Strategic regional water resource solutions: detailed feasibility and concept design

Standard gate two submission for Minworth 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 and Affinity 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 and Affinity 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.

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

Minworth SRO Gate 2 Submission

Dear Paul,

Affinity Water and Severn Trent Water are pleased to submit a gate-2 report for the Minworth 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.

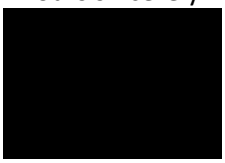
As recommended in in our gate-1 submission, we are proposing that Minworth, Severn Trent's largest wastewater treatment works and a highly drought-resilient source, could supply the GUC SRO with up to 115Ml/d of water, and/or the Severn to Thames Transfer (STT) SRO with up to 115Ml/d. This means we could increase the scope to provide a total of 230 Ml/d. We can provide 57Ml/d to the GUC SRO in 2031 in line with the draft Water Resource Management Plans in August 2022. We propose additional treatment processes to improve water quality, followed by transfer to the River Avon and/or the Grand Union Canal system.

Our team, including personnel from both Affinity Water and Severn Trent Water, have 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 Boards of Affinity Water and Severn Trent Water confirm their support for this SRO with the supporting board statement attached.

We have aimed to create 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 send your queries to wrmpcomms@affinitywater.co.uk, justin.bailey@severntrent.co.uk and minworth@severntrent.co.uk; we would welcome the opportunity to provide further clarity where needed. We look forward to receiving your feedback, and to developing this SRO into gate-3.

Yours sincerely



Ian Tyler
Chair Affinity Water

Liv Garfield
Chief Executive Severn Trent

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

Minworth Strategic Resource Option
Joint Board Assurance Statement

This joint board assurance statement is provided by the Minworth partners, Severn Trent Water and Affinity Water. The two companies have worked effectively and collaboratively on the Gate 2 solution development. In support of this statement the two companies have undertaken both joint and individual company assurance and due diligence.

Each of the boards are 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 Severn Trent Water board confirm that they understand their role in this submission as suppliers of the water. Affinity Water confirm that they understand their role in this submission as a recipient of the water.

The boards all 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]
Affinity Water		14 November 2022	

Author signatures redacted

Board Assurance

The following table provides details the main factors the Boards have taken into account in support this joint 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	**NSIP**	Nationally Significant Infrastructure Project
ADO	Average Deployable Output	**O&M**	Operations & Maintenance
AfW	Affinity Water	**OB**	Optimism Bias
AIC	Average Incremental Costs	**OPEX**	Operating Expenditure
BAU	Business As Usual	**PAS**	Publicly Available Specification
BNG	Biodiversity Net Gain	**PEIR**	Preliminary Environmental Information Report
BSA	Bulk Supply Agreement	**PFOA**	Perfluorooctanoic Acid
CAP	Competitively Appointed Provider	**PFOS**	Perfluorooctane Sulfonate
CAPEX	Capital Expenditure	**PQQ**	Pre-Qualification Questionnaire
CCG	Customer Challenge Group	**PR24**	2024 Price Review
CCW	Consumer Council for Water	**PRoW**	Public Rights of Way
CDR	Conceptual Design Report	**RAPID**	Regulators' Alliance for Progressing Infrastructure Development
CPO	Compulsory Purchase Order	**RO**	Reverse Osmosis
CPRE	Campaign to Protect Rural England	**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
UC	Grand Union Canal	**SuDS**	Sustainable Drainage Systems
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		
NPV	Net Present Value		

Contents

1. Executive Summary

Opening Statement

1.1. Minworth Strategic Resource Option (SRO) is a viable solution that offers a robust and reliable source of raw water support to the Grand Union Canal (GUC) SRO, the Severn to Thames Transfer (STT) SRO, or a combination of the two. Minworth SRO will be construction ready in AMP8, and will deliver a deployable output (DO) in a phased approach to match the requirements of receiving SROs, commencing in 2031.

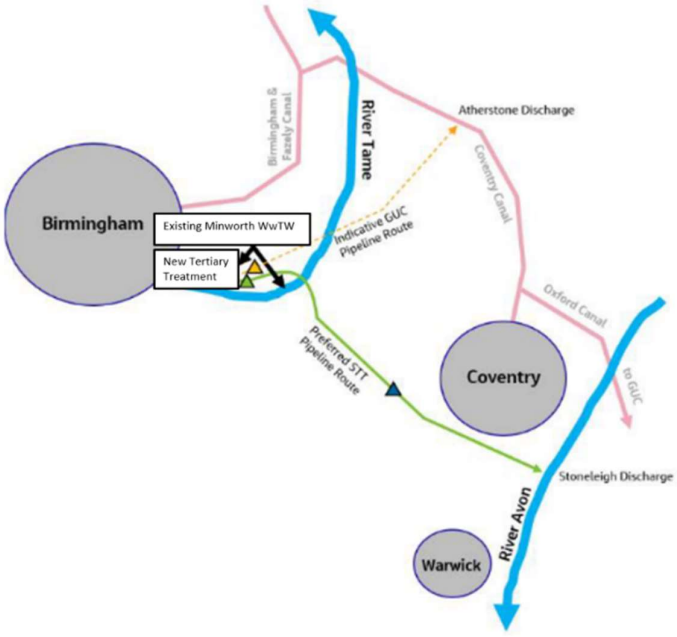
1.2. We have delivered our gate two submission at 18% below the gate two Final Determination allowance (inclusive of gate one carry-over), ensuring efficiency via competitive tendering (57%) and by collaborative procurement with other SROs.

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

1.4. The specific water treatment requirements at Minworth Wastewater Treatment Works (WwTW) for discharge to both the Coventry Canal (for GUC SRO) and the River Avon (for STT SRO) have been identified in gate two, through discussion and reviews with the Regulators' Alliance for Progressing Infrastructure Development (RAPID), the Environment Agency (EA) and the National Appraisal Unit (NAU). We have established a range of costs covering different treatment scenarios, relative to water quality requirements at point of discharge, which will be confirmed during gate three.

1.5. Minworth SRO will be the sole source of raw water to support a new abstraction for the GUC SRO. Minworth SRO will also be one of several sources of raw water support for a new abstraction for the STT SRO system. Minworth SRO system is shown in Figure 1-1. Both receiving SROs are reported separately to RAPID in their own gate two submissions.

Figure 1-1: Minworth SRO system



Key Facts

1.6. Minworth SRO will offer support to the receiving SRO(s) by diverting some of the treated wastewater from Minworth WwTW, without detriment to its current discharge location in the River Tame. The diverted flow will be subject to additional treatment appropriate to the receiving waterbody; accepted treatment targets will need to be agreed with the EA.

1.7. The maximum support available to either or both receiving SROs is subject to further environmental and hydrological investigations. We have considered the outputs to respective receiving SROs, and system losses, as set out in Table 1.1.

1.8. The proposed treatment processes have 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 Water Framework Directive (WFD) status.

Table 1.1: Minworth WwTW outputs

SRO Element	Yield Benefit Delivered	Cumulative Yield Benefit Delivered	Average Deployable Output Benefit Delivered	Cumulative Average Deployable Output Benefit Delivered	Earliest Deployable Output Date	Average Deployable Output Benefit Required*	WRSE Earliest Date Required*
GUC SRO (Phase I)	58 Mld	58 Mld	50 Mld	50 Mld	2031	50 Mld	2031
GUC SRO (Phase II)	57 Mld	115 Mld	50 Mld	100 Mld	2031	100 Mld	2040
STT SRO	115 Mld	230 Mld	70 Mld	170 Mld	2032	170 Mld	2060

* Based on draft WRSE regional plan (November 2022)

Key Risks

1.9. Regional Plan reconciliation remains a key risk until final drafts of all documents are agreed and issued, as they may impact upon the timelines of the two SROs that the Minworth SRO will serve. In order to mitigate this risk, scenario planning has been undertaken. Minworth SRO has the capability to be delivered in a phased approach to align with raw water demand. We propose to commence the planning and consenting process prior to finalisation of Regional Plan outputs, to mitigate delivery risk.

1.10. Environmental impact on the Rivers Tame and Trent also remains a key risk, for which environmental investigations will continue beyond gate two. Our consenting route is Development Consent Order (DCO) as “associated development” to the GUC SRO, although this preference is based on several assumptions that we will continue to work through in gate three.

Conclusions

1.11. The Minworth SRO will be construction ready within AMP8, as per the Final Determination requirement.

- The earliest Yield Benefit for Minworth SRO to support the GUC SRO will be 2031, which supports the programme published by the GUC SRO (refer to Table 1.1 for detail). Minworth SRO would make water available to enable a 58 Megalitres per day (Ml/d) Yield Benefit transfer via the GUC SRO, with the necessary treatment

processes to meet the accepted quality requirements of the receiving waterbody (GUC).

- The earliest Yield Benefit for Minworth SRO to support the STT SRO will be 2032, which supports the programme published by the STT SRO in terms of the earliest possible construction date for the STT pipeline (refer to Table 1.1 for detail). This Yield Benefit would be for Minworth SRO to be available and commissioned into service to supply 115 Ml/d to the STT SRO, with the necessary treatment processes to meet the accepted quality requirements of the receiving waterbody (River Avon).

1.12. The new assets required at Minworth SRO could be phased to meet the individual need of each transfer SRO, or a combination of the two.

1.13. The key benefit of using Minworth SRO as a source for both GUC and STT SROs is that wastewater is produced and fed into Minworth WwTW for treatment under all conditions. It is therefore very resilient to drought, improving the resilience of both subsequent transfer SROs.

1.14. We recognise that further work is required, in partnership with the EA, to confirm the approach and set the discharge requirements, which in turn will shape the treatment design. Timely agreement of the water quality drivers is now paramount, as Minworth SRO may need to be in service to support the GUC SRO by 2031.

1.15. 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:

- Minworth (GUC);
- Minworth (STT);
- Minworth (GUC) and Atherstone Pipeline;
- or Minworth (STT) and STT Pipeline.

DPC is, however, considered suitable for the STT Pipeline alone.

1.16. Through gate two we have not discovered any showstoppers, and recommend this SRO proceeds to gate three.

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. Minworth 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 an inter-regional water transfer based on identified requirements, Minworth SRO takes a step towards the national transfer network first highlighted in the NIC report. Minworth SRO offers a source of treated final effluent from Minworth WwTW, providing raw water support to STT SRO, GUC SRO, or both.

2.6. The Minworth SRO is being developed in a partnership arrangement between Severn Trent Water (STW) and Affinity Water (AfW), working collaboratively to produce this gate two submission.

Objective

2.7. Our main objectives for the RAPID gated process have been to develop Minworth SRO to better understand the technical, environmental and social requirements, and to work with key stakeholders to highlight and address queries. Minworth SRO has been fed into the Water Resources South East (WRSE) Regional Plan as a source to support the GUC SRO, and could be required to support a transfer to the south east of England by the early 2030s. We have therefore undertaken a number of workstreams in parallel to increase understanding of this scheme, and to ensure we develop a gate two submission that meets the guidance set out by RAPID.

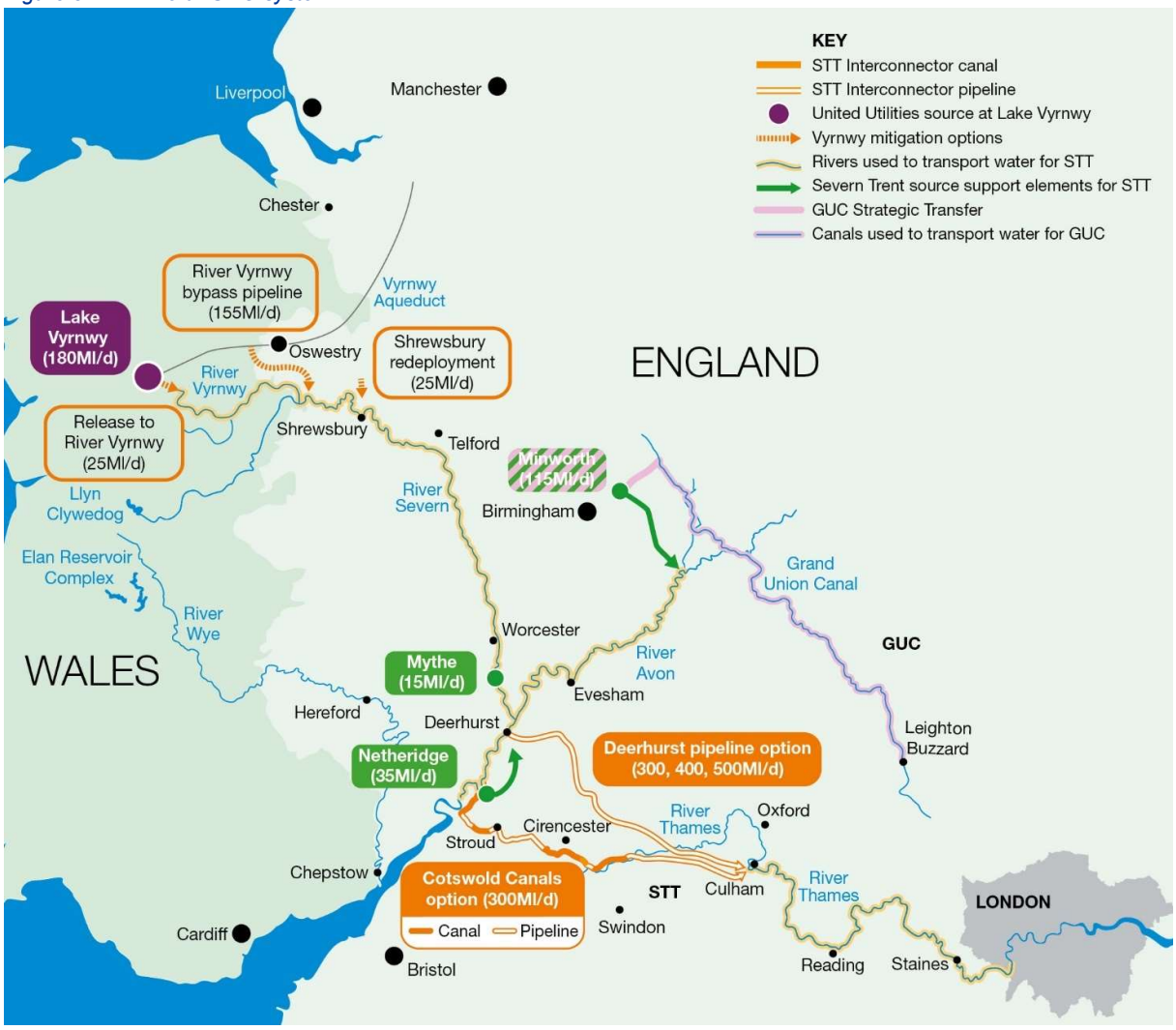
[1] 'Preparing for a drier future: England's water infrastructure needs', National Infrastructure Commission, 2018
[2] 'Meeting our future needs: a national framework for water resources', Environment Agency, 2020

3. Solution Design, Options and Sub-options

Outline of the Solution

3.1. Minworth SRO provides a source of raw water to support inter-regional transfers from the Water Resources West (WRW) region to the WRSE region. The raw water would be transferred via either the GUC SRO, the STT SRO, or a combination of both. Figure 3-1 shows the relation between Minworth SRO and the two inter-regional transfers.

Figure 3-1: Minworth SRO system



3.2. The principal change from gate one is the scale of treatment on the existing Minworth site that may be required to support the WFD “no deterioration” criteria. A range of process configurations are available at this stage.

3.3. Minworth SRO consists of new treatment processes at Minworth WwTW for both GUC SRO and STT SRO. Our analysis shows that the two receiving watercourses, the Coventry Canal (for GUC SRO) and the River Avon (for STT SRO), require the same level

of additional treatment to meet the likely discharge standard. The application of the ACWG Design Principles is contained in Section 2.1 of Annex A1, Engineering CDR.

3.4. A pumping station and pipeline are included in Minworth SRO to transfer the treated wastewater to the River Avon for STT SRO. In line with our gate one scope, the equivalent transfer assets for GUC SRO are included in the GUC SRO submission. If GUC SRO progresses, we may consider a change in this allocation for the design and construction phases, as it may be more appropriate for STW to deliver all assets to the point of discharge within its region. This is discussed further in paragraph 7.44.

3.5. Minworth WwTW currently discharges final effluent to the River Tame, with a consented dry weather flow of 450 Ml/d. Between 57 Ml/d and 230 Ml/d of this discharge will be diverted into new additional treatment process units, providing the additional treatment required to meet the likely discharge standard for the receiving watercourse(s).

3.6. The treated wastewater will then be transferred via new pumping stations and pipelines to the Coventry Canal, the River Avon, or both.

Options and Configurations

3.7. Treatment and transfer options have been developed to take account of the support requirements of the inter-regional transfers, and the environmental impacts on the existing and proposed receiving watercourses.

3.8. Minworth SRO's maximum total supply capacity is considered to be 230 Ml/d (subject to further modelling during gate three) to avoid unacceptable environmental impacts on the River Tame and River Trent. Of this 115 Ml/d will be transferred to the Coventry Canal for GUC SRO with the remaining 115 Ml/d being transferred to the River Avon for STT SRO.

3.9. River modelling has determined that, without mitigation measures, the Hands-off Flow (HoF) at North Muskham could be breached sooner than normal if the SRO was operational.

3.10. We have had frequent and ongoing communications with the EA and RAPID, and we have now commissioned a high-level feasibility study to understand the options and costs of avoiding increased breaching of the North Muskham HoF. Details of the preferred mitigation measures will be included in our gate three submission.

3.11. The new treatment processes at Minworth WwTW have been sized to provide the required level of raw water support for the two inter-regional transfer SROs. Options for flow rates of 57 Ml/d, 115 Ml/d, 172 Ml/d and 230 Ml/d have been developed to allow scalability and phasing of delivery to be considered by WRSE water resource modelling.

3.12. The new pumping station and pipeline to transfer the raw water to the River Avon for STT SRO have been sized at 115 Ml/d. As with the GUC SRO pipeline, this will be delivered in a single phase to ensure the transfer can be supported at the earliest date required. Phasing of the pipelines by installation of twin pipelines is considered to be uneconomical (this will be verified through further assessment during gate three) unless significant uncertainty arises over the ultimate transfer capacity.

3.13. WRSE has confirmed the options and benefit delivery dates to support its draft Regional Plan for the south east of England. Minworth SRO is selected to support GUC SRO with a phased delivery of 58 Ml/d in 2031, and a further 57 Ml/d in 2040. Minworth SRO is selected to support STT SRO at 115 Ml/d in 2060.

3.14. Whilst we have developed a combined option to treat 230 Ml/d, the significant time period between the two benefit delivery dates is unlikely to make a single 230 Ml/d treatment plant economical. This will be reviewed in gate three, particularly in light of WRSE's adaptive pathway, which calls for Minworth SRO to support STT SRO in 2040 if the South East Strategic Reservoir Option SRO proves to be undeliverable.

Description of the Key Assets to be Constructed

3.15. The new transfer pipeline, pumping station and treatment processes are shown in Figure 3-2. These have 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. Details of the analysis undertaken to determine the required level of treatment can be found in Annex A3 (1) (Basis of Design Report). 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).

3.16. The guidance detailed above 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.

3.17. When the project was originally submitted for PR19, the assumption was made that a discharge standard matching our existing Finham WwTW discharge to the River Avon would be acceptable. This would require the addition of tertiary treatment to reduce the total phosphorus concentration to 0.2 mg/l.

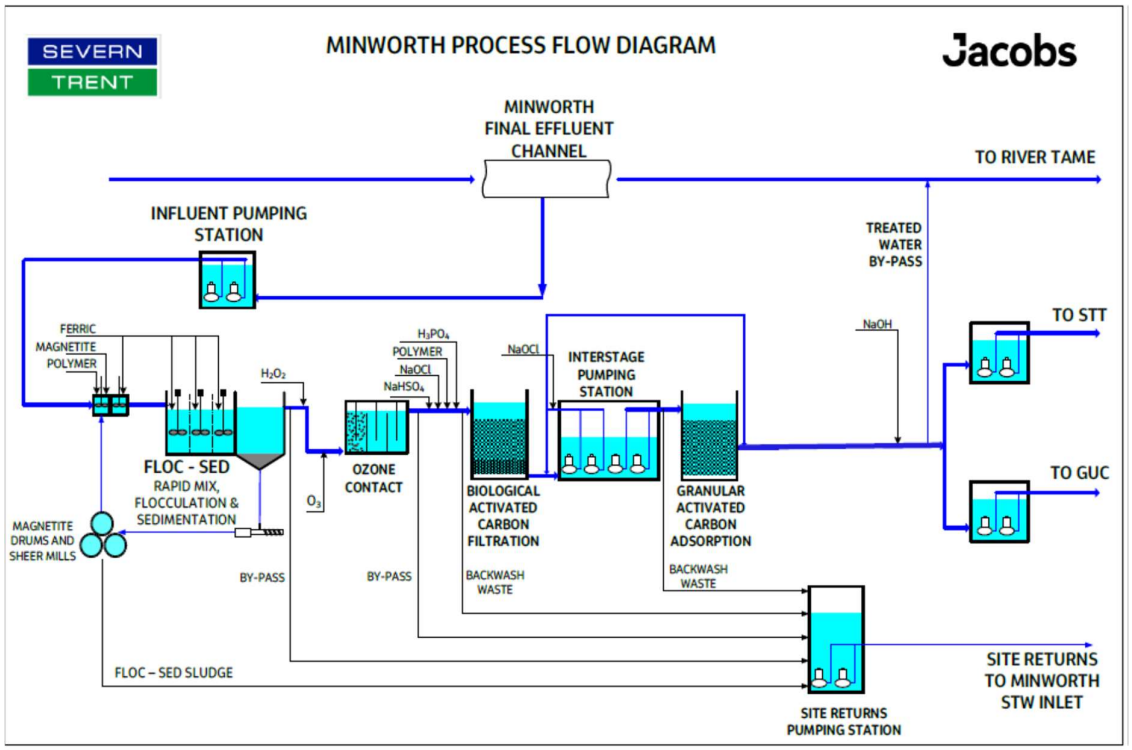
3.18. By way of comparison, we have undertaken sensitivity analysis to demonstrate the additional carbon and cost impact of complying with the guidance above. This analysis shows that an additional 63,953 tonnes of carbon dioxide equivalent (tCO2e) will be generated, and £56m net present value (NPV) expended, over the 80-year life cycle.

3.19. As detailed in paragraph 3.36, STW intends to review how the SRO could be deployed to address its own supply-demand deficit when not required to support GUC. If an efficient solution can be found, this would significantly reduce the carbon and cost impacts detailed above.

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 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.

Figure 3-2: Proposed treatment process flow diagram to comply with EA guidance



3.22. The treatment process provides a multiple barrier system for treatment of solids, organics and pathogens. Refer to Annex A3 (ii) (Process Design Report) for a full description of the treatment process, along with reasons for the rejection of alternatives.

3.23. A carbon-based treatment process has been proposed as a robust, well-studied advanced treatment scheme. An alternate treatment scheme using reverse osmosis (RO) was considered, but was eliminated due to its larger capital and operating cost, higher whole-life carbon impact and energy consumption, and anticipated challenges with managing the waste brine concentrate flow.

3.24. When using RO for reuse projects, this reject stream typically cannot be returned to the same treatment plant that is supplying the flow, as it would increase the nutrient/organic load, resulting in an ever-increasing returns loop of substances that are not removed in the WwTW process. The resulting high level of brine concentration discharged to the River Tame would cause a WFD deterioration due to the limited dilution available.

3.25. Ocean disposal is the most common method of brine management, as many RO facilities are located in coastal areas, but this is not a practical solution for Minworth WwTW, which is situated on the north side of Birmingham.

3.26. In non-coastal areas, deep well injection of the brine flow is commonly practiced overseas. We have discussed this principle with the EA and they consider it highly unlikely that they would be able to issue a permit for such a discharge. The power requirement for RO at Minworth WwTW with deep-well injection of brine is estimated to be six times that of the proposed carbon-based treatment process.

Operation of the New Assets

3.27. Utilisation profiles are detailed in section 4. These show that operation of the new assets would be less intermittent for GUC SRO than for STT SRO.

3.28. As a raw water support to the transfer SROs, Minworth SRO will be operated to ensure support is available in line with the operational strategies developed by GUC and STT SROs. We have worked closely with the transfer SRO project teams to develop modes of operation for Minworth SRO that meet this fundamental requirement.

3.29. The driver for the two transfer SROs is to provide resilience in high demand and drought scenarios in the WRSE region. As a resilient source of raw water, Minworth SRO, including the HoF mitigation measures detailed in paragraph 3.10, will be available for use throughout the year, and will be capable of deployment within the timescales specified by GUC and STT SROs.

3.30. We have developed a hot standby operational mode for the additional treatment processes at Minworth WwTW, allowing the plant to be ramped up to provide peak flow when required by the inter-regional transfers.

3.31. Hot standby will also provide a sweetening flow to ensure consistency of water released to the receiving watercourses. This reduces the time to recommission the pipelines when required to deliver peak flow for normal operation mode.

3.32. OPEX costs have been developed based on the proposed modes of operation. Refer to Annex A1 (CDR, Appendix D3 Operational Philosophy) for full details of the operating modes. As detailed in paragraph 3.10, we have commissioned a high-level feasibility study to understand the potential mitigation options, their potential constraints and costs.

3.33. There is an interaction between Minworth SRO (to support GUC SRO, STT SRO, or both) and the South Lincolnshire Reservoir (SLR) SRO, as SLR SRO also includes a support transfer from the River Trent. Concurrent operation of Minworth SRO and SLR SRO would increase the impact on the HoF and we are working closely with the SLR SRO project team to understand this interaction.

3.34. Several of the options being considered to avoid impacting the HoF are to provide additional storage. This would allow releases to be made to the transferring watercourses if operation of Minworth SRO had to be stopped to avoid an earlier breach of the HoF.

3.35. Minworth SRO is a potential source of raw water for some of these storage options. If these options progressed, Minworth SRO may need to be operated to provide the volume of water required to fill some of the additional storage options. If existing storage assets can be utilised, using Minworth as an additional source of raw water would improve their resilience.

3.36. We are also considering whether some of these options could provide a dual benefit, reducing STW's own supply-demand deficit by increasing the volume of storage provided. This would increase the operation of Minworth SRO to fill the additional volume. Increasing the utilisation of Minworth SRO and GUC SRO components would result in improved efficiency. Assets could be used for both AfW and STW drought scenarios, and to reduce STW's supply-demand deficit.

3.37. The Minworth SRO project team is working closely with STW's water resources team to understand the benefits and costs of these potential interactions.

4. Water Resource Assessment

Utilisation

4.1. As a raw water source to support the inter-regional transfer SROs, Minworth SRO will be utilised to meet the need of GUC and/or STT SROs, for the benefit of the WRSE region.

4.2. Each of the inter-regional transfer SROs has developed dry weather profiles, based on water resource modelling covering the receiving water company's areas.

4.3. GUC SRO's water resource modelling during gate two identified a need to increase the level of raw water support provided by Minworth SRO from 100 Ml/d to 115 Ml/d. The increase was driven predominantly by the lack of available storage within the AfW supply system, requiring a higher average deployable output (ADO) to deliver the 100 Ml/d DO benefit. A small amount of losses was also allowed for within the canal transfer network, as well as process losses at the WTW.

4.4. GUC SRO has developed two utilisation profiles, detailed in Table 4.1, that demonstrate the scheme will operate at varying levels throughout the year. The first covers normal dry-year demand, and the second covers a drought period.

Table 4.1: Anticipated scheme utilisation (GUC SRO)

Period	Utilisation (%)	
	Normal dry year	Drought year (> 1 in 50 year)
October - April	25	25
May	55	65
June - August	80	100
September	55	65

4.5. GUC SRO is also considering the use of the inter-regional transfer as a resilience supply that would be deployed in the event of an outage in AfW's supply area. Depending on the level of resilience required, the operating regime of Minworth SRO may need to be amended to ensure the transfer can be deployed within the required timescale. This, along with the utilisation profiles, will be reviewed in gate three by the two SRO project teams.

4.6. 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 the modelling.

4.7. 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 4.2 shows that the utilisation profile has a range of 6.20% to 22.60%, depending on the nature of the raw water support deployed.

Table 4.2: 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[3]	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)

4.8. Minworth SRO raw water support remains unchanged from the 115 Ml/d detailed at gate one. This will provide 103 Ml/d for abstraction at the STT SRO preferred abstraction location, after an allowance for losses during transfer along the River Avon.

4.9. As a robust and reliable source of raw water, Minworth SRO can deliver the stated levels of support year-round, subject only to the North Muskham HoF constraint detailed in paragraph 6.24. In view of the relatively low level of anticipated utilisation, STW intends to review how the SRO could be deployed to address its own supply-demand deficit.

Water Resource Benefit

4.10. As a raw water source to support the two inter-regional transfers, Minworth SRO has no direct DO benefit.

4.11. For each of the transfers, a variable yield of up to 115 Ml/d will be available at the point of discharge to the GUC canal and/or STT SRO transfer networks. Each transfer SRO has accounted for the appropriate level of losses in the transfer networks before determining the DO benefit to the WRSE region.

4.12. Based on the available yield and transfer losses, GUC SRO can deliver an ADO benefit of up to 100 Ml/d, and STT SRO can deliver an ADO benefit of up to 70 Ml/d. Both benefits are realised within the WRSE region. Refer to the gate two submissions of the transfer SROs for details of the water resource modelling.

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

Long-term Opportunities and Scalability

4.14. Our environmental assessments have demonstrated that the options presented represent the maximum yield benefit available from Minworth WwTW within the context of the requirements of the inter-regional transfers and the WRSE Regional Plan.

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

4.15. Based on the needs of the draft WRSE Regional Plan, Minworth SRO additional treatment process units will be constructed in a single phase, but benefit delivery will be phased by operating the plant to provide 58 Ml/d by 2031 and 115 Ml/d by 2040.

4.16. As detailed in paragraph 4.9, STW will consider developing options that would make use of the 230 Ml/d raw water source when not required by the inter-regional transfers. To date, options using Minworth WwTW as a raw water source have proven to be an uneconomical option for the STW Water Resource Management Plan (WRMP). With the delivery of the inter-regional transfers, more options may be available to STW that could change the cost-benefit analysis.

4.17. As detailed in section 3.11, we have presented options to allow a phased delivery of the assets, but these are unlikely to progress in view of the level of need and timescales identified by the regional planning process.

Infrastructure Resilience to the Risk of Flooding and Coastal Erosion

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

4.19. We have undertaken an initial Flood Risk Assessment (FRA) for both the new treatment processes at Minworth WwTW and the transfer pipeline route for STT SRO. Part of the new treatment plant falls within the boundary of a low-risk Flood Zone 2. All electrical equipment will be elevated above the floodplain to mitigate the risk of damage from flooding.

4.20. The pipeline route appraisal for the STT SRO's River Avon transfer considered the length of pipeline that would be located within flood zone areas as one of the selection criteria. We have sought to minimise the length of pipeline within flood zone areas as much as possible. Further detailed assessments will be undertaken in gate three to ensure all new assets are resilient to flooding.

5. Drinking Water Quality Considerations

5.1. As a source SRO, Minworth SRO does not serve customers directly, and is represented as an input to the catchment within the risk assessments of the transfer SROs. Throughout gate two, we have engaged regularly with the Drinking Water Inspectorate (DWI) and agreed that source SROs do not need to complete the All Company Working Group (ACWG) treated water methodology. Minworth SRO has supported the development of the Drinking Water Safety Plans (DWSP) for the transfer SROs through provision of water quality data, "emerging substance" assessments, stakeholder engagement, and treatment design to develop the risk assessments.

5.2. Minworth SRO has engaged with the ACWG Water Reuse Group to ensure a common approach to schemes that could be considered "reuse". However, given the large travel distances compared to other schemes (e.g. c.200km from the Minworth-to-STT discharge point to the abstraction location in London), and dilution before abstraction for supply, this SRO could be considered flow augmentation rather than reuse.

5.3. A review of emerging substances risk has been carried out, aligning with the methodology that had been discussed with the DWI and EA by Thames Water for its SROs. Following the review, 51 parameters have been added to the ongoing water quality monitoring programme from September 2022. This assessment followed a methodology developed by the ACWG water reuse group, and considered the effluent sources that feed Minworth WwTW. The methodology and list of parameters has been presented to and discussed with the DWI and the EA.

5.4. As this scheme does not provide drinking water directly, there are no drinking water-based mitigations from the scheme. Both GUC and STT SROs have completed the treated water risk assessment and used it to design the treatment requirements in place prior to the water going into supply.

6. Environmental Assessment

6.1. The gate two environmental assessment has built on the work completed at gate one, incorporating feedback from regulators. As with the gate one studies, we worked with the SLR SRO to carry out the bulk of the environmental assessments, due to our joint interest in the River Tame and River Trent system. To ensure efficient spend, consistency of data and a common understanding of the river systems – and to prevent duplicate investigations – we jointly procured consultants to carry out ecological monitoring, environmental assessments and river flow modelling workstreams. These have greatly developed our understanding of the Tame and Trent system. In line with the RAPID gate two guidance and ACWG SRO environmental assessment guidance, we have also carried out water quality monitoring and modelling of the Tame and Trent system, as well as regulatory assessments for Minworth SRO.

6.2. We have had frequent, constructive engagement with the EA (through the NAU) and Natural England (NE) throughout gate two. This has included monthly updates on the development and evolution of the investigations, as well as regular informal liaison. We have carried out joint site visits to areas of specific interest, which have been particularly helpful in developing our knowledge of key features on the River Tame. The regular engagement with regulators has enabled a two-way forum for information sharing that has led to detailed discussions on key topics such as the River Mease Special Area of Conservation (SAC) and HoF investigations, and increases in scope to fill potential gaps where identified.

6.3. We actively participate in the River Trent Working Group, sharing the information we have generated with the other users of this river system. This forum has helped us to understand the needs of other abstractors along the rivers, such as the energy sector, for whom the River Trent is of strategic importance, and the National Farmers' Union (NFU).

6.4. The investigations into the receiving waterbodies are carried out within the transfer SRO gate two submissions.

Water Framework Directive (WFD)

6.5. During gate two, more information has been collected to allow the WFD assessment completed at gate one to be refined. This considered whether Minworth SRO would lead to deterioration within the Rivers Tame and Trent, or could cause an impediment to the future Good WFD status of the rivers, or any of the waterbodies that the pipeline to the River Avon will cross.

6.6. At gate one, STW's Aquator model was used to show how flows within the River Tame and River Trent could change based on the implementation of Minworth SRO. This model has been enhanced through gate two, creating a more accurate and realistic representation of the rivers' response to the reduced discharge from Minworth WwTW. This included detailed field-based surveys of river morphology around sensitive areas to allow 2D modelling. The updated model allows assessment of how key WFD criteria could be affected by the transfer. This model refinement will continue during gate three and support the detailed WFD assessment required and further scoping related to the planning and consenting process.

6.7. We have carried out water quality monitoring at Minworth WwTW and throughout the River Tame and River Trent for 12 months during the gate two period, providing an initial indication of water quality in the river. This data has been added to the River Tame and Trent model to understand the impact of the flow diversions on water quality. This will be continued in gate three to allow better characterisation of the river system.

6.8. Our modelling shows that the reduction in discharge could cause a local increase in nutrient concentrations, pH, and water temperature, as the dilution capacity around the outfall site declines. However, this would not cause a deterioration in WFD water quality status, even near to the discharge point in the River Tame. Several water quality parameters will reduce in concentration within the River Tame because of reduced discharge from Minworth WwTW. Those that increase are many orders of magnitude below Environmental Quality Standards. Refer to Annex B5 (Water Quality Monitoring) for a detailed analysis. Modelling has shown that water quality changes in the Tame will not cause a deterioration from its Moderate WFD status.

6.9. Minworth SRO has been assessed using the ACWG SRO environmental assessment guidelines and spreadsheet for WFD compliance assessments. The assessment is supported by bespoke hydrological and water quality modelling of the scheme. The outcome of the Level 2 WFD assessment, outlined in Table 6.1, demonstrates that:

- The 57 Ml/d flow transfer is considered to be compliant with WFD objectives.
- The 115 Ml/d, 172 Ml/d, and 230 Ml/d flow transfers need further modelling and assessment in gate three, as fish passage is uncertain on a small number of weirs. Confidence in data will increase to the High level required for gate three, and potential WFD impacts can be confirmed or removed from the scope. Further monitoring and modelling would be required in order to provide a definitive WFD outcome. Consultation with the EA is required to determine how the hydrological regime is classified, especially in regard to the potential ecological benefits of reductions in flow in the River Tame (previously requested by the EA). The gate three scope will look to improve the data confidence to High.

Table 6.1: Output from the ACWG WFD Level 2 assessment for all flow scenarios for Minworth SRO

Waterbody	57 Ml/d scenario			115, 172, 230 Ml/d scenarios		
	Max. Level 2 impact score[4]	Confidence in WFD data	Confidence in option design	Max. Level 2 impact score	Confidence in WFD data	Confidence in option design
Tame: River Rea to River Blythe	0	High	Moderate	1	Moderate	Moderate
Tame: River Blythe to River Anker	0	High	Moderate	1	Moderate	Moderate
Tame: River Anker to River Trent	0	High	Moderate	1	Moderate	Moderate
Trent: River Tame to River Dove	0	High	Moderate	0	High	Moderate
Trent: River Dove to River Derwent	0	High	Moderate	0	High	Moderate

[4] Scores are from 0 (lowest risk) to 3 (highest risk).

6.10. The WFD assessment assumes that the two transfers operate throughout the year (i.e. maximum discharge reduction 100% of the time). As described in section 4, this is not likely to be the case. With the schemes operating intermittently, depending on the requirement from the receiving companies, the impact would be intermittent and therefore lower. The effect of the duration of transfer activation will be further investigated in gate three.

Informal Habitats Regulations Assessment (HRA)

6.11. HRAs investigate the impact of schemes on internationally important protected sites and species, of which there are two of relevance to Minworth SRO: the River Mease SAC, and the Humber Estuary SAC, Special Protection Area (SPA) and Ramsar site.

6.12. The River Mease was screened out at an early stage in the gate one assessment. Liaison took place with the EA and NE before gate two identified concerns around potential impacts. Therefore, an additional assessment was carried out during gate two.

River Mease SAC

6.13. The River Mease, a tributary of the River Trent, is designated as a SAC primarily due to its population of the fish species spined loach. The SAC is one of only four known outstanding localities in the UK for spined loach, and is also an important habitat for bullhead. The SAC also qualifies for SAC status due to its floating vegetation, often dominated by water-crowfoot, and because it has a significant presence of otters and white-clawed crayfish (although the latter have not been observed in recent years).

6.14. For the gate two study, an investigation has been undertaken into potential hydrological linkages between the River Tame and the River Mease. Our investigations showed that the flows and levels in lower River Mease will not be negatively influenced by changes in River Tame levels via hydraulic continuity with the river terrace gravels secondary aquifer, and are therefore not expected to be affected by a reduction in discharge at Minworth WwTW. The modelling has been supported by engagement with the EA and NE, who have been an integral part of this assessment, and on-site walkovers.

6.15. Under the 230 Ml/d flow reduction scenario (equivalent to both GUC and STT SROs operating at their maximum) the predicted fall in River Trent levels at the River Mease is 8.2cm at Q95 (low flows) and 5.2cm at Q50 (average flows). This is not considered likely to negatively affect flows in the River Mease.

6.16. The gate two investigations and modelling supports a conclusion of “no likely significant effects” to the River Mease SAC, either alone or in combination with other projects such as the proposed diversion of discharge from Packington and/or Measham WwTW. Any flow reduction in the River Mease may contribute to the SAC being more likely to achieve its flow targets.

Humber Estuary SAC, SPA and Ramsar site

6.17. The Humber Estuary is a large tidal estuary with high suspended sediment loads, leading to the rapid building and eroding of intertidal mudflats, sandflats, saltmarsh and reedbeds. Notable fish species include river and sea lamprey, which migrate up the estuary to breed in upstream waterbodies. From autumn onwards, the south bank of the estuary (Donna Nook) provides habitat for breeding grey seal colonies. The

diverse array of habitats supports many wintering and passage waterfowl, including breeding populations of bittern, marsh harrier, avocet, and little tern. The SPA also supports an internationally important waterbird assemblage.

6.18. We have not been able to rule out an impact on the Humber Estuary as a result of reduced water levels in the SAC or Ramsar, or affecting fish passage at weir locations. This may be sufficient to disrupt the ability of sea lamprey and river lamprey to migrate upstream in the Rivers Trent and Tame. The Humber Estuary SAC and Ramsar site also includes approximately 15km of the River Trent in its tidal reaches between Keadby and the Humber Estuary itself.

6.19. Hydraulic modelling has been undertaken, and is ongoing into gate three, to help appraise the effects of the SROs on fish passage. Maintaining fish passage through weirs to allow them to migrate from the estuary to their spawning grounds is a key assessment area for the Humber SAC. Hydraulic models have been developed for the River Tame within the study area, and for the River Trent as far downstream as Burton Joyce, slightly upstream of Gunthorpe Weir. A total of 25 weirs or potential barriers were examined. Three of these barriers have been screened out as posing “no likely significant effect” on the SAC.

6.20. Cromwell Weir (barrier 24) is currently impassable to river and sea lamprey. If the weir is unchanged, the Minworth SRO scheme would not result in “likely significant effects” on passage of sea or river lamprey from the Humber Estuary SAC. However, there is a consented proposal to install two eel/lamprey passes at Cromwell Weir that would render it passable, and therefore further barriers upstream would need to be assessed to inform the HRA. We are progressing with investigating the weirs upstream of Cromwell Weir on the presumption that the fish pass will be installed.

6.21. Initial assessment of the 22 barriers upstream of Cromwell Weir indicate that flow reductions at Minworth WwTW may negatively affect fish passage. This is mainly due to reductions in water depth, which are translated as an increment of the head drop at the weirs, but also because such drops can also reduce the efficacy of existing fish passes. 2D modelling may be necessary to unpick the relative effects of reducing discharge on fish passage and to enable mitigations to be proposed. This additional modelling is underway and will further inform the assessment of fish passage, and therefore the WFD and HRA, as it becomes available during gate three.

6.22. A conclusion of “no likely significant effects” requires there to be “no reasonable scientific doubt”. Our aquatic ecology report recommends further 2D modelling at and around targeted weir sites to investigate the risk. This will also inform any subsequent mitigation that may be required. The potential need for mitigation means that a conclusion of “no likely significant effects” cannot be drawn at this stage. Mitigation cannot legally be taken into account at the Test of Likely Significant Effects stage of HRA, but only at the later Appropriate Assessment stage.

6.23. As a result, likely significant effects in terms of HRA cannot be dismissed without further investigation as part of gate three, including further development of in-combination assessments. Mitigation will be identified where there is a potential for adverse effects on the SAC or its protected species.

Hands-off Flow (HoF)

6.24. A HoF exists on the River Trent to ensure that water levels in the river are maintained through times of low flow, allowing navigation along the river. The HoF is set at 2,650

Ml/d at North Muskham. When this value is reached, abstractors with HoF-related restrictions in their abstraction licences are required to comply with the listed conditions, which will usually be to stop or to reduce abstraction.

6.25. By reducing discharge from Minworth WwTW into the River Tame, there will be less water in the river system, which would likely extend the period and could increase the frequency that the HoF is triggered through low-flow periods. Through gate two, we have been liaising extensively with the EA to jointly understand the impact this could have, and the mitigation options available.

6.26. STW is under no obligation to maintain a minimum volume of discharge into the Rivers Tame and Trent system. This is reflected in the flexibility of the EA's licencing strategy, which renews licences based on available water at defined intervals. However, we recognise that the SRO does not want to negatively impact current downstream abstractors such as the energy or agricultural sectors that abstract water from the Rivers Tame and/or Trent.

6.27. We are working with the EA to understand whether the HoF remains the right level 20+ years since it was determined. The investigations into the Rivers Tame and Trent through gate one and gate two have advanced our understanding of the flow within the rivers and its interaction with the environment, allowing reassessment of this HoF level. The modelling will continue in gate three, including detailed 2D modelling at a greater number of locations, supporting a reassessment of how the SRO interacts with the HoF. Furthermore, it will inform any mitigations required, alongside feeding into ongoing environmental assessment.

6.28. Parallel investigations, described in section 3, are looking at alternative solutions such as additional storage, should it prove unfeasible to change the HoF at North Muskham.

6.29. A working group, set up between the project team and the EA, will continue through gate three. This group will help to steer the environmental investigations and modelling needed to continue to enhance our understanding of the Tame and Trent system.

Invasive Non-Native Species (INNS)

6.30. A biosecurity strategy is in place at Minworth WwTW to ensure that the risk of the spread of INNS at the site is minimised. Best practice will be used during construction to minimise the risk of INNS spread. There is no increased risk to the Rivers Tame and Trent, due to the new tertiary treatment at Minworth WwTW, but a slight risk has been flagged due to lower water levels in the River Tame, potentially leading to habitat disturbance which could allow INNS species to further colonise. A monitoring plan is proposed to keep track of this once the SRO is active, and mitigation measures explored (as necessary).

6.31. The INNS risk due to increased flow in the GUC or the rivers that form part of STT SRO is assessed using the EA INNS risk assessment tool within the respective transfer SRO gate two submissions.

Natural Capital

6.32. Our assessment adopts an integrated Six Capitals approach, following the four stages outlined in the Capitals Coalition's Natural Capital Protocol and Social & Human Capital Protocol, which recognises natural, social, human, intellectual, manufactured and financial capitals.

6.33. The impacts and/or dependencies on the six capitals included in this assessment were based on the materiality assessment undertaken within Annex B3 (Environmental Assessments) for the Tame Trent and Humber gate two assessment. This was informed by gate one and gate two data and reports, as well as working closely with other disciplines to incorporate the results of their respective assessments. The materiality assessment consisted of a qualitative scoring exercise that identified five impacts on the six capitals as being materially affected by one or more of the four scenarios, as follows:

- Natural capital: Global climate regulation, Water quality, Recreation, Biodiversity.
- Financial capital: OPEX.

6.34. A summary of the results from the assessment of material impacts is presented for each scenario in Table 6.2. All values are presented in present value terms over a 30-year time horizon, using a 3.5% declining discount rate and adjusted to 2020 prices.

Table 6.2: Summary results of the Six Capitals assessment

Option				Estimated Present Value (30 years, £million)				
Code	Natural Capital	Value Type	Confidence	0 - Do-nothing	1 - STT Transfer 57 Ml/d	2 - STT Transfer 115 Ml/d	3 - Combined Transfer 172 Ml/d	4 - Combined Transfer 230 Ml/d
NC 13	**Global climate regulation**			£13	£1	-£2	-£4	-£7
NC 13a	**Land use change**	External	Moderate	£13	£13	£13	£13	£13
NC 13b	**Construction and operation**	Private	Low	£0	-£13	-£16	-£17	-£21
NC 21	**Recreation**	External	Low	£0	£62	£62	£62	£62
NC 25	**Biodiversity**	External	Moderate	£208	£197	£197	£197	£197
-	**Net Present Value (£2020 millions)**	-	-	£221	£259	£256	£254	-£251
-	**Net Impact (£2020 millions)**	-	-	-	-£38	£36	£34	-£30
-	**Change in value relative to Do Nothing**	-	-	-	17%	16%	15%	15%

6.35. Opportunities for natural capital increases have been investigated. There are limited improvements available as part of the core scheme engineering element in comparison with other SROs. Benefits and mitigations identified on the Rivers Tame and Trent could bring significant net gain to the scheme. Examples include:

- Improving connectivity of Sites of Special Scientific Interest (SSSI) during low flows.
- Improving efficiency of fish pass structures based on their efficiency, which we are modelling as part of the WFD and HRA assessments described above.
- Improving access to the river for communities.

Biodiversity Net Gain (BNG)

6.36. The RAPID gate two guidance states that BNG assessment "should support the net gain actions in the Government's 25-year Environment Plan and aim to meet the likely future requirements as per the Environment Act". Both Minworth SRO and the

transfers it would support will aim to achieve a minimum 10% net gain in biodiversity units, relative to the site's baseline biodiversity value.

6.37. The review of designated sites and water-dependent wetland habitats during gate one identified a total of 21 floodplain locations for inclusion in the gate two BNG assessment. All sites that we could access in person were then subject to preliminary ground truthing habitat condition survey visits during Winter and/or Spring 2021/22.

6.38. Parallel to the BNG assessment, the hydrological assessment found that SSSIs were not affected by changes in flow in the Rivers Tame and Trent, as described in the HRA section above. Therefore, post-development modelling of BNG assumes no reduction in existing SSSI habitat condition or any degree of SSSI habitat loss or reduction in habitat extent. A 10% gain for all scenarios has been modelled by calculating metrics, using NE's Biodiversity Metric 3.0, that show the generalised improvements the scheme needs to make to enhance existing habitat condition values.

6.39. As the engineering and environmental aspects of the scheme are refined through gate three, the interventions that are needed to generate 10% BNG for the scheme will become clearer. It is recommended that opportunities to create and enhance wetland habitats within the Study Area are identified through a combination of habitat opportunity mapping and stakeholder engagement. The creation of new wetlands within the Study Area would particularly benefit the species associated with those habitat types. The selection of candidate wetland habitat creation and enhancement sites will need to be discussed with local biodiversity groups, and will aim to benefit key habitats and the species they support. Wetlands can also be designed to provide a wide range of other environmental benefits, such as flood resilience and water purification. Any wetlands created for the SRO will be designed to have the largest overall environmental benefit.

Carbon and Greenhouse Gases (GHG)

6.40. STW and AfW have both made corporate commitments to net zero. 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. AfW has committed to becoming carbon negative for all three scopes by 2030, based on six core principles that include the empowerment of customers and influencing carbon-related and environmental public policy issues.

6.41. 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.

6.42. 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.

6.43. 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.

6.44. Carbon reduction design decisions for Minworth SRO include the optimisation of the outline control philosophy to ensure that treatment requirements are minimised (i.e. only biological treatments remain operational) whilst GUC and STT SROs are not calling for flow. Additionally, the River Avon pipeline route has been selected to minimise pumping and trenchless sections. A 20% carbon reduction is also forecast through materials management and low-carbon construction.

6.45. 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.

Table 6.3: Example carbon summary for Minworth Treatment and River Avon Pipeline (115 Ml/d) option

Scheme element	Embodied carbon (tCO2e)	Operational carbon (tCO2e)	Whole-life carbon (tCO2e)
Gate one solution[5]	22,629	109,528[6]	132,157
Gate two "unmitigated" option	130,048	281,742	411,790
Gate two "mitigated" option	73,078[7]	168,848[8]	241,926

6.46. The development of the gate two solution has been aligned with the ACWG carbon ambition and, if the Minworth 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.

6.47. 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

[5] Gate one emissions calculated for Minworth 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] Compared on a like-for-like operational basis confirmed at gate two: 10% time at peak flow, 90% time at sweetening flow of 3 Ml/d.

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

[8] Operational mitigation is recognition that STW will achieve its ambition of generating 100% of power from renewable sources by 2030 (representing a reduction of 66,619 tCO2e over 71 years) and optimisation of the outline control philosophy. There is also potential for a further reduction of 156 tCO2e annually, using a hydropower scheme at the River Avon discharge, not included in these figures.

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 plan, with all key milestones met to date. Minworth SRO falls in line with the timescales set out in the guidance provided by WRSE in August 2022, in terms of the output requirements to support both the GUC and STT SROs, based on three scenarios of support. Table 7.1 sets out the respective SRO outputs and associated dates.

Table 7.1: Minworth WwTW outputs

SRO Element	Yield Benefit Delivered	Cumulative Yield Benefit Delivered	Average Deployable Output Benefit Delivered	Cumulative Average Deployable Output Benefit Delivered	Earliest Deployable Output Date	Average Deployable Output Benefit Required*	WRSE Earliest Date Required*
GUC SRO (Phase I)	58 Mld	58 Mld	50 Mld	50 Mld	2031	50 Mld	2031
GUC SRO (Phase II)	57 Mld	115 Mld	50 Mld	100 Mld	2031	100 Mld	2040
STT SRO	115 Mld	230 Mld	70 Mld	170 Mld	2032	170 Mld	2060

* Based on draft WRSE regional plan (November 2022)

7.2. The timescales given in the project plan (See Figure 7-1) are based on the use of a DCO planning and consenting route, for which the treatment upgrades at Minworth WwTW would be considered associated development to the GUC SRO. The pipeline element of the Minworth SRO, which would support the STT SRO, would utilise its own DCO planning and consenting route to cater for the differing timescales of support requirement.

7.3. Gate three has been set as a review point immediately before the formal 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. Table 7.4 shows that DPC would not be applicable to Minworth SRO, and therefore the project plan does not incorporate this process when defining the project critical path.

7.5. The delivery of the Minworth SRO considers three different SRO supply support scenarios. These scenarios include planning and consenting timeline assumptions, after which estimated detailed design, construction and commissioning periods are followed. The three scenarios considered are set out below, using earliest possible dates:

7.6. **Scenario 1:** To support GUC SRO, Minworth WwTW will require new tertiary treatment process units to treat the final effluent to suitable water requirements to transfer to the GUC. The project plan for GUC SRO requires a DO of 50 Ml/d by Q2 2031. This plan would require the Minworth WwTW new tertiary plant to be operational to support a DO of 50 Ml/d by Q2 2031, which is within the scope of the current Minworth SRO project plan.

- The GUC SRO can be phased from 50 Ml/d (phase 1) to 100 Ml/d (phase 2) if required by the Regional Plan; however, the full 100 Ml/d will be available from Q1 2031 in a single construction phase. Note that the draft WRSE Regional Plan does not call for the GUC SRO DO of 100 Ml/d until 2040.

7.7. **Scenario 2:** To support STT SRO, Minworth WwTW will require new tertiary treatment process units to treat the final effluent to suitable water quality requirements to transfer to the STT SRO, along with a new transfer pumping station at Minworth WwTW and a new transfer pipeline from Minworth WwTW to the River Avon.

- The project plan for STT SRO requires a DO of 70 Ml/d in 2033, based on the earliest possible construction date for the STT SRO pipeline. This plan would require Minworth WwTW new tertiary treatment process units, a new transfer pumping station at Minworth WwTW, and a new transfer pipeline to be operational to support a DO of 70 Ml/d by 2033, which is within the scope of the current Minworth SRO project plan, if required. Note that the draft WRSE Regional Plan does not call for the STT SRO DO of 70 Ml/d until 2060.

7.8. **Scenario 3:** To support both GUC and STT SROs, Minworth WwTW will require new tertiary treatment process units to treat the final effluent to suitable water requirements to transfer to the GUC and STT SROs, along with a new transfer pumping station at Minworth WwTW and a new transfer pipeline from Minworth WwTW to the River Avon. The GUC SRO requires a new transfer pumping station at Minworth WwTW and a new transfer pipeline to the GUC, which are supported by the GUC SRO.

- The project plan to support both SROs would be to prioritise GUC SRO for construction programming of Minworth WwTW new tertiary treatment process units, in accordance with the draft WRSE Regional Plan.
- GUC SRO would undertake the transfer pumping station and transfer pipeline construction to support a DO of 50 Ml/d from Minworth SRO for 2031 (phase 1), which is within the scope of the current Minworth SRO project plan.
- The transfer pipeline to support STT SRO would be phased to tie in with a 2033 delivery of a DO of 70 Ml/d, which is within the scope of the current Minworth SRO project plan.
- Upgrades at Minworth WwTW would be undertaken for GUC SRO phase 2, to support 100 Ml/d by Q2 2032, if required. This is within the scope of the current Minworth SRO project plan.
- Note that the draft WRSE Regional Plan does not call for GUC SRO DO of 50 Ml/d until 2031, the GUC SRO DO of 100 Ml/d until 2040 and the STT SRO DO of 70 Ml/d until 2060. All of these requirements can be supported by the current Minworth SRO project plan, if required.

Critical Path

7.9. The Minworth SRO critical path for both the GUC and STT SROs is currently being considered as running through the DCO consenting and pre-application process. This includes DCO approval, conditions and requirements, which need to be satisfied prior to business cases and eventual contract award with a contractor. 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.

7.10. Minworth SRO will be required to be operational just prior to the completion and commissioning of the GUC SRO. If the final WRSE Regional Plan identifies that the GUC SRO is required by 2031, there will be a reliance on the planning and procurement processes taking place to facilitate this.

Interdependencies

7.11. If the WRSE identifies that both the GUC SRO and STT SRO are not taken forward as preferred resource options, then the Minworth SRO will not be required.

7.12. GUC SRO: Minworth SRO will be required to be operational just prior to the completion and commissioning of the GUC SRO. The Minworth SRO would need integrated programming with the GUC SRO to ensure water supplies would be available when needed. Any delay in the GUC SRO and a mistimed output would affect Minworth SRO, and vice versa, resulting in stranded assets.

7.13. STT SRO: Minworth SRO will be required to be operational just prior to the completion and commissioning of the STT SRO. The Minworth SRO would need integrated programming with the STT SRO to ensure water supplies would be available when needed. Any delay in the STT SRO and a mistimed output would affect Minworth SRO, and vice versa, resulting in stranded assets.

7.14. We have jointly procured a number of work packages to better understand potential impacts of Minworth and SLR SROs operating in tandem and are liaising with the EA regarding water availability and the potential for both SROs. Further work will be required once operational regimes are better defined and once the regional need has been set, as the sequencing of delivery of these SROs is an important consideration.

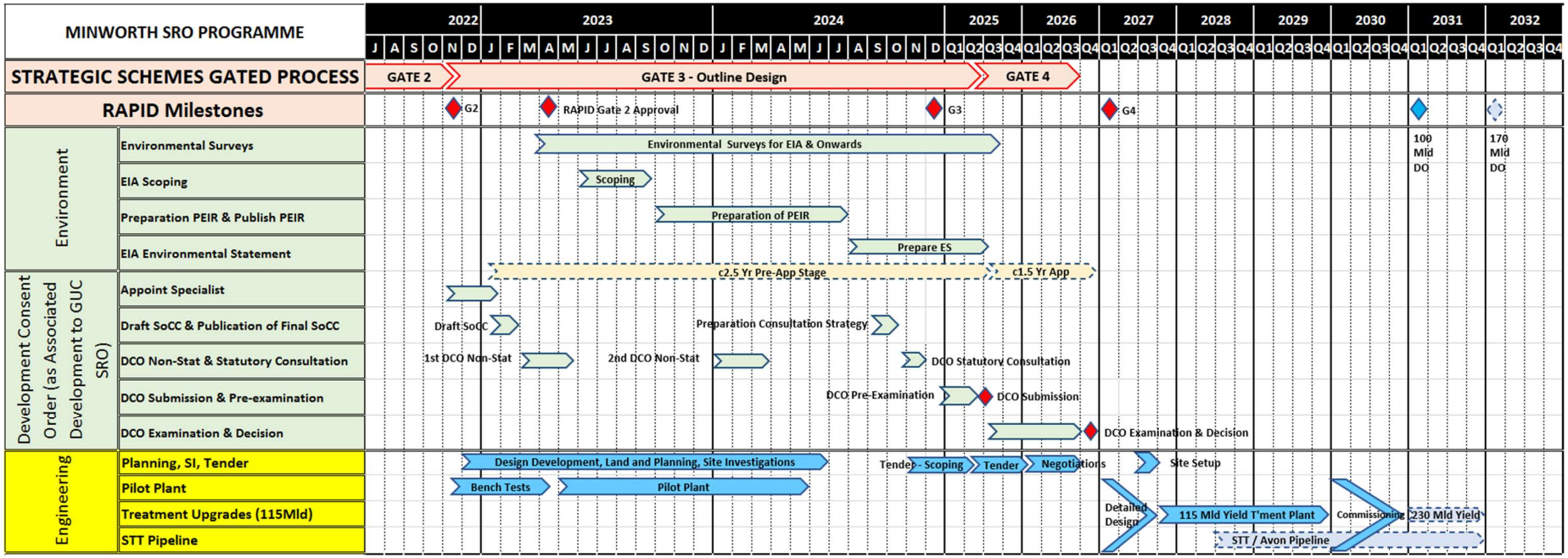
Constraints

7.15. Not having an agreement with the EA as to discharge water quality in the canal system would constrain the treatment design from being finalised (GUC SRO impact).

7.16. Not having an agreement with the EA as to discharge water quality in the River Avon would constrain the treatment design from being finalised (STT SRO impact).

7.17. Not having an agreement with the EA as to the HoF storage mitigation requirements would constrain the hydraulic design being finalised.

Figure 7-1: Project-level plan



Planning and Consenting Route

7.18. Minworth SRO will supply the GUC SRO, the STT SRO, or both. As such, we have considered the consenting options for both options through our gate two assessments.

7.19. Through gate two, it has become clear that it is very unlikely that both requirements will come forward in parallel. This is important, as it influences the consenting options open to us and how various aspects could be delivered. As it now seems increasingly likely that the GUC SRO will be required significantly in advance of the STT SRO, we have split our assessments between the two options in our comments below.

Minworth GUC (new treatment asset at Minworth WwTW only)

7.20. We have considered the options for how these works could be consented through gate two and 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 (SoS) 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 GUC SRO, which is expected to be consented via DCO.

7.21. The preferred consenting strategy is to deliver the new assets as associated development to the GUC SRO DCO, but we will retain the option of seeking planning permission for the Minworth WwTW, if timings allow and it is considered a beneficial approach to GUC SRO delivery. We will only seek permission if it is considered likely we could secure this in advance of the DCO for GUC SRO, as we would not wish to place any unnecessary risk on GUC SRO by having an undetermined planning application during that process. This is because the SoS, in determining the GUC SRO, is likely to require confirmation that any works upon which the application is reliant have the necessary consents in place.

7.22. Further assessments on the approach to be taken will occur at gate three, following programming, design and assessment work, and engagement with stakeholders. A decision will need to be made as to whether there is significant benefit (e.g. securing ability to commence works in advance of DCO consent and timing restrictions) in seeking planning permission separately, or whether to simply seek consent as associated development, where all matters can be consented in unison.

Minworth STT (new treatment asset at Minworth WwTW and 30km pipeline to River Avon)

7.23. In the gate one submission, we explained that our preferred planning route was to deliver the project via a DCO, via a s.35 direction. Due to the complexity of the project and the likely number of consents we would need, it was clear at that stage that this route would offer more certainty on programme delivery. This route remains our preferred consenting option, due to the risks presented by following the typical route of planning permission and use of powers under the Water Industry Act (WIA). Some of the issues and risks identified include:

- At least four separate planning permissions.
- A number of major crossings.
- Land acquisition for a break pressure tank.

- A route through high-value development land, involving interaction with various statutory undertakers and special category landowners.
- Temporary land take (compounds, access roads, etc.) to facilitate construction.

7.24. The DCO process would afford us the opportunity to secure the majority of consents we would require to deliver the project, albeit we may have to secure the compulsory acquisition of any special category land (SCL) via a special parliamentary procedure (SPP). This would involve additional parliamentary scrutiny prior to a DCO coming into effect. All these factors have come together to endorse and confirm that DCO is our preferred planning route, if and when the STT SRO element is progressed.

7.25. It should be noted that, in AMP6, STW successfully delivered the Birmingham Resilience Project under a TCPA route rather than DCO, which was a very similar project in character to the Minworth SRO. The TCPA route therefore represents a viable alternative, should the DCO route prove unfavourable for the STT Pipeline element.

7.26. Our discussions with Defra to date confirm that official s.35 guidance does not exist. However, we have been directed to recent guidance issued when Defra was looking to alter the thresholds for DCO projects, which has been useful to us in our assessments. The recent decision on the Hampshire Water for Life project[9] is also a useful gauge for us, given the similarities with Minworth SRO, suggesting that a similar application on this project would likely be successful.

7.27. We estimate a DCO process will take between three and four years to approval from the commencement of active stakeholder engagement and consultation. Note that if and when this supply is required (beyond 2040), there may be a different consenting regime available.

Works in Private Land

7.28. As stated above, we are considering two potential scenarios for Minworth SRO, to support the GUC and STT SROs. The land process for GUC SRO is relatively straightforward, as the land on which the new assets would be constructed is owned by STW, and there are therefore no third-party concerns impacting decisions on land. However, the STT SRO scenario is more complex, as it includes a cross-country pipeline of approximately 30km. The commentary below focuses on how the land issues in that scenario would be handled.

7.29. 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).

7.30. 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. Where Minworth SRO supports STT SRO, there is the need to acquire at least one piece of land for a break pressure tank upstream of the discharge to the River Avon. As with any acquisition of land, we would seek to complete this by agreement with the landowner, and would hope not to require compulsory powers.

[9] https://www.gov.uk/government/publications/hampshire-water-transfer-and-water-recycling-project-section-35-direction-planning-act-2008

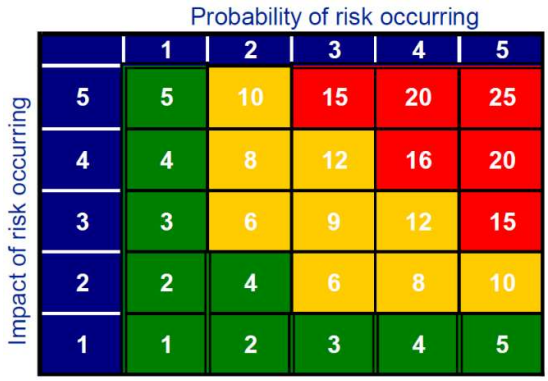
7.31. Minworth SRO would follow the same approach whether it was delivered as a DCO project or via the typical route, making use of the powers available under the WIA. If we delivered the project via DCO, we note that our powers under the WIA would not be available to us, and that instead we would have to seek entry via agreement or formal easement to avoid the need for compulsory powers through the DCO. We would look to invest in early engagement with all affected parties, and aim to secure voluntary agreements for the land and rights needed to deliver the project, as early as possible in the application/examination process.

7.32. In terms of systems and resources required to deliver the planning and land process, STW is well versed in delivering large treatment and pipeline projects, and has established processes and governance arrangements we would rely on for delivery.

Key Risks and Mitigation Measures

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

Figure 7-2: Risk score matrix



7.34. Of the risks identified in Table 7.2, the key risks at gate two are RSK020 and RSK032.

- RSK020 relates to the North Muskham River Trent HoF threshold which, if breached, would restrict the use of Minworth WwTW raw water until normal river levels were reinstated. The mitigation strategy for this risk is ongoing investigation into the provision of alternative storage, which could be called upon as compensation in times of the HoF threshold approaching its trigger point (as discussed in sections 3 and 6).
- RSK032 relates to the anticipated permitting requirements for the Minworth WwTW raw water discharge to the Coventry Canal, 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.

7.35. The project team does not believe any of the risks identified in Table 7.2 are showstoppers, and will continue to monitor them into gate three. We will continue to develop our mitigation plans to ensure that risks are managed and mitigated effectively.

Table 7.2: Project risks[10]

RAPID Risk number	Short Description	Detailed Description	Risk Score	Mitigation strategy	Category	Trend / Status	Residual Risk
RSK003	Delays from extended environmental investigations	Due to the nature of the programme there could be pressures from environmental regulators (EA, NE) to undertake additional extensive varied environmental surveys at any stage.	12	Arrange workshops with EA to inform and receive inputs at fixed times, setting expectations for what can be achieved in the timescales. Technical experts from Severn Trent and Affinity involved in project.	Environment	Stable	6
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. Piece of work GUC for Social, non-water resource and environment valuation.	Environment	Stable	6
RSK009	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.	Planning	Stable	6
RSK013	Clarity of WRMP requirements	Inputs for WRSE have been clarified for the March deadline. There is additional activity for the SRO as the metrics for WRW and WRSE are different. This risk has decreased with recent clarity around requirements and engagement over resilience metrics.	8	Inputs for WRSE have been clarified for the October deadline.	Other	Stable	6
RSK014	Potential for HS2 to leave Minworth landlocked	We have identified a risk that the construction of HS2 and the Curzon Street station spur could cut off Minworth from the 2 transfer SROs it has potential to supply.	16	We are working with the STW HS2 liaison team to understand the timelines and options for mitigation. This will continue into gate-3.	Engineering	Stable	12
RSK020	Navigational flow requirments on River Trent	Flows required for navigation on the River Trent at North Muskham or requirements to maintain flows for ecological reasons in the river Tame or Trent may limit the amount of effluent that can be diverted from the River Tame under low flow conditions, this risk relates directly to the downstream HOF	20	We have held a discussion with RAPID to emphasise this risk and are looking at potential to add storage options into this SRO to mitigate.	Environment	Stable	12
RSK031	Impacts of planning process	Current timelines and gate requirements involved with potential DCO application may not align with gated process dates. Process will require significant resources, and there will be pressure on resources with multiple SROs requiring the same expertise from consultants	15	Employ specialist consultant to assist the project with the complications of planning and route strategy	Other	Stable	10
RSK032	Anticipated permitting is resulting in additional treatment - GUC	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	Undertaking 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 dialogue with the EA. Bench trials and pilot plants proposed in G3	Engineering	Stable	12
RSK033	Anticipated permitting is resulting in additional treatment - River Avon	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 2	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. Lower risk to River Avon due to greater dilution levels	Engineering	Stable	10

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

Proposed Gate Activities and Timelines

7.36. The outcome of our gate three plan will be the completion of outline design activities, including all relevant site investigation works, to support both GUC SRO and STT SRO (assuming that the final WRSE Regional Plan calls for the progression of both SROs). Gate three activities will also include collation of all engineering, modelling, planning, environmental and water quality 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.

7.37. 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 7.3.

Table 7.3: Phases of future project delivery

Phase	Timing	Name	Key Activities	Decisions
1	April 2020 – Jan 2022	Gate 1	• RAPID Gate 1 submission	Gate 1 approved by RAPID
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) • 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 • Statement of Community Consultation (SoCC) drafted, agreed and published • Preliminary Environmental Information Report (PEIR) • 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 • Submission for RAPID Gate 3 document suite • Design & Build Contract Scoping	• RAPID Gate 2 approval (Draft decision March 2023, Final June 2023) • PINS EIA Scoping Opinion
4	Q3 2025 – Q3 2026	Gate 4	• DCO submission to PINS • preparation, preliminary meeting and examination in public • Planning Inspector's report to Secretary of State • Submission for RAPID Gate 4 document suite • Design & Build Contract Tender	• Partner company approval to submit DCO application • RAPID Gate 3 approval • Secretary of State's grants GUC DCO
5	Q4 2026 - Q2 2027	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 2027 – Q1 2031	Construction	• 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

7.38. At gate one, Minworth SRO, whether as a scheme to supply the GUC SRO or the STT SRO, was assessed as either unsuitable for DPC or requiring further analysis. There were concerns around discreteness on an existing site owned and operated by STW.

7.39. In gate two, we have updated the DPC analysis based on Ofwat guidance[11] – 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 each element of the scheme, plus combinations of these individual elements, comprising:

- **Minworth (GUC):** Works to expand Minworth WwTW capacity to supply the GUC SRO.
- **Atherstone Transfer:** A transfer pipeline from Minworth WwTW to the Coventry Canal at Atherstone that was originally part of the GUC SRO.
- **Minworth (STT):** Works to expand Minworth WwTW capacity to supply the STT SRO.
- **STT Pipeline:** A transfer pipeline from Minworth WwTW to the River Avon to supply the STT SRO.

7.40. Table 7.4 summarises the results of the assessment for DPC.

Table 7.4: Results of the assessment for DPC

Option	Test 1: Size	Test 2: Discreteness	Test 3: Value for Money	Result: Suitability for DPC
Minworth (GUC) or Minworth (STT)	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
Minworth (GUC) and Atherstone Transfer	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
Minworth (STT) and STT Pipeline	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
STT Pipeline	Suitable for DPC	Suitable for DPC	Suitable for DPC	Suitable for DPC

7.41. Whilst the options on or including the Minworth WwTW site pass the size test and represent value for money for customers, they fail the discreteness test.

7.42. 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 operations and maintenance (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.

7.43. The STT Pipeline, when considered as an asset in its own right and based on current inputs, is suitable for DPC. Our analysis shows that it passes the size test, is a discrete asset separate from other infrastructure, and represents value for money for customers.

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

Delivery Parties

7.44. Based on the results of the DPC assessment, we propose the following parties deliver each element of the scheme:

- **Minworth (GUC) and Atherstone Transfer:** Given that STW owns, finances, constructed, maintains and operates the existing WwTW site, it is considered best placed to deliver the assets. 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.
- 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.
- **Minworth (STT):** As above, given that STW owns and operates the existing WwTW site, it is considered best placed to deliver the assets. Alternative non-DPC delivery options were considered, including a non-DPC DBFOM contract, a DBOM contract, and D&B contract. For the reasons set out above, a D&B contract is preferred.
- **STT Pipeline:** With the STT Pipeline suitable for DPC, we considered the appropriate Competitively Appointed Provider (CAP) contract counterparty. These included the Provider of the water resource, the Beneficiary of the water resource, and a Joint Venture of the two.

7.45. As the STT Pipeline only connects into the Provider network and does not rely on the Beneficiary for any enabling works or other support, STW (as the Provider) may be the most appropriate contract counterparty. However, as STW customers do not benefit from the water resources of the project, there would be no mechanism for STW to recover the CAP's costs from its customers. The principal Beneficiary of the STT SRO may therefore be better placed to manage the payment obligations as contract counterparty. The alternative options will be explored further as the STT SRO is developed.

7.46. We also considered whether there is a case for applying the Specified Infrastructure Projects Regulations (SIPR). This would protect STW (if the contract counterparty) from the size and complexity of the project by moving the third party into a separately licensed entity, as per the Thames Tideway Tunnel (TTT). Based on the scale of the works, there does not appear to be a need for applying SIPR in this instance. This will be kept under review.

Contractual and Operational Arrangements

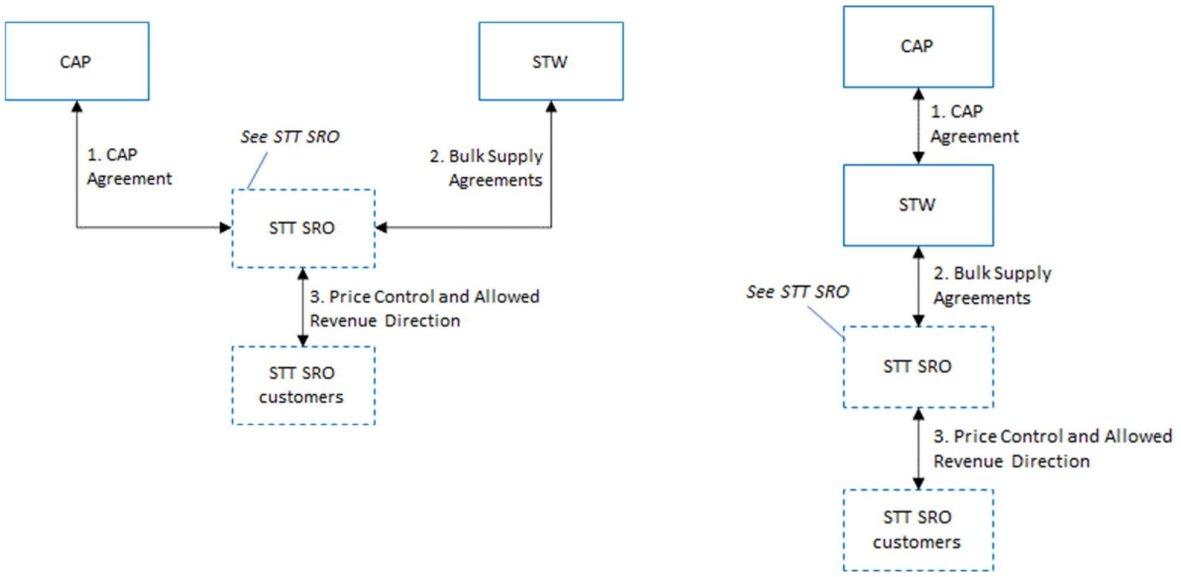
7.47. Below (and in Figure 7-3) we set out indicative contractual arrangements for the Minworth (STT) and STT Pipeline assets based on the delivery parties identified above, with alternatives for the two potential CAP contract counterparties. We will continue to investigate and develop these proposals further ahead of gate three.

- **CAP Agreement:** Sets out the services the CAP will deliver, and the basis on which they will be paid. The payment amount will be based on the bid during the competitive procurement process.
- **Bulk Supply Agreement (BSA)**: Any BSA between STT SRO Beneficiaries and STW could be modified to include the provision of the capacity at Minworth WwTW,

alongside any payment for the water resource. Where STW is the CAP counterparty, there would also need to be provision for recovering CAP costs on a back-to-back basis, leaving no liability sitting with STW.

- **Price Control and Allowed Revenue Direction:** STT SRO would be expected to recover all the costs of the scheme from customers.

Figure 7-3: Indicative contract structures, with STT SRO and STW as CAP counterparty



7.48. Contractual and operational arrangements for the Minworth (GUC) and Atherstone Transfer are set out in the GUC SRO gate two submission, given their integration into that system.

7.49. The operation of Minworth (STT) and STT Pipeline 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.

In-house Procurement Model

7.50. 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.

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

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

Stage	Assumptions	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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																								

DPC Tender Model

7.52. For the STT Pipeline being procured via DPC, we have considered the appropriate tender model in appointing the CAP. Potential alternatives include:

- **Early model:** Schemes will be tendered out once the preferred solutions have been identified by incumbent companies. The tender and handover of assets will be at the "initial solution design" stage.
- **Late model:** Schemes will be tendered out after incumbent companies have obtained consent and initial design has been completed. The tender and handover of assets will be at the "detailed design of assets" stage.
- **Split model:** Schemes will be tendered out in two separate tenders: one for the design, and another for the construction and operation of the asset. Under this model, there will be two handover points, one at the "initial solution design" stage and second at the "detailed design of assets" stage.
- **Separation of construction and financing:** Following the example of TTT, the separate procurement of the construction contractor and the project company that will finance and own the asset. This could be considered a bespoke version of the late model (above).

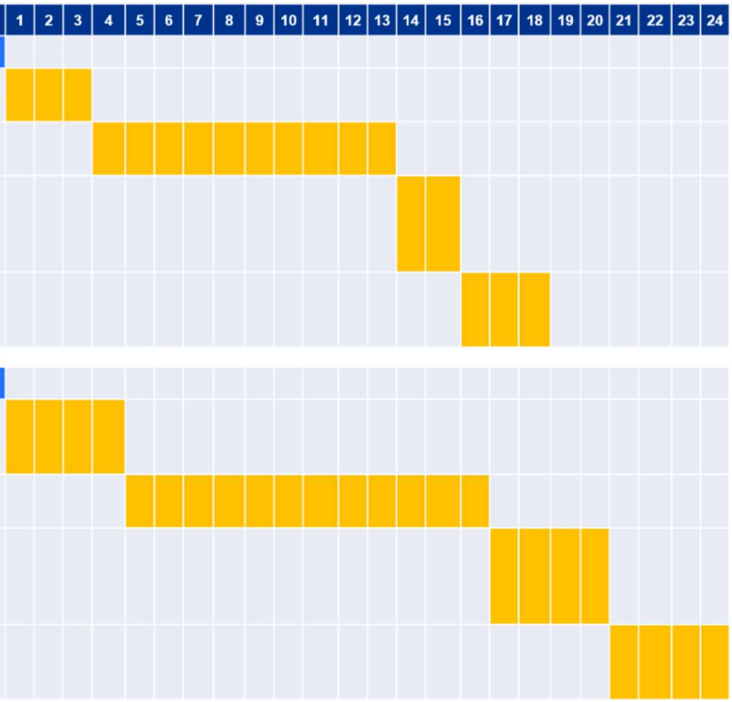
7.53. Based on a consideration of the examples where the alternative tender models have been applied or are in development (including Offshore Transmission Owners, Competitively Appointed Transmission Owners, Private Finance Initiative, Public Private Partnership, and TTT), we consider the late model to be the most appropriate for the STT Pipeline element.

7.54. The early model could mean significant cost uncertainty at the time of appointment, and the split model could add significant lead times with two procurements. Separating the finance and construction may mean that bidders are unable to optimise the risk allocation between contractors and the CAP. The late model can be aligned to the DCO and TCPA planning application timelines, as well as providing additional benefits to customers in the form of fixed prices for the contract duration.

7.55. Figure 7-5 below sets out the indicative procurement timeline for the DPC model. This includes the timing of control points, and both an "optimistic" and "conservative" timeframe for the process from tender launch to be established from market engagement.

Figure 7-5: DPC procurement process

Stage	Assumptions	Months
Optimistic DPC scenario		**18 months**
SQ (PQQ) (incl. evaluations)	Assumes a shorter qualification stage of 3 months	3
ITT	Assumes that this stage includes detailed design of c.6-8 months	10
Evaluation, Bidder negotiation,	Assumes a shorter period of negotiation, governance and regulatory review as part of the Control Point process	2
Preferred bidder & financial close	Assumes a shorter financial close period of 3 months from notification of award.	3
Conservative DPC scenario		**24 months**
SQ (PQQ) (incl. evaluations)	Assumes a longer qualification stage of 4 months (e.g. due to complexity or delay)	4
ITT	Assumes that this stage includes detailed design of c.8-10 months	12
Evaluation, Bidder negotiation	Assumes a longer period of negotiation, governance and regulatory review as part of the Control Point process	4
Preferred bidder & financial close	Assumes a longer financial close period of 4 months from notification of award.	4



Market Engagement

7.56. Where the DPC model is used for the STT pipeline, market engagement would be undertaken early in gate three, focusing on:

- Market appetite for the STT Pipeline as a DPC project.
- CAP Agreement risk allocation principles, including payment mechanism and termination provisions, etc.
- Testing of the proposed late tender model and procurement timeline.

8. Solution Costs and Benefits

8.1. This section outlines the costs and benefits of the proposed Minworth 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 Profile) and presents the cost profile information, consistent with Table 5 in the WRMP24 Water Resource Planning (WRP) tables.

Comparison of Options

8.2. 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.

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 scheme 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

Option	Units	GUC TREAT 57	GUC TREAT 115	STT TREAT 57	STT TREAT 115	Combined		GUC TREAT 57 ALT	GUC TREAT 115 ALT
						STT 115 GUC 57	STT 115 GUC 115		
Yield Benefit	MLD	57	115	57	115	172	230	57	115
Base CAPEX	£m	58.840	86.327	149.825	177.312	204.053	230.857	21.745	31.138
Costed Risk	£m	6.255	8.475	12.806	15.025	16.909	19.796	3.316	3.828
Optimism Bias	£m	18.770	27.538	46.166	54.934	63.464	72.015	6.937	9.933
Total G2 CAPEX	£m	83.865	122.340	208.796	247.270	284.427	322.668	31.998	44.899
Total G1 CAPEX	£m	10.853	14.604	n/a	245.922	302.063	358.966	n/a	n/a
G2 Fixed OPEX	£m/annum	0.905	1.404	1.046	1.546	2.011	2.476	0.278	0.391
G2 Variable OPEX	£/MLD	304.0	272.0	422.0	387.0	349.0	319.0	144.0	116.0

G1 Fixed OPEX	£m/annum	0.034	0.040	n/a	0.109	0.113	0.119	n/a	n/a
G1 Variable OPEX	£/MLD	4.0	3.0	n/a	43.0	46.0	44.0	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

Option Name	Units	GUC TREAT 57	GUC TREAT 115	STT TREAT 57	STT TREAT 115	Combined		GUC TREAT 57 ALT	GUC TREAT 115 ALT
Option benefit	Ml/d	57	115	57	115	172	230	57	115
Total planning period option benefit (NPV)	Ml	415,217	837,718	415,217	837,718	1,252,934	1,675,436	415,217	837,718
Total planning period indicative capital cost of option (CAPEX NPV)	£m	65.624	95.819	154.916	225.316	214.288	311.217	24.910	35.067
Sweetening Flow									
Total planning period indicative operating cost of option (OPEX NPV)	£m	49.617	85.048	55.93	95.693	127.593	156.305	20.498	27.239
Total planning period indicative option cost (NPV)	£m	115.241	180.867	210.846	321.009	341.881	467.522	45.408	62.306
Average Incremental Cost (AIC)	p/m³	27.75	21.59	50.78	38.32	27.29	27.90	10.94	7.44
G1 AIC	p/m³	4.4	3.0	n/a	32.3	23.9	18.7	n/a	n/a
Maximum Flow									
Total planning period indicative operating cost of option (OPEX NPV)	£m	144.287	256.11	196.107	355.05	477.412	583.876	65.342	104.98
Total planning period indicative option cost (NPV)	£m	209.911	351.930	351.023	580.366	691.700	895.093	90.252	140.046
Average Incremental Cost (AIC)	p/m³	50.55	42.01	84.54	69.28	55.21	53.42	21.74	16.72
G1 AIC	p/m³	4.8	3.3	n/a	36.4	26.8	21.0	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.

Best Value Assessment and Solution Benefits

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

8.9. WRSE carries out best value assessments based on the information submitted by the two transfer SROs. At gate one, Minworth SRO, GUC 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 Minworth SRO. The Regional Plan also considered the suite of environmental metrics submitted by each SRO.

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, Minworth 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[12]. 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 (refer to Table 9.1) 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.

[12] 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. Feedback from these sessions has led us to extend the scope of our modelling to include 2D modelling at a number of key locations.
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, we held a site visit for RAPID colleagues at Minworth WwTW. This was arranged so that the team could see the site and potential pipeline routes, and gain a greater understanding of the complexities and challenges of the 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.
HS2	As one of the biggest infrastructure projects in the West Midlands area, HS2 plans to construct more than 50km of railway in Warwickshire. There are points along our proposed SRO route where the projects could intersect.	We are setting up regular meetings with the utilities team. These will help us explore the efficiency of crossing HS2 in the same location for the two proposed SRO pipelines, to minimise disruption for residents, customers and businesses during construction of each scheme.
Canal & River Trust (the Trust)	The proposed SRO pipeline options cover an area where Birmingham and Fazeley	The Trust is a key member of the WRSE Stakeholder Advisory Group, highly

Stakeholder	Interest(s)	Activity
	Canal, Grand Union Canal, Coventry Canal, Oxford Canal, the River Avon and River Tame are located. The Trust is a guardian for canals and waterways in the UK for the public to enjoy.	engaged in WRSE activities and consultations, and also a member of the Project Management Board, attending meetings. In addition, Trust council members were invited to the WRSE Options Week in May 2021 for updates on the scheme, and to understand concerns and opportunities. Quarterly updates are in place.

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

9.9. Our stakeholder engagement to date has not highlighted any major issues, and we will continue to provide details on the proposed SRO design, construction and operation, including costs, environmental impact and recreational opportunities.

9.10. Our customer engagement to date has not highlighted any major issues, and we will continue to provide details on the safety and quality of our water supply.

9.11. Early studies have shown that there are a number of listed buildings within 100m of the Minworth SRO proposed routes in one location. If any homes, businesses or heritage sites could be affected by the construction and route of the Minworth SRO, we will design the scheme/route to avoid or mitigate any impacts on land and properties, and speak openly to local residents and landowners early in the process about the potential options.

9.12. Together with a group of water companies who are also developing SROs, we commissioned PJM Economics and Accent to conduct a programme of research to obtain primary evidence on customer preferences. We want to understand what added value customers perceive is important as part of the SRO infrastructure, as well as a number of other factors that will shape our gate three work.

10. Board Statement and Assurance

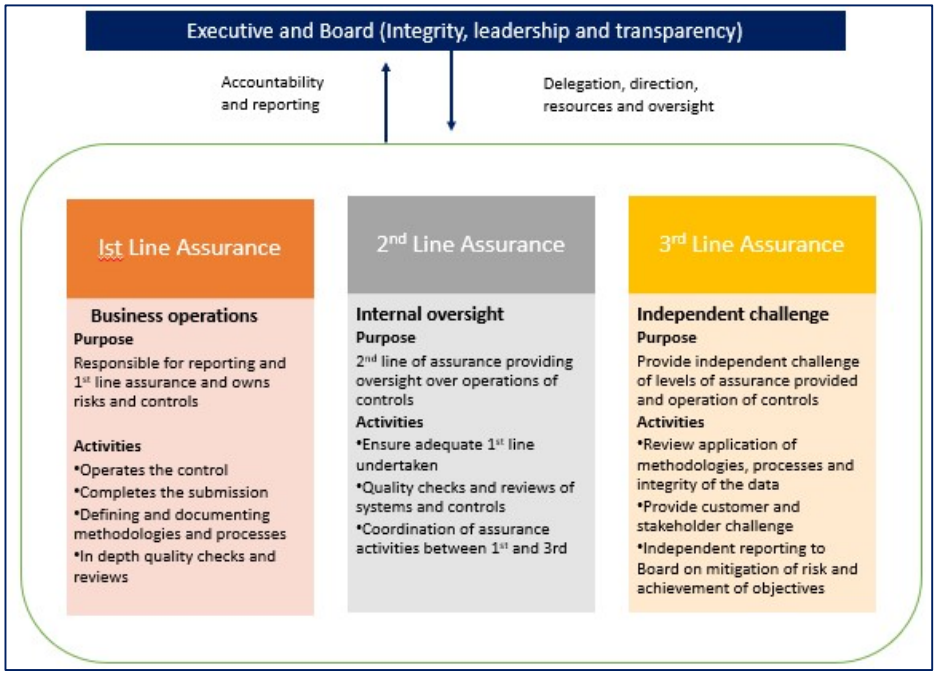
10.1. Board statements are provided in the covering letter to this gate two submission. The boards of STW and AfW support our recommendation for progression of this SRO. The views of the boards are aligned, as evidenced by their respective statements.

Assurance Approach

10.2. The assurance framework used for this submission has been developed jointly by STW and AfW.

10.3. The risk-based assurance approach is consistent with that documented in the individual companies' statements of reporting risks, strengths and weaknesses, and our respective Business Plans for 2020 to 2025 (AfW: Appendix 11[13]; STW: Appendix A1[14]), and is based on a shared understanding of 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[15].

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.

[13] AfW: https://www.affinitywater.co.uk/docs/corporate/plans/appendix-11-governance-and-assurance.pdf
[14] STW: Risks, Strengths and Weaknesses in regulatory reporting and assurance plan; 2020-2025 Business Plan: Appendix A12
[15] 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/

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 supported by the assurance statement, and there are no outstanding material issues to be resolved prior to gate two submission. The company boards are satisfied that progress to date allows the scheme to be construction ready by AMP8. Our approach was augmented by experience that the companies gained through the PR19 assurance process and the sharing of best practice (e.g. use of the STW risk assessment framework).

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 Minworth 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 Minworth SRO gate two budget was £1.35m (in 17/18 prices). £457k of gate one funding was transferred into the gate two allowance, giving a total gate two budget of £1.8m (in 17/18 prices).

11.2. In 2017/18 prices, we anticipate the gate two outturn cost expenditure will be £1,476,275, 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 £330,725k, equating to 18% compared to the Final Determination (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 Minworth SRO activities. Costs for other SRO activities and other company activities, including regional and WRMP24 planning, are not included in expenditure for Minworth SRO activities. Refer to Table 11.1 for a detailed breakdown.

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 Minworth 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. AfW and STW have small teams working full-time across the two SROs for which we are partners, 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. Examples of this include WRMP modelling, where we are utilising the existing STW model of the River Tame and River Trent, with Minworth SRO is funding only additional work such as scenario runs on the River Tame and River Trent to model the downstream impact of diverting treated wastewater from Minworth WwTW.
- **Utilise established supplier frameworks** from both partners 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.
- Competitively tender work within frameworks, where time allows. Of the 65% of gate two costs which could be competitively tendered (Table 11.2), 51% were let specifically for gate two via company frameworks, 6% were gate two work package extensions through company frameworks, 3% were direct awards, and 5% were undertaken by internal company resources. It was not possible to competitively tender 35% of the gate two costs. For example, work undertaken by the two partners and the costs of regulators such as the EA/NAU and Natural England could not be tendered. **Procure collaboratively with other SROs**, where appropriate. For example, aspects of the environmental monitoring work – including ecological monitoring and modelling of the Rivers Tame and Trent, and water quality assessment for the River Avon – were completed jointly with the GUC, STT and SLR SROs.

Table 11.1: Summary of gate two spend and forecast by workstream[16]

Category	Activity	Expenditure Activity (£)	% of Total Expenditure Activity	Expenditure Category (£)	% of Total Expenditure Category	Description
Programme and Project Management	PM & PMO	154,821	10.5%	183,395	12.4%	Project manager and project management office
	Assurance	28,574	1.9%			3rd line assurance and copywriting
Feasibility Assessment and Concept Design	Engineering	431,243	29.2%	481,789	32.6%	Engineering CDR
	Flow Reduction	16,279	1.1%			Flow reduction investigations
	Modelling	34,267	2.3%			Modelling
Option benefits, development and appraisal	Water resource	-	0.0%	-	0.0%	(included in feasibility and concept design)
	Non-water resource benefits	-	0.0%			(included in feasibility and concept design)
	Carbon, wider best value and option appraisal	-	0.0%			(included in feasibility and concept design)
Environmental Assessment	Ecological Monitoring	27,279	1.8%	381,409	25.8%	Ecological monitoring and reporting
	Environmental Assessments	120,629	8.2%			SEA, HRA, BNG, NC, EAR
	Environmental Impact Assessment	66,006	4.5%			EIA
	National Assessment Unit (NAU) & Environment Agency (EA) Area costs	133,406	9.0%			3rd party cost
	Natural England	34,088	2.3%			3rd party cost
Data collection, sampling and pilot trials	Targeted baseline desktop studies	-	0.0%	249,470	16.9%	(included in feasibility and concept design)
	Water Quality Monitoring	222,264	15.1%			Water quality monitoring
	2D bathymetric survey	27,206	1.8%			Bathymetric survey
Procurement Strategy	Procurement strategy	69,474	4.7%	69,474	4.7%	Procurement advice
Planning Strategy	Minworth Storage Options	1,364	0.1%	55,148	3.7%	Croft Quarry - High-Level Assessment
	Land and planning	53,784	3.6%			Land referencing, field surveys, permitting plans
Stakeholder engagement	Customer Engagement	42,806	2.9%	42,806	2.9%	Customer research, benefits & impact
Legal	Legal advice and collaborative agreement	12,784	0.9%	12,784	0.9%	Legal activities related to the SRO
Other	Other	-	0.0%	-	0.0%	n/a
Total		**1,476,275**	100%	**1,476,275**	100%	
Gate 2 Allowance	OFWAT PR19 final determination for gate 2	1,350,000		1,350,000		
Transfer from gate 1	Gate 1 underspend approved for gate 2 use	457,000		457,000		RAPID approval January 2022
Revised gate 2 allowance		**1,807,000**		**1,807,000**		
Gate under / overspend		330,725		330,725		

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	69,398	4.7%	7.2%
Framework Mini-bid procured at gate 2	756,031	51.2%	78.5%
Extension to Framework Mini-bid procured at gate 2	89,306	6.0%	9.3%
Direct Award	48,236	3.3%	5.0%
3rd Party	176,994	12.0%	n/a
Dual leadership costs	336,311	22.8%	n/a
Total	**1,476,275**	100%	100%

[16] Dual leadership costs (Table 11.2) are apportioned across workstreams according to the Expenditure Activity percentage.

Forecast Spend to Gate Three

11.6. We have reviewed the gate three guidance and planned our gate three activities. We have coordinated and consulted with the GUC SRO and STT SRO gate three proposed schedules 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.

11.7. The gate three proposed submission date of Q4 2024 has been recognised through our gate three collaborative planning and activity schedule. The Minworth SRO gate three forecast costs are outlined in Table 11.3.

11.8. Gate three forecast costs are £7.36m (2017/18 prices), which indicates a £275k overspend against the combined gate three and gate four budget of £7.08m.

11.9. 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. Note that dialogue is ongoing with the EA to determine final treatment requirements and that the current gate three forecast assumes a worst case scenario in terms of level of treatment.
- Treatment process bench tests and extended trial plant use, to feed into the above design, driven by additional treatment requirements and therefore a change in scope.
- Extended programme duration and DCO process support requiring extended/additional resourcing.
- Increased Environmental Impact Assessment (EIA) costs to support DCO application.

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	650,779	684,753	9.3%
	Assurance	33,974		
Feasibility Assessment and Concept Design	Solution design & support data	3,397,359	5,338,707	72.6%
	Development design sufficient for EA/EIA	1,456,011		
	Modelling	485,337		
	CDM	-		
Option benefits, development and appraisal	Water quality	145,601	148,763	2.0%
	Operational Strategy	3,162		
Environmental Assessment	Environmental (data)	145,601	223,255	3.0%
	National Assessment Unit (NAU) & Environment Agency (EA) Area costs	77,654		
	Natural England	-		
Data collection, sampling and pilot trials	Surveys & data collection	388,270	388,270	5.3%
Procurement Strategy	Procurement and funding strategy (support / advice) (DPC)	67,928	67,928	0.9%
	Engineering procurement (in house, included in hours assessment)	-		
Planning Strategy	Land referencing	29,120	325,176	4.4%
	Land acquisition	-		
	Planning (EIA co-ordinator / planning advisor)	247,522		
	Fees	48,534		
Stakeholder engagement	Stakeholder Engagement	38,827	38,827	0.5%
Legal	Commercial and legal advice	126,188	126,188	1.7%
Other	Other	13,589	13,589	0.2%
Total		**7,355,456**	**7,355,456**	100%
Gate 3 Allowance	OFWAT PR19 final determination for Gate 3	3,150,000	3,150,000	
Gate 4 Allowance	OFWAT PR19 final determination for Gate 4	3,600,000	3,600,000	
Underspend from Gate 2	RAPID email 28/09/22	330,725	330,725	
Gate 3 & 4 allowance		**7,080,725**	**7,080,725**	
Remaining Budget		-274,731	-274,731	

12. Conclusions and Recommendations

Conclusions

12.1. The Minworth SRO offers a robust, reliable and resilient source of raw water to support the STT and/or GUC SROs. The new assets required at Minworth WwTW could be phased to meet either the individual requirements of each transfer SRO, or a combination of the two.

12.2. Minworth SRO's maximum total yield supply capacity is confirmed at 230 Ml/d to avoid unacceptable environmental impacts on the River Tame and River Trent. In accordance with the draft WRSE Regional Plan, it is assumed that Minworth SRO will provide a DO of 100 Ml/d to the GUC SRO in a phased approach. A DO of 70 Ml/d will be provided to STT SRO, if required.

12.3. 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, which we will continue to develop and review in consultation with all relevant stakeholders and consultees in gate three.

12.4. The CAPEX and OPEX costs required by Minworth SRO to support the WFD "no deterioration" criteria over its defined design life would be significant and represent an uplift in option costs reported at gate one. Scope to reduce costs in gate three is a potential opportunity, dependent upon the outcome of option reviews with environmental regulators.

12.5. The major challenge with reducing discharge into the River Tame is the increase in frequency of the North Muskham HoF being met. We are currently reviewing mitigation measures to eliminate this risk, which includes storage assets. The outcomes of this exercise will be confirmed in gate three.

12.6. 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 18% below the Final Determination allowance.

12.7. We have completed RAPID's three tests for DPC and find that it is not applicable for Minworth SRO. However, in a scenario where the STT Pipeline were delivered separately from the treatment element, DPC may be applicable to the STT Pipeline.

12.8. In terms of the planning route, it is assumed that Minworth SRO will progress as associated development to the GUC SRO, and mirror its timescales. There may be an opportunity for shorten the planning timeline via a TCPA route.

12.9. The project will be construction ready in AMP8, as per the Final Determination requirement. The earliest DO from Minworth SRO to GUC SRO will be 2031, and to STT SRO will be 2032. Both dates are in advance of the requirements set out in the draft WRSE Regional Plan.

Recommendations

12.10. Through gate two, we have not discovered any showstoppers, and recommend this SRO proceeds to gate three. AfW and STW boards support 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 Minworth SRO Annexes

A	**Engineering**
A1	Engineering Conceptual Design Report (CDR)
A2	Pipeline Route Appraisal Report (STW Pipeline Asset only)
A3 (i)	Basis of Design Report
A3 (ii)	Process Options Report
A4	Cost and Carbon Report
B	**Environmental**
B1	Aquatic Ecology Monitoring: Tame & Trent
B2	Flow Reduction Investigations: Tame & Trent
B3.1	Environmental Assessment: Minworth & SLR – Overall report
B3.1.1	Environmental Assessment: Minworth & SLR - SSSIs
B3.1.2 (i)	Environmental Assessment: Minworth & SLR – Ecology
B3.1.2 (ii)	Environmental Assessment: Minworth & SLR – Aquatic Ecology
B3.1.3	Environmental Assessment: Minworth & SLR – River Mease SAC
B3.1.4	Environmental Assessment: Minworth & SLR – INNS
B3.1.5	Environmental Assessment: Minworth & SLR – Sedimentation
B3.1.6	Environmental Assessment: Minworth & SLR – BNG & Natural Capital
B4	Regulatory Environmental Assessment: Tame & Trent – EAR
B4	Regulatory Environmental Assessment: Tame & Trent – WFD
B5	Water Quality Monitoring
B5	Appendix B Lab Certs
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	Procurement Strategy
F	**Scheme Delivery Plan**
F1	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 Profile**
K1	WRMP24 Table 5 Cost Profile