Carbon reduction decisions for STS SRO include the reduction in length of conveyance pipeline and pumping requirement through discharge at Haw Bridge (rather than further upstream at Deerhurst), and optimisation of the outline control philosophy to ensure that treatment requirements are minimised (i.e. only biological treatments remain operational) whilst STT SRO is not calling for flow. A 20% carbon reduction is also forecast through materials management and low-carbon construction.

6.29. Offsetting opportunities have been explored and monetised for remaining emissions, based on our experience of renewable energy prices and yield for solar, hydropower, tree planting and wind. An opportunity has been identified to collaborate with the adjacent Gloucester Eco Park using ground-mounted solar array, which generates a saving of 95 tCO2e per hectare per year, as well as tree-planting and wind opportunities.

Table 6.1: Carbon summary

Scheme element	Embodied carbon (tCO2e)	Operational carbon (tCO2e)	Whole-life carbon (tCO2e)
Gate one solution[5]	6,478	98[6]	6,575
Gate two "unmitigated" option	36,425	109,048	145,473
Gate two "mitigated" option	30,989[7]	47,160[8]	78,149

6.30. Alternative options that avoid the need for additional treatment processes at Netheridge WwTW are currently being investigated, following discussions with the EA. This could reduce whole-life carbon against the gate two "unmitigated" option

[5] Gate one emissions calculated for STS SRO reflect the treatment scenario considered relevant at that time. Through the gate two process, we have identified requirements for additional treatment, which have increased the relative cost, carbon and GHG emissions for the solution.

[6] This assumed a constant sweetening flow of 10%, and assumed all power would be sourced from renewable sources.

[7] Embodied mitigation is an estimation of a 20% reduction in embodied carbon through materials management, low-carbon construction, and pipeline route selection to Haw Bridge.

[8] Operational mitigation is achieved through optimisation of the outline control philosophy and a reduction in pumping requirements to Haw Bridge.

(Deerhurst) by 125,549 tCO2e, or by 58,225 tCO2e against the gate two "mitigated" option (Haw Bridge).

6.31. The development of the gate two solution has been aligned with the ACWG carbon ambition and, if the STS SRO is selected, the solution will be progressed in gate three to take into account the recently published ACWG SRO low-capital carbon alternatives guidance, in which "middle case" initiatives (such as selection of low-carbon materials) will be developed further to drive a 20% reduction in embodied carbon emissions. The carbon impact associated with any change in land use will also be assessed and mitigated during the gate three outline design, once footprints and pipeline routes are finalised.

6.32. In terms of carbon reporting, STW's carbon tools for feasibility and outline design are based on the principles of PAS 2080 and are regularly updated to incorporate learning from ongoing projects, as part of a continuous development cycle. STW processes already exist for monitoring and reporting of carbon emissions through the project lifecycle, with the expectation that emissions will be reduced through build clever/build efficiently principles throughout.

7. Programme and Planning

Project Plan

Introduction

7.1. The scheme is proceeding to programme, with all key milestones met to date. The project falls in line with the timescales set out in the guidance provided by WRSE in Autumn 2022, in terms of the output requirements to support the STT SRO as a sweetening flow. Netheridge WwTW will be able to supply a DO of 35 Ml/d by an earliest date of Q3 2031. Further detail of the project-level plan is given in Figure 7-1.

7.2. The timescales given in the project plan are based on the use of the STT SRO DCO planning and consenting route. The treatment upgrades at Netheridge WwTW and the associated pipeline would be considered associated development to the STT SRO DCO application. STS SRO qualifies as associated development on the basis that it is directly related to the STT SRO and will help support its operation, therefore satisfying the definition in the Planning Act 2008.

7.3. The gate three date of Q1 2025 has been set as a review point ahead of the formal STT SRO DCO application. Unlike gates one and two, it should be noted that the timing of gates three and four can only be indicative at this stage as they are tied to the DCO pre-application process (including public consultation), and therefore durations may vary depending on the feedback received.

7.4. Our analysis demonstrates that DPC would not be applicable to STS SRO, and therefore the project plan does not incorporate this process. More detail is given in Table 7.3.

Critical Path

7.5. The STS SRO critical path is considered as running through the DCO consenting and pre-application process. This will be led by STT SRO, with STS SRO being associated development to the STT SRO. There is an opportunity to shorten the planning and consenting timeline should a Town and Country Planning Act (TCPA) route prove to be viable, and investigations are ongoing into this possibility; however, DCO remains the recommended route.

7.6. In terms of critical path alignment with STT SRO, STS SRO will be required to be operational just prior to the completion and commissioning of STT SRO. There will be a reliance on the planning and consenting processes having been resolved; should the TCPA route be selected, there must be confidence that consent will be granted within an appropriate timeline. Note that although the earliest DO date for STS SRO of 2031 lies ahead of the earliest STT pipeline completion date of 2033, the guidance given by WRSE in Autumn 2022 is that the STT SRO will not be required until 2050.

Interdependencies

7.7. If WRSE identifies that STT SRO is not taken forward as a preferred resource option, then STS SRO will not be required. Although the project plan shows gate three at the beginning of 2025, a gate three checkpoint will be set at the beginning of 2024 for both STS SRO and STT SRO, to ensure delivery alignment with WRSE output requirements. If STS SRO is not required, the Netheridge works will not be pursued and consent will not be sought.

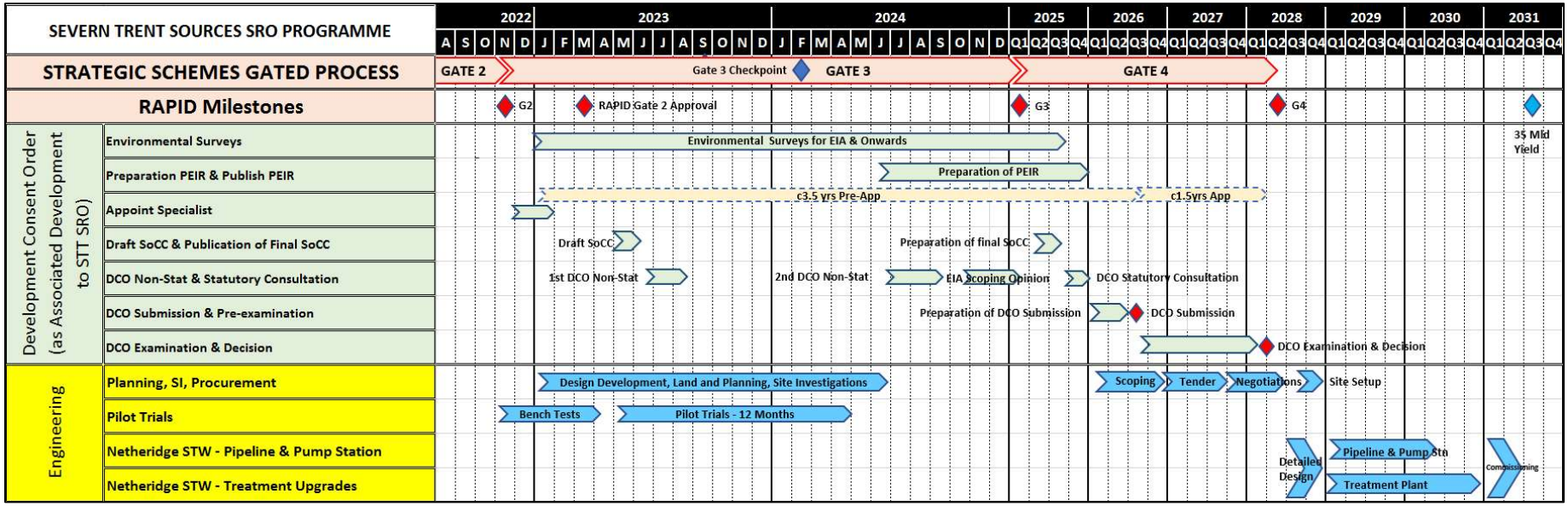
7.8. STS SRO progression requires planning consent for the STT SRO to be granted through the DCO process. An assumption has been made that issues and concerns arising from key stakeholders identified during gate two and gate three engagement and consultation can be addressed and mitigated within the gated timescales ahead of the DCO application.

Constraints

7.9. The following project constraints have been identified:

- Not having an agreement with the EA as to discharge water quality in the River Severn would constrain the treatment design from being finalised; collaborative discussions to resolve this issue are ongoing.
- Not having an agreement with the EA as to discharge location at Haw Bridge would constrain the pipeline hydraulic design from being finalised; collaborative discussions to resolve this issue are ongoing.
- Not having planning consent for the STT SRO granted through the DCO process would constrain construction commencement proposals and timeline.

Figure 7-1: Project-level plan



Planning and Consenting Route

7.10. In the gate one submission, we explained that our preferred consenting route was to deliver the project via planning permissions and powers under the Water Industry Act (WIA).

7.11. Through gate two, we have continued to assess the various options for how these works could be consented. We have concluded that the works would not qualify for DCO and would not justify a direction under Section 35 (s.35) of the Planning Act (the mechanism by which the Secretary of State would direct the consenting mechanism via a DCO route, notwithstanding the criteria not being met). They would therefore fall to be consented through either a TCPA planning application or as associated development as part of STT SRO, which is expected to be consented via DCO.

7.12. The STT SRO gate two submission recommends that this project should be delivered as associated development, given the likely operational reliance STT SRO will now have on Netheridge WwTW for sweetening flows. This operational reliance has emerged through gate two and has necessitated a need to review the optimum consenting strategy. However, we will retain the option of seeking planning permission for these assets, if timings allow and it is considered a beneficial approach to STT SRO delivery.

7.13. We will only seek planning permission locally if it is considered likely we could secure this in advance of the DCO for STT SRO, as we would not wish to place any unnecessary risk on STT SRO. The ability to secure consent for the project through the TCPA regime will be kept under review in the event that circumstances change such that operational or commercial reasons indicate that this should be the preferred route to consent.

7.14. During the pre-application stage, particularly following the non-statutory and statutory consultation exercises proposed, the consenting approach will remain under review to take account of input from stakeholders and other consultees. At present, it remains the case that the DCO route is recommended for consent.

7.15. The work we have done in gate two has confirmed there to be no showstoppers or major issues likely to be faced that would give rise to significant consenting risk on this scheme. There are a number of crossings to contend with, and a variety of landowners, but this is in line with similar projects.

7.16. The new treatment assets are likely to be contained within the existing operational site at Netheridge WwTW. Initial consultation with the local planning authority suggests that, as expected, this causes no obvious concern.

Works in Private Land

7.17. The works-in-private-land process for this project would involve us following our tried-and-tested methods of accessing land for the delivery of pipeline infrastructure projects. With any pipeline, we seek to engage early with all affected landowners to understand how land is used, and any plans for its use in the future. We strive to build new assets by minimising impacts on landowners, including routing or location of assets and the timing of installation (e.g. being sensitive to cropping seasons).

7.18. We also seek to minimise the need to acquire land and rights on a permanent basis, instead preferring to deliver assets under the WIA wherever possible. There is the need to acquire at least one piece of land for a break pressure tank upstream of the discharge to the River Severn. As with any acquisition of land, we would seek to

complete a deal by agreement with the landowner, and would hope not to require compulsory powers.

7.19. Powers of compulsory purchase of the land required to deliver the project would be included in the DCO. However, as is the case when acquisition is sought under WIA powers, efforts will be made to enter into agreements with affected landowners to secure the land, rights and powers needed to delivery, including easements for operations and maintenance (O&M).

7.20. If the DCO consenting route is the preferred option, we will require easements to be in place to allow for the construction, operation, maintenance and eventual decommissioning of the pipeline, without having to acquire the freehold of the land outright. These are the standard industry mechanisms for securing land rights or pipelines where the WIA is not utilised.

7.21. In terms of systems and resources required to deliver the planning and land process, we are well versed in delivering large treatment and pipeline projects, and has established processes and governance arrangements we would rely on for delivery. Additional specialist resource will be required for the DCO process.

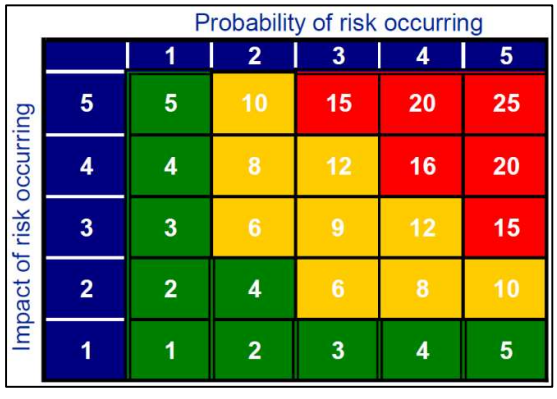
7.22. We have completed initial land referencing of the indicative pipe route. This has been "non-contact" and therefore this information has not been verified, and nor have those with any additional interests or rights in the land, such as tenants/occupiers, been identified. Several land-users and key land-owning stakeholders have been identified upon review of the land referencing data, including a number of special category land (SCL) interests. However, specific stakeholder and land-use impact cannot be fully understood without further consultation and investigation.

7.23. We would invest in the required level of consultant support to deliver the various requirements for us, and would work closely with the STT SRO team. However, if the project were to be delivered via DCO, we would appoint a team with the relevant experience and expertise in this field to take the project through the process.

Key Risks and Mitigation Measures

7.24. The risk scoring referenced in this section is completed based on the definitions given in Figure 7-2.

Figure 7-2: Risk score matrix



7.25. Of the risks identified in Table 7.1, the key risks at gate two are RSK031 and RSK032.

- RSK031 relates to conditions of low-effluent inflow to Netheridge WwTW and the potential impacts on STS SRO support provision. The mitigation strategy for this

risk is further analysis of flow data to determine the impacts of catchment growth, and to define any modelled periods of deficit.

- RSK032 relates to the anticipated permitting requirements for the Netheridge WwTW raw water discharge to the River Severn, which would result in significant levels of additional treatment. The mitigation strategy for this risk is an assumption of worst-case scenario treatment, whilst continuing further sensitivity analysis, dilution modelling and pilot plant trials, plus ongoing dialogue with the EA.

7.26. The project team does not believe any of the risks identified in Table 7.1 are showstoppers, and will continue to actively monitor them into gate three. We will continue to develop our mitigation plans to ensure that risks are managed and mitigated effectively.

Table 7.1: Project risks[9]

RAPID Risk number	Short Description	Detailed Description	Risk Score	Mitigation strategy	Category	Trend / Status	Residual Risk
RSK004	Regional Plan Reconciliation	Risk that the regional Plans will not align, and that a difference will exist in the selection of SROs across the regional plans.	16	Active engagement with regional groups. Scenario planning work is currently being undertaken in case this risk is realised.	Planning	Stable	12
RSK005	Commercial information sharing	Where companies are working together on scheme costing they will be potentially sharing cost sensitive information which could be interpreted as being anti-competitive.	9	Embedded processes in the project to ensure competition law is not breached following advice from legal colleagues. An interim management strategy is to take a cautionary approach which means what is shared is only what is needed to be shared	Competition act	Stable	6
RSK007	CBA and social net gain valuations	Risk that our current CBA methodology doesn't adequately account for emerging views on social net gain valuation.	9	Common issues across SROs with a common solution being sought through ACWG. A brief has been written and shared with RAPID.	Environment	Stable	6
RSK010	Carbon Neutrality approach	Lack of clarity around carbon neutrality requirements could lead to inconsistent costing across SROs and deliverables that don't meet RAPIDs expectations.	12	All SROs are working with RAPID to get a clear and common position on Carbon Neutrality. A task and finish group has been established to provide a consistent approach across SROs.	Environment	Stable	6
RSK031	Output availability	We have identified that during conditions of low inflow to Netheridge WwTW we may not be able to supply STT with 35ML/D raw water	12	Further analysis of flow data and impact of growth to be undertaken in Gate 3; make up any shortfall via other sources if required	Environment	Stable	12
RSK032	Anticipated permitting is resulting in additional treatment	Due to the EA current requirements to undertake a surface water pollution risk assessment, the engineering consultant's solution deals with a worse case scenario - which has increased the SRO cost considerably from what was understood at Gate 1	25	Undetaking sensitivity analysis and dilution modelling reviews to establish if the proposed treatment and process units can be relaxed in the solution by provision of supporting information through further dialouge with the EA. Bench trials and pilot plants proposed in G3	Engineering	Stable	9
RSK034	Discharge point agreement	There is a risk that there is no formal agreement / sign-off of the Haw Bridge option as the preffered solution. STW have discussed with RAPID and the EA have not currently agreed.	15	The EA have agreed that STW will issue a technical note on the benifits / drawbacks and impact to the Environment to use the Haw Bridge location to discharge, risk of option selection considered low	Engineering	Stable	4
RSK035	Securing cross company bulk water supply agreements	STW will need to agree a commercial contact with Thames Water to cover the bulk supply of raw water to feed STT SRO from STS SRO; risk to both projects remains until terms are agree and contract executed	15	Ongoing and continued close collaborative liaison between STW and Thames Water, utilising approriate legal and commercial support as required, to draft and agree approtiate contractual terms and conditions	Commercial	Stable	10

[9] The mitigation status column utilises the RAPID report definitions.

Proposed Gate Activities and Timelines

7.27. The outcome of our gate three plan will be the completion of outline design activities, including all relevant site investigation works. Gate three activities will also include collation of all data, plus completion of all consultations and pre-assessments necessary to permit a formal DCO application. Our gate three activities will improve certainty of outcome and cost estimates, and further develop a detailed programme for delivery.

7.28. Gate four will be set to coincide with the DCO determination date. Gate four activities will encompass the pre-procurement activity necessary to permit immediate commencement of detailed design activities in the event of a positive response. The workstreams and key activities we plan to undertake to achieve our objectives at gates three and four are outlined in Table 7.2.

Table 7.2: Phases of future project delivery

Phase	Timing	Name	Key Activities	Decisions
1	April 2020 – Jan 2022	Gate 1	• RAPID Gate 1 submission	
2	July 2021 – Nov 2022	Gate 2	• RAPID Gate 2 submission	
3	Dec 2022 – Q2 2025	Gate 3	• Alignment of scheme need timing and scale to Final WRMP24 and final Draft Regional Plan (winter 2023/4) • Statement of Community Consultation (SoCC) drafted, agreed and published • Commence and complete engineering data collection and survey • Commence environmental baseline data collection and survey • Land referencing • Complete remaining options technical appraisal for key aspects of the project • Undertake Non-statutory consultation(s) on options and initial preferred scheme • Develop EIA Scoping Report, submit to PINS and receive formal EIA Scoping Opinion • Response to Scoping Opinion – clarity sought on issues raised. (non-statutory consultation(s) on options and initial preferred scheme • Complete baseline data collection and survey • Preliminary Environmental Information Report (PEIR) • Submission for RAPID Gate 3 document suite	• RAPID Gate 2 approval (Draft decision March 2023, Final June 2023) • PINS EIA Scoping Opinion
4	Q3 2025 – Q2 2028	Gate 4	• Statutory consultation(s) on final scheme • Further design refinement and development of initial preferred scheme to reflect survey data collection and stakeholder feedback at consultation • Ongoing liaison and negotiation with affected landowners • Formal Environmental Impact Assessment • Creation of full DCO document suite • DCO submission to PINS • preparation, preliminary meeting and examination in public • Planning Inspector's report to Secretary of State • Design & Build Contract Scoping • Design & Build Contract Tender • Submission for RAPID Gate 4 document suite	• Partner company approval to submit DCO application • RAPID Gate 3 approval • Secretary of State's award of DCO
5	Q2 2028 - Q3 2028	Contract award	• Design & Build Tender Assessment and Contract Award • Confirm securement of land control / acquisition	• RAPID Gate 4 Approval • Contract award for delivery • Land acquisition contracts
6	Q3 2028 – Q1 2031	Construction	• Detailed Design • Construction lead-in and pre-mobilisation activities • Construction and commissioning 50Ml/d /100ML/d (phased as required)	• Design approvals • Final system testing • Handover

Procurement, Ownership and Operation

Assessment for DPC

7.29. At gate one, the STS SRO was assessed as unsuitable for DPC for reasons of size, and requiring further analysis for discreteness, as there were concerns that this could be achieved on an existing site owned and operated by STW.

7.30. In gate two, we have updated the DPC analysis based on Ofwat guidance[10], including revised size and discreteness tests, and a new value-for-money test using the cost data now available. The tests have been run for the scheme as a whole and sections of the scheme, comprising:

- Works to expand Netheridge WwTW capacity to supply the STT SRO.
- A transfer pipeline from Netheridge WwTW to the River Severn at Haw Bridge.

7.31. Table 7.3 summarises the results of the assessment for DPC.

Table 7.3: Results of the assessment for DPC

Option	Test 1: Size	Test 2: Discreteness	Test 3: Value for Money	Result: Suitability for DPC
Whole scheme	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
Netheridge WwTW only	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
Pipeline only	Not suitable for DPC	Suitable for DPC	Not suitable for DPC	Not suitable for DPC based on size and value for money

7.32. Whilst the whole scheme and the options on the Netheridge WwTW site pass the size test and represent value for money for customers, they fail the discreteness test.

7.33. Works required to expand an existing treatment site require significant interventions in assets that need to remain operational during the construction phase. There will then be significant overlap in O&M of the new and existing assets. This can lead to interface risk and loss of synergies. It also means that complex contractual arrangements would need to be developed to ensure the appropriate split of responsibilities is maintained.

7.34. The Haw Bridge pipeline, when considered as an asset in its own right and based on current inputs, passes the discreteness test, as it has limited interfaces with existing infrastructure. However, it does not pass either the size or the value-for-money test.

Delivery Parties

7.35. As neither the entire SRO nor any section has been assessed as being suitable for DPC, we have only considered options for procuring the entire scheme. This is because the same approach would apply to each element. Considering the SRO in its entirety limits the number of interfaces during delivery.

7.36. Given that STW owns and operates the existing WwTW site, it is considered best placed to deliver the assets; the exact approach will be agreed with Thames Water and form

[10] Ofwat, Delivering Water 2020: Our methodology for the 2019 price review, Appendix 9: Direct procurement for customers (December 2017)

part of the DCO agreement. Alternative non-DPC delivery options were considered, including a non-DPC design, build, finance, operate and maintain (DBFOM) contract, a design, build, operate and maintain (DBOM) contract, and a Design & Build (D&B) contract.

7.37. A non-DPC DBFOM would face the same issue with discreteness identified in the DPC assessment. STW will be carrying out O&M in close proximity. As such, there are likely to be significant efficiency savings from combining the O&M of new assets with existing operations, making a DBOM approach less attractive. We therefore recommend a D&B contract for the works.

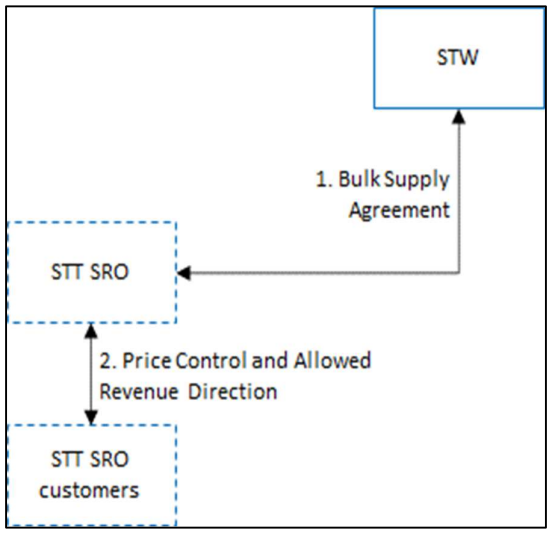
Contractual and Operational Arrangements

7.38. Below (and in Figure 7-3) we set out indicative contractual arrangements for the STS SRO assets based on the delivery parties identified above.

7.39. The principal purpose of each contract would be:

- **Bulk Supply Agreements (BSA):** BSAs between STT SRO Beneficiaries and STW could be modified to include the provision of the capacity at Netheridge WwTW alongside any payment for the water resource.
- **Price Control and Allowed Revenue Direction:** STT SRO would be expected to recover the schemes costs from its customers, as appropriate.

Figure 7-3: Indicative contract structure



7.40. The operation of STS SRO would be subject to the operational arrangements of the STT SRO system. The current STT SRO expectation is that individual water companies making use of the system will enter into bilateral BSAs with STW (as the owner and operator of the water resource) for supply. STW may therefore receive multiple instructions from the Beneficiaries of the STT SRO or, potentially, a single set of instructions consolidated by a System Operator.

Procurement Timeline

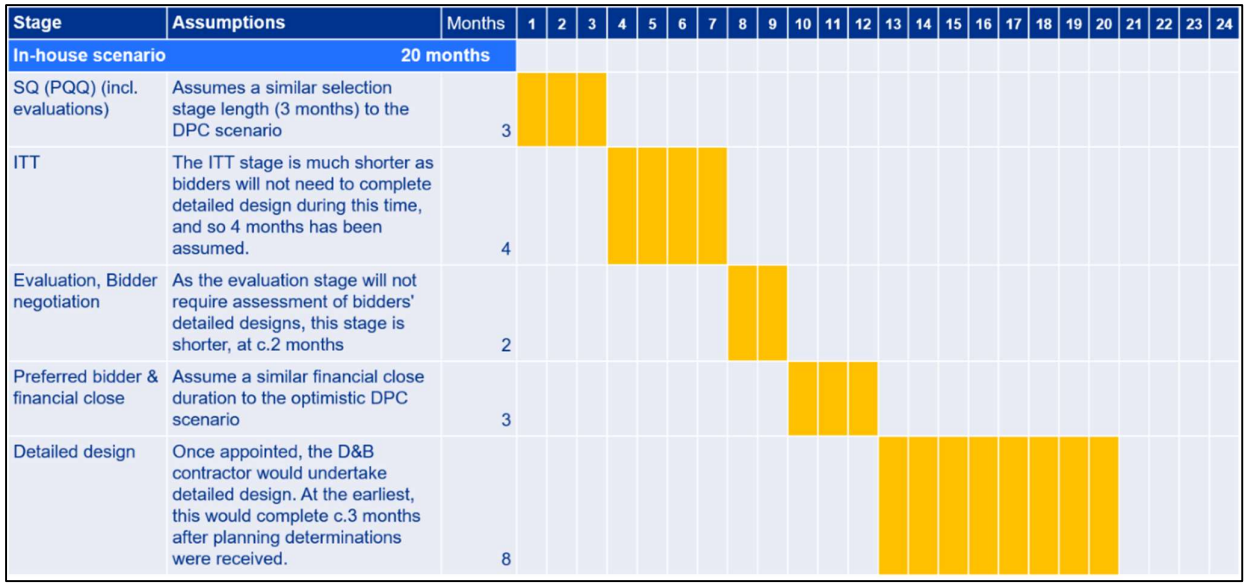
7.41. The in-house procurement scenario assumes the appointment of a contractor to assume responsibility for the D&B of the SRO only, with the procuring authority to retain responsibility for finance, operation and maintenance. This process includes:

- A pre-qualification stage, to identify bidders with sufficient technical and financial capability to deliver the project.
- An Invitation to Tender (ITT) stage, wherein bidders produce a tender submission.
- An evaluation and negotiation stage, during which time submitted bids are assessed and details negotiated with participants in the competition.
- A preferred bidder and financial close stage, where the procuring authority finalises terms with the preferred bidder in order to reach contract award.

7.42. A detailed design stage is undertaken after contract award. Figure 7-4 below shows the indicative timeline for this approach.

Figure 7-4: In-house (D&B) procurement timeline

Stage	Assumptions	Months
In-house scenario		**20 months**
SQ (PQQ) (incl. evaluations)	Assumes a similar selection stage length (3 months) to the DPC scenario	3
ITT	The ITT stage is much shorter as bidders will not need to complete detailed design during this time, and so 4 months has been assumed.	4
Evaluation, Bidder negotiation	As the evaluation stage will not require assessment of bidders' detailed designs, this stage is shorter, at c.2 months	2
Preferred bidder & financial close	Assume a similar financial close duration to the optimistic DPC scenario	3
Detailed design	Once appointed, the D&B contractor would undertake detailed design. At the earliest, this would complete c.3 months after planning determinations were received.	8



8. Solution Costs and Benefits

8.1. This section outlines the costs and benefits of the proposed STS SRO. The cost estimates prepared for the scheme at gate two used the ACWG methodology. They therefore contain a standardised optimism bias (OB) that will reduce as we gain more certainty through the gates. Detailed costing is given in Annex K (WRMP24 Table 5 Cost Report) and presents the cost profile information, consistent with Table 5 in the WRMP24 Water Resource Planning (WRP) tables.

Comparison of Options

8.2. During gate two, the discharge location changed to Haw Bridge, reducing the transfer pipe length and pumping head, which reduces the scheme's carbon, OPEX and CAPEX. The preferred option is Option 2 in Table 8.1 below.

8.3. CAPEX estimates, including the ongoing capital maintenance component, were produced using a combination of STW cost models where appropriate, and bottom-up cost estimation by an expert cost consultant. These were based on industry benchmark models, as-built construction costs of similar schemes elements, supplier quotations, and quantity take-off calculations.

8.4. OPEX costs associated with each of the newly constructed assets were estimated, and include labour, power and chemicals.

8.5. Table 8.1 summarises CAPEX and OPEX costs for the individual option configurations. Financing costs have been calculated, in accordance with Section 6.3 of the ACWG cost consistency methodology, purely for comparison purposes.

Table 8.1: CAPEX and OPEX costs for each option, based on 2020/21 price base

	Units	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
Yield Benefit	MLD	35	35	35	35	35	35	35	35
Base CAPEX	£m	96.482	92.687	83.049	77.203	8.752	34.113	17.531	45.690
Costed Risk	£m	18.852	18.014	11.914	7.721	1.188	5.117	2.629	8.880
Optimism Bias	£m	29.418	28.381	26.086	24.528	2.757	9.211	4.734	13.743
Total G2 CAPEX	£m	144.752	139.082	121.049	109.452	12.697	48.440	24.893	68.313
Total G1 CAPEX	£m	47.339	n/a	16.765	n/a	n/a	n/a	n/a	n/a
G2 Fixed Opex	£m/annum	0.848	0.848	0.853	0.857	0.017	0.021	0.011	0.554
G2 Variable OPEX	£/MLD	225.61	212.64	199.43	203.85	55.70	25.87	21.96	50.02
G1 Fixed Opex	£m/annum	0.020	n/a	0.020	n/a	n/a	n/a	n/a	n/a
G1 Variable OPEX	£/MLD	32.00	n/a	21.00	n/a	n/a	n/a	n/a	n/a

8.6. Table 8.2 summarises the net present values (NPV) and average incremental costs (AIC) for each option.

Table 8.2: NPVs and AICs for each option, based on 2020/21 price base

	Units	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
Option benefit	Ml/d	35	35	35	35	35	35	35	35
Total planning period option benefit (NPV)	Ml	254,958	254,958	254,958	254,958	254,958	254,958	254,958	254,958
Total planning period indicative capital cost of option (CAPEX NPV)	£m	152.201	148.377	140.063	133.349	13.713	34.169	17.701	49.471
Sweetening Flow									
Total planning period indicative operating cost of option (OPEX NPV)	£m	49.797	47.907	46.08	46.803	8.456	4.195	3.412	18.338
Total planning period indicative option cost (NPV)	£m	201.998	196.284	186.143	180.152	22.169	38.364	21.113	67.809
Average Incremental Cost (AIC)	p/m³	79.23	76.99	73.01	70.66	8.70	15.05	8.28	26.60
G1 AIC	p/m³	18.80	n/a	7.60	n/a	n/a	n/a	n/a	n/a
Maximum Flow									
Total planning period indicative operating cost of option (OPEX NPV)	£m	74.449	71.142	67.871	69.078	14.542	7.022	5.812	23.804
Total planning period indicative option cost (NPV)	£m	226.650	219.519	207.934	202.427	28.255	41.191	23.513	73.275
Average Incremental Cost (AIC)	p/m³	88.90	86.10	81.56	79.40	11.08	16.16	9.22	28.74
G1 AIC	p/m³	21.50	n/a	9.60	n/a	n/a	n/a	n/a	n/a

8.7. We are aware that the RAPID Pricing, Incentives and Risk Working Group is considering the commercial framework for SROs, and we will review our costs in light of any outputs from this working group for our gate three submission.

8.8. Following discussions with the EA, alternative options avoiding the need for additional treatment processes at Netheridge WwTW are currently being investigated. This could reduce carbon by up to 64,328 tCO2e and NPV by up to £118.5m.

Best Value Assessment and Solution Benefits

8.9. Best value assessments are undertaken by WRSE as part of the development of its Regional Plan. STS SRO and its individual components are not included in STW's WRMP or WRW's Regional Plan. If selected, STS SRO will be included in STW's PR24 Business Plan.

8.10. WRSE carries out best value assessments based on the information submitted by the transfer SRO. At gate one, STS SRO and STT SRO project teams agreed final scores for the resilience metrics developed by the WRSE regional modelling team. These scores have not changed during our gate two investigations for STS SRO.

8.11. WRSE has confirmed that its Regional Plan for the south east includes STS SRO to support the STT SRO inter-regional transfer. This plan changed after comparison with its original least cost plan, which formed the basis of its draft Regional Plan published in January 2022. The final Regional Plan, rather than being based primarily on cost efficiency, will take account of environmental, carbon and wider societal benefits.

9. Stakeholder and Customer Engagement

Introduction

9.1. From statutory consultees and specialist interest groups to local communities and businesses, we need to engage effectively with people who have an interest in, or could be impacted by, STS SRO. Our stakeholder engagement programme combines two strands of activity: engagement via the water resources planning process, and engagement on scheme-specific issues.

Water Resources Planning

9.2. There is an established engagement programme to support the development of the WRSE Regional Plan, the draft WRW Regional Plan, and individual water companies' WRMP24s, with active participation by regulators and stakeholders. By working within this framework, we are ensuring that the key messages are aligned and consistent.

9.3. The engagement activity for this SRO is framed within the water resources planning context to ensure that stakeholders understand the overall process, the key decision points, and the opportunities to contribute.

9.4. Earlier this year, WRW held regional consultation workshops with more than 100 stakeholders on water resources options[11]. Highlights of the findings are as follows:

- There was majority support for sharing water resources; however, this was a divisive issue. Some delegates objected to their water-rich region losing out to developments in the south east, whereas others agreed that water transfer was ethically the right thing to do.
- When asked to rank the benefits of water transfers, enhancements to the environment ranked first, followed by improvements to water supply and resilience, with investment into the area third.

9.5. In addition, WRW has been using the online forum Idea Stream to engage with members and stakeholders. To date, there have been over 5,000 site visits and 341 registered stakeholders, with 73 using the platform to provide WRW with their views. A new consultation on water transfers will be launched to understand stakeholder views on the impacts of changes of water supply, and understand their opinions on the specific SRO proposals under consideration.

Engaging Stakeholders

9.6. The stakeholder engagement programme builds on the work completed in gate one, as well as ongoing feedback from RAPID and other regulators. In gate one, the focus was on issues which could potentially prevent, or substantially change, the development of the scheme.

9.7. We are now starting a dialogue with the wider stakeholder community and special interest groups (refer to Tables 9.1 and 9.2) to ensure there is a full understanding of concerns. We also want to identify potential benefits, so that they can be considered and addressed in the ongoing technical work and preliminary design of the scheme.

[11] The report can be found in full on the WRW website https://waterresourceswest.co.uk/publications

Table 9.1: Stakeholder interests

Stakeholder	Interest(s)	Activity
Drinking Water Inspectorate (DWI)	As the body responsible for the quality of drinking water, DWI is interested in the progression of this scheme as an alternative source of water, recycled water sources, and emerging contaminants.	Quarterly updates are in place as we share plans for water quality monitoring and understand water safety plans.
National Appraisal Unit (NAU)	As part of the EA, the NAU aims to protect and improve the environment. It acts to reduce the impacts of a changing climate on people and wildlife, reduce the risks to people, properties and businesses from flooding and coastal erosion, and protect and improve the quality of water, making sure there is enough for people, businesses, agriculture and the environment.	Regular update sessions are held with our NAU representative. These meetings have proved very successful and already elicited lots of useful information and comments to support our assessments.
Regulators' Alliance for Progressing Infrastructure Development (RAPID)	RAPID identifies and addresses issues relevant to the development of joint infrastructure projects, and analyses the feasibility of nationally strategic supply schemes.	We are in regular contact with RAPID as we progress through the gated process. In May 2022, the RAPID team visited the Netheridge WwTW and one of the proposed discharge sites at Haw Bridge to gain a better understanding of the area's topography and potential constraints of this SRO.
Natural England (NE)	As the government's adviser for the natural environment in England, NE aims to protect and restore our natural world.	An introductory meeting has been held to identify key areas of interest, and NE is now invited to regular NAU meetings.
Historic England (HE)	HE ensures that the historic environment is protected, reconciling this with economic and social needs and aspirations of the people who live and use the area. Its particular interests are with the locks and buildings along the length of the canal.	An introductory meeting has been held, which will be followed up with local inspectors to identify any key assets at this stage.
Local authorities	Local authorities are interested in how their local development plans and major infrastructure development projects will be affected by our SRO, and if the planning application process will be at a local or national level.	Our planning consultants Fisher German have written to the Chief Executives and Directors of Planning at Birmingham City Council, Gloucester City Council, North Warwickshire Borough Council, Solihull Metropolitan Borough Council and Warwick District Council to outline the proposed scheme, and will continue a dialogue throughout the planning process.
Cotswold Canals Trust (CCT)	In the design for STS SRO, the Cotswold Canal would be an abstraction or transfer point, so naturally the CCT is very interested in the development of this SRO.	In March 2022, the CCT was encouraging its members to take part in the WRSE consultation process to share their views on STS SRO. We want to establish an open relationship with this group, understand their concerns and ensure that their feedback is incorporated into the SRO scheme design.

Stakeholder	Interest(s)	Activity
Royal Society for the Protection of Birds (RSPB)	Our environmental contractor is looking into whether reduced flows could increase marginal habitats for birds, which would be of interest to the RSPB.	We are planning to set up regular meetings with this stakeholder to keep them involved and enlist their support of our scheme.

Table 9.2: Special interest groups

Organisation	Interest(s)
Gloucestershire Wildlife Trust (GWT)	Five percent of Gloucestershire households are members of GWT, one of the highest membership rates in the UK. GWT has over 500 active volunteers who help conserve wildlife.
Stroud Valley Projects (SVP)	Originally founded in 1988 to help protect the industrial heritage of Stroud and its five valleys, SVP works with local community groups and volunteers to discover and nurture the wildlife and green spaces on their doorsteps.
Gloucestershire Local Nature Partnership (GLNP)	The GLNP is composed of over 30 organisations working together to recognise the importance of embedding nature's value in local decisions for the benefit of nature, people and the economy. LNPs are seen by Defra as key to the local delivery of the UK Government's 25 Year Environment Plan.
Campaign to Protect Rural England (CPRE) Gloucestershire	Gloucestershire has the potential to be a leading area for sustainable economic growth and human wellbeing. The CPRE has its own six-point vision for 2050.
Severn Rivers Trust	The Severn Rivers Trust protects and enhances the River Severn, its tributaries and streams in both England and Wales. Its vision for the Severn is "a vibrant, healthy Severn for everyone". It is concerned with loss of habitat, collapse of ecosystems, erosion of precious soils, increased flooding and devastating drought.
Inland Waterways Association	The Inland Waterways Association campaigns to protect and restore canals and navigable rivers, as well as promoting greener boating.
National Farmers' Union (NFU)	The NFU represents more than 46,000 farming and growing businesses. Their purpose is to champion British agriculture and horticulture, and campaign for a stable and sustainable future for British farmers.
Cotswold Canals Connected	The Cotswold Canals Connected project is linking the Stroudwater Navigation Canal with the Gloucester and Sharpness Canal to join with the rest of the UK's canal network. This will open up new business opportunities, creating a new wildlife corridor and a vibrant tourist destination.

9.8. In the approach to gate three, our stakeholder engagement strategy will focus on engagement with local stakeholders and communities, enabling them to participate in the design of the scheme at a formative stage.

9.9. We anticipate that stakeholders will need more information about any changes to the canal design, construction activity and operation, including costs, environmental impact and recreational opportunities.

9.10. We anticipate that customers will need assurances about the safety of transferred water, and will want to understand if there will be changes to the aesthetics of their water supply.

9.11. We will design the scheme/route to avoid or mitigate any impacts on land and properties. If any homes, businesses or heritage assets are affected by the construction and route of this scheme, we will speak openly to local residents and landowners early in the process about the potential options. At gate three, we will be seeking to mitigate impacts, maximise benefits, and develop a scheme that is supported by our customers and stakeholders.

10. Board Statement and Assurance

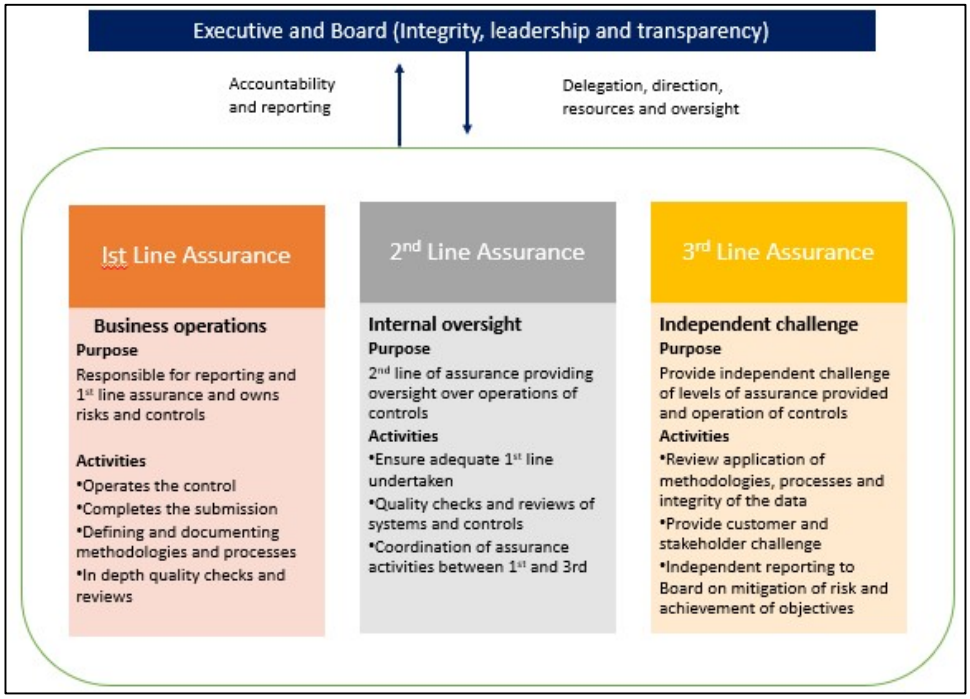
10.1. The board statement is provided in the covering letter to this gate two submission. The STW Board supports our recommendation for progression of this SRO.

Assurance Approach

10.2. We have used STW's assurance framework for this submission and agreed ACWG statement.

10.3. The risk-based assurance approach is consistent with that documented in our statement of reporting risks, strengths and weaknesses, and our Business Plan for 2020 to 2025 (Appendix A1[12]), and is based on the "three lines of assurance" model shown in Figure 10-1. It is also consistent with the assurance requirements laid out in Ofwat's Company Monitoring Framework[13].

Figure 10-1: Risk assessment and assurance approach



10.4. This approach provides an effective programme of assurance which considers areas that we know are of prime importance to our customers and regulators, or may have a significant financial value, alongside the likelihood of reporting issues. Areas of higher risk receive three lines of assurance while other areas, where the risk is lower, receive first- and second-line assurance only.

10.5. Following a competitive tender, we appointed an external assurer. The third-line assurance statement confirms that the assurer is satisfied that, on the basis of the evidence presented and the limitations and scope of the assurance activities, the submission is suitable for progression through gate two. The board statement is

[12] Risks, Strengths and Weaknesses in regulatory reporting and assurance plan; 2020-2025 Business Plan: Appendix A12

[13] The latest iteration of the Company Monitoring Framework can be found on the Ofwat website: http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/

supported by the assurance statement, and there are no outstanding material issues to be resolved prior to gate two submission. The STW Board is satisfied that progress to date allows the scheme to be construction ready by AMP8.

10.6. We continually look to improve our assurance approach and will conduct a lessons-learned exercise before we finalise our assurance approach for gate three.

Overview of Assurance Scope and Findings

10.7. Stantec was appointed as an external assurer. The objectives of the independent third-line assurance are to:

- Confirm that the requirements set out in Ofwat's Final Determination and subsequent additional feedback from Ofwat have been met.
- Confirm that the companies comply with RAPID's reporting requirements and guidelines.
- Ensure that the companies' material assumptions and methodologies have been disclosed and explained.
- Be satisfied that the work carried out is consistent with the stated methods, procedures, policies and assumptions.
- Confirm that the submission has been subject to sufficient processes and internal systems of control to ensure that the information on design, costs and benefits contained in this submission is reliable.
- Confirm that the submission has been appropriately assured to give STS SRO stakeholders, including customers, trust and confidence in the gate two submission.

10.8. The board support the recommendation for the solution progression made in this submission and the recommendations for which options with the solution should be progressed;

- Support the recommendation for the solution progression made in this submission and the recommendations for which options with the solution should be progressed;
- Are satisfied that progress on the solution is commensurate with the solution being "construction-ready" for 2025-2030
- 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
- Are satisfied that expenditure has been incurred on activities that are appropriate for gate two and is efficient.

11. Efficiency of Expenditure for Gate Two and Forecast

Breakdown of Cost and Evidence of Efficiency

11.1. The Final Determination allowance for the STS SRO gate two budget was £795k (in 17/18 prices). £262k of gate one funding was transferred into the gate two allowance, giving a total gate two budget of £1.057m (in 17/18 prices).

11.2. In 2017/18 prices, we anticipate the gate two outturn cost expenditure will be £814k based on actual costs incurred to 29 July 2022, combined with forecast expenditure to 14 November 2022. The current forecast to the end of gate two provides a saving of £243k, equating to 23% compared to the Final Determination budget (inclusive of gate one carry-over). Care has been taken to ensure efficient and relevant spend on agreed activities to advance this project during gate two. Note that no gate three budget has been allocated or spent within gate two.

11.3. The workstream activities are solely in respect of specific STS SRO activities. Costs for other SRO activities and other company activities, including regional and WRMP24 planning, are not included in expenditure for STS SRO activities. Refer to Table 11.1 for a detailed breakdown.

Table 11.1: Summary of gate two spend and forecast by workstream

Category	Activity	Expenditure Activity (£)	% of Total Expenditure Activity	Expenditure Category (£)	% of Total Expenditure Category	Description
Programme and Project Management	PM & PMO	225,305	28%	243,050	30%	Project manager and project management office
	Assurance	17,745	2%			3rd line assurance and copywriting
Feasibility Assessment and Concept Design	Engineering	285,030	35%	285,030	35%	Engineering CDR
Option benefits, development and appraisal	Water resource	-	0%	-	0%	(included in feasibility and concept design)
	Non-water resource benefits	-	0%			(included in feasibility and concept design)
	Carbon, wider best value and option appraisal	-	0%			(included in feasibility and concept design)
Environmental Assessment	Environmental Assessments	92,675	11%	190,738	23%	SEA, HRA, BNG, NC, EAR
	National Assessment Unit (NAU) & Environment Agency (EA) Area costs	88,605	11%			3rd party cost
	Natural England	9,458	1%			3rd party cost
Data collection, sampling and pilot trials	Targeted baseline desktop studies	-	0%	-	0%	(included in feasibility and concept design)
Procurement Strategy	Procurement strategy	44,040	5%	44,040	5%	Procurement advice
Planning Strategy	Land and planning	40,402	5%	40,402	5%	Land referencing, field surveys, permitting plans
Stakeholder engagement	Customer Engagement	-	0%	-	0%	Customer research, benefits & impact
Legal	Legal advice and collaborative agreement	10,664	1%	10,664	1%	Legal activities related to the SRO
Other	Other	-	0%	-	0%	n/a
Total		**813,924**	100%	**813,924**	100%	
Gate 2 Allowance	OFWAT PR19 final determination for gate 2	795,000		795,000		
Transfer from gate 1	Gate 1 underspend approved for gate 2 use	262,000		262,000		RAPID approval January 2022
Revised gate 2 allowance		**1,057,000**		**1,057,000**		
Gate under / overspend		243,076		243,076		

11.4. We can confirm that our gate two expenditure and forecast gate three expenditure has been assured by our external assurance providers, who found that spend on the STS SRO was both relevant (focusing on critical areas) and appropriately efficient.

11.5. To achieve savings, opportunities have been sought to:

- **Undertake work internally** where appropriate. STW has a small team working full-time across our SROs, with support from other specialist internal and external staff as required. Internal recharging to the scheme has been proactively monitored and robustly challenged to ensure that the SRO has not paid business-as-usual (BAU) costs.
- **Utilise established supplier frameworks** where appropriate, which have previously been competitively tendered to establish pre-agreed rates. This approach allows access to specialist advice from professionals who are already familiar with our existing assets. Opportunities have been sought to competitively tender work within frameworks, where time allows. In total, 49% of external spend (excluding company costs) has been through framework suppliers. The procurement strategy split is illustrated in Table 11.2.
- **Procure collaboratively with other SROs**, where appropriate. For example, environmental assessment was completed via the STT SRO, whereby STW has contributed to the output and reviewed the environmental and ecological reports. This includes water quality surveys and modelling for Minworth SRO final discharge and STS SRO final discharge, which formed part of the Thames Water monitoring package to service its own five SROs.
- **Competitively tender work within frameworks** where time allows. Of the 73% of gate two costs which could be competitively tendered (see Table 11.2), 48% were let specifically for gate two via company frameworks, 0.8% were gate two work package extensions through company frameworks, 16.8% were direct awards, and 7.2% were undertaken by internal company resources. It was not possible to competitively tender all work elements. 27% of the gate two costs could not be competitively tendered. For example, STW leadership costs and the costs of regulators such as the EA/NAU, NE and Water Resources East (WRE) could not be tendered.

11.6. As the environmental assessments for STS SRO were undertaken under the umbrella of the STT SRO studies, this has permitted an exceptionally low spend on this element of the project. Note that the low environmental assessment cost for this SRO falsely inflates the proportional allocation of other spend categories, particularly feasibility and concept design.

Table 11.2: Summary of spend by procurement method

Award Type	Totals by Award type (£, 2017-2018 prices)	% of total spend	% eligible external spend
STW internal resource	58,541	7.2%	9.9%
Framework Mini-bid procured at gate 2	390,906	48.0%	65.9%
Extension to Framework Mini-bid procured at gate 2	6,910	0.8%	1.2%
Direct Award	136,700	16.8%	23.1%
3rd Party	107,507	13.2%	n/a
Leadership costs	113,361	13.9%	n/a
Total	**813,924**	100%	100%

Forecast Spend to Gate Three

11.7. We have reviewed the gate three guidance and planned our gate three activities. We have coordinated and consulted with the STT SRO gate three proposed schedule to determine required work packages, activities, further testing, environmental considerations and planning and procurement routes. We have looked at our gate two resources and are forecasting additional resources through to gate three, including specialists and technical experts for DCO planning.

11.8. The gate three proposed submission date of Q1 2025 has been recognised through our gate three collaborative planning and activity schedule. The STS SRO gate three forecast costs are outlined in Table 11.3.

Table 11.3: Summary of gate three forecast by workstream

Category	Activity	Expenditure Activity (£, 2017-2018 prices)	Expenditure Category (£, 2017-2018 prices)	% of Total Expenditure Category
Programme and Project Management	PM & PMO	645,697	665,538	10%
	Assurance	19,841		
Feasibility Assessment and Concept Design	Solution design & support data	2,881,226	3,448,845	54%
	Development design sufficient for EA/EIA	524,487		
	Modelling	43,132		
	CDM	-		
Option benefits, development and appraisal	Water quality	603,850	682,528	11%
	Operational Strategy	78,678		
Environmental Assessment	Environmental (data)	129,396	198,407	3%
	National Assessment Unit (NAU) & Environment Agency (EA) Area costs	69,011		
	Natural England	-		
Data collection, sampling and pilot trials	Surveys & data collection	258,793	258,793	4%
Procurement Strategy	Procurement and funding strategy (support / advice) (DPC)	138,023	976,770	15%
	Engineering procurement (in house, included in hours assessment)	838,747		
Planning Strategy	Land referencing	10,352	75,050	1%
	Land acquisition	-		
	Planning (EIA co-ordinator / planning advisor)	64,698		
	Fees	-		
Stakeholder engagement	Stakeholder Engagement	17,253	17,253	0%
Legal	Commercial and legal advice	34,506	34,506	1%
Other	WRW regional planning	12,077	12,077	0%
Total		**6,369,767**	**6,369,767**	100%
Gate 3 Allowance	OFWAT PR19 final determination for Gate 3	1,855,000	1,855,000	
Gate 4 Allowance	OFWAT PR19 final determination for Gate 4	2,120,000	2,120,000	
Underspend from Gate 2	RAPID email 28/09/22	243,076	243,076	
Gate 3 & 4 allowance		**4,218,076**	**4,218,076**	
Remaining Budget		-2,151,691	-2,151,691	

11.9. Gate three forecast costs are £6.37m (2017/18 prices), which indicates an overspend against the £4.22m budget of £2.15m.

11.10. This increase in gate three expenditure is due to a number of factors, including:

- The requirement to treat additional emerging substances, which is a scope change since gate one; increased CAPEX solution costs have driven increased outline design fees (+ c.£1m). Note that dialogue is ongoing with the EA to determine final treatment requirements.
- Treatment process bench tests and extended trial plant use to feed into the above design (+ c.£2m).
- Extended programme duration and DCO process support requiring extended/additional resourcing. Note that a mid-gate checkpoint will be utilised to ensure that any decisions to progress the SRO align with regional and national water resource plans.
- Increased Environmental Impact Assessment (EIA) costs to support DCO application (+c.£600k).

12. Conclusions and Recommendations

Conclusions

12.1. The STS SRO offers a robust, reliable and resilient source of raw water to support the STT SRO. The STS SRO will be construction ready in AMP8, as per the Final Determination requirement. The planned construction start date is 2029, to achieve a DO date of 2031.

12.2. The principal change from gate one is the scale of treatment that may be required to support the WFD "no deterioration" criteria. Several options are available at this stage. Following discussions with the EA, alternative options avoiding the need for additional treatment processes at Netheridge WwTW are currently being investigated.

12.3. In gate one, we outlined the option of utilising the Mythe WTW 15 Ml/d licence transfer for STS SRO. During gate two, and as part of the Regional Plan reconciliation exercise, this was not accepted and therefore withdrawn from the STS SRO. As a result of this, the latest WRMP now reflects the 15 Ml/d now being utilised "in region". The work undertaken in gate two and subsequent removal of Mythe from STS SRO was a paper exercise: no material costs have been incurred on the project and it does not impact on the allowable gate three funding, as there is no change in scope. Note that the 35 Ml/d yield flow available from Netheridge WwTW is sufficient for the requirements of the STT SRO sweetening flow.

12.4. During gate two, the discharge location changed to Haw Bridge, reducing the transfer pipe length, which reduces the scheme's carbon and CAPEX impacts.

12.5. The STS SRO does not meet the NSIP criteria. However, it will form part of the STT SRO DCO application as associated development, as it is required to provide the sweetening flow.

12.6. We have completed RAPID's three tests for DPC and find that it is not applicable for STS SRO.

12.7. Stakeholder research undertaken by WRW confirms that stakeholders are supportive of water transfers and see them as key part of future water resource options.

12.8. Care has been taken to ensure efficient and relevant spend on agreed activities to advance this project. We have delivered our gate two submission efficiently, at 23% below the Final Determination allowance (inclusive of gate one carry-over).

Recommendations

12.9. Through gate two, we have not discovered any showstoppers, and recommend this SRO proceeds to gate three. The STW Board supports the recommendation for solution progression made in this submission.

13. Supporting Documentation

13.1. Table 13.1 provides the list of annexes that accompany this gate two submission. Where annex numbering is not concurrent, this indicates amalgamation of deliverables into fewer documents as the gate has progressed than anticipated at the outset.

Table 13.1: List of STS SRO Annexes

A	**Engineering**
A1	Netheridge Conceptual Design Report (CDR)
A1.1	Alternative Options Addendum
A2	Pipeline Route Appraisal Report
A3	Process Basis of Design Report
A4	Netheridge Carbon Report
A5	Netheridge Cost Report
B	**Environmental**
B1	Environmental Regulatory Assessments (IEA) Overarching Report
B2	Environmental Regulatory Assessments (SEA)
B3	Environmental Regulatory Assessments (WFD)
B4	Environmental Regulatory Assessments (HRA)
B5	Environmental Regulatory Assessments (Natural Capital)
B6	Environmental Regulatory Assessments (BNG)
B7	Environmental Regulatory Assessments (INNS)
D	**Stakeholder Engagement**
D1.1	Stakeholder Engagement Report
D1.2	Water Club Changes of Source
D1.3	Customer Preferences on Added Value for Large Resource Schemes
E	**Procurement Strategy (including Ownership)**
E1	Further Advice DPC Procurement Options
F	**Scheme Delivery Plan**
F1	Updated Scheme Delivery Plan
G	**Planning and Consents Strategy**
G1	Constraints Strategy Report
H	**Assurance Report and Board Statements**
H1	Assurance Report
I	**Efficiency of Gate Two Spend**
I1	Efficiency of Gate Two Spend
J	**Gate One Decision – Actions and Recommendations**
J1	Gate One Decision – Actions and Recommendations
K	**WRMP24 Table 5 Cost Report**
K1	WRMP24 Table 5 Cost Report