Strategic regional water resource solutions: Preliminary feasibility assessment

Gate-1 submission for Minworth Strategic Resource Option

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WONDERFUL ON TAP

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

01 July 2021

Minworth SRO Gate 1 Submission

Dear Paul

Affinity Water and Severn Trent Water are pleased to submit a gate-1 report for the Minworth Strategic Resources Option (SRO). The report outlines how we have developed this SRO since its approval in the PR19 Final Determination, and the key steps we intend to take in gate-2.

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 100Ml/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 215 Ml/d. 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-1 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 have received a letter of support from the Environment Agency, which can be provided on request. We look forward to receiving your feedback, and to developing this SRO into gate-2.

Yours sincerely

Ian Tyler
Chair
Affinity Water

Liv Garfield
Chief Executive
Severn Trent

Gate 1 preliminary feasibility assessment

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 1 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 1 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 1 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 confirms 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:

- progress on the solution, to date, is commensurate with the Final Determination timeline of being 'construction ready' in AMP8;
- scope, detail and quality of the preliminary activities are that which would be expected of a large infrastructure scheme of this nature at this stage;
- expenditure incurred in generating the Gate 1 submission is efficient and relevant to the development of the submission.

On Behalf of:	**Name and position:**	**Date:**
Severn Trent Water	Liv Garfield, CEO	01 July 2021
Affinity Water	Ian Tyler, Chair	30 June 2021

Contents

Glossary

ACWG	All Company Working Group
AfW	Affinity Water
AIC	Annual Incremental Costs
CAP	Competitively Appointed Provider
CCG	Customer Challenge Group
CCW	Consumer Council for Water
CDR	Conceptual Design Report
CPO	Compulsory Purchase Order
DBFOM	Design, Build, Finance, Operate and Maintain
DCO	Development Consent Order
DPC	Direct Procurement for Customers
DWI	Drinking Water Inspectorate
DWSP	Drinking Water Safety Plan
EA	Environment Agency
GUC	Grand Union Canal strategic transfer
HoF	Hands-off Flow
HRA	Habitat Regulations Assessment
HS2	High Speed 2 railway
INNS	Invasive Non-Native Species
Ml/d	Megalitres per day
NAU	National Appraisals Unit
NE	Natural England
NPV	Net Present Value
NSIP	Nationally Significant Infrastructure Projects
SEA	Strategic Environmental Assessment
SLR	South Lincolnshire Reservoir
SRO	Strategic Resource Option
SSSI	Site of Special Scientific Interest
STS	Severn Trent Sources
STT	Severn to Thames Transfer
STW	Severn Trent Water
tCO_2e	Tonnes CO_2 equivalent
TCPA	Town and Country Planning Act 1990
The Trust	The Canal & River Trust
TWUL	Thames Water Utilities Ltd
UU	United Utilities
WFD	Water Framework Directive
WRE	Water Resources East
WRMP	Water Resources Management Plan
WRSE	Water Resources South East
WRW	Water Resources West
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

1. Executive Summary

Opening Statement

1.1. Minworth Strategic Resource Option (SRO) is a viable solution that offers a source of raw water flow augmentation to support either the Severn to Thames Transfer (STT) SRO, the Grand Union Canal (GUC) SRO, or a combination of the two. The combined option is a change from the original concept for the scheme which assumed only one of the SROs would be supported. This change represents an increase in the scope of the SRO, capturing additional opportunities and benefits.

1.2. Through gate-1 we have established that Minworth offers a robust and reliable source of raw water to support transfer SROs, and that it is very resilient to drought. We have not discovered any showstoppers, and therefore recommend this SRO proceed to gate-2.

1.3. With greater understanding developed in gate-1, we have seen the treatment needs and costs increase for Minworth STT but decrease for Minworth GUC.

1.4. We have delivered our gate-1 submission efficiently at 18% below the Final Determination allowance.

1.5. The ultimate recipient(s) of the scheme benefit will be determined by modelling undertaken by Water Resources South East (WRSE) to provide the best value plan for customers in the South East.

1.6. The source of raw water, Minworth wastewater treatment works (WwTW) is shown in Figure 1.1.

1.7. Minworth SRO will be one of several sources of flow augmentation to support a new abstraction for the STT SRO System shown in Figure 2.2. Minworth SRO will be the sole source of flow augmentation to support a new abstraction for the GUC SRO shown in Figure 2.3. Both receiving SROs are reported separately to RAPID in their own gate-1 submissions.

Key Facts

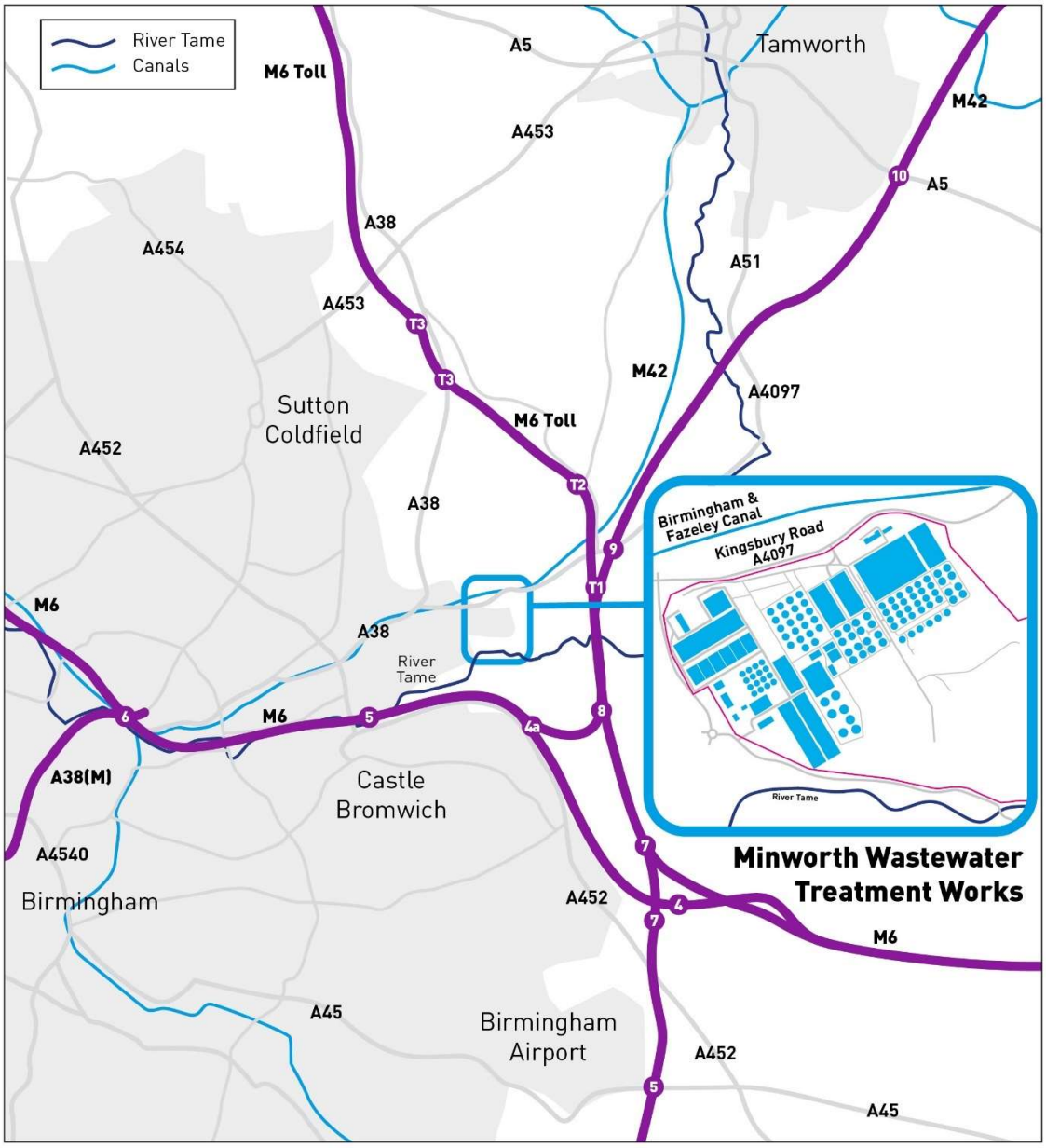
1.8. Minworth SRO will offer support to the receiving SROs by diverting some of its treated wastewater without detriment to its current discharge location in the River Tame. The diverted flow will be subject to additional treatment appropriate to the receiving waterbody.

1.9. The maximum support available to either or both SROs is subject to further environmental and hydrological investigations, as described in Chapter 2. We have considered asset configurations to provide support of 50, 100, 115, 165 and 215 Ml/d.

1.10. Depending on the outcome of these investigations, the source will provide flow augmentation to either the River Avon to support the STT SRO System, the Grand Union Canal to support the GUC SRO System, or a combination of the two. Please refer to Chapter 2 for further details.

1.11. As detailed in Chapter 4, varying levels of additional treatment will be required at Minworth WwTW to ensure no detrimental impact on the water Framework Directive (WFD) status of the receiving waterbodies.

Figure 1.1: Minworth Wastewater Treatment Works
(Diagram for illustrative purposes only)



Conclusions

1.12. Our studies in gate-1 have shown there is an interaction between the Minworth discharge and the environmental and hydrological elements of the Rivers Tame and Trent. This will form a key part of our gate-2 submission to enhance our understanding through extensive field studies.

1.13. This gap in our understanding is an indication of the scheme maturity, which currently lags some aspects of the receiving SROs. However, we are confident we can address this position in time for gate-2.

1.14. The project will be construction ready in AMP8, as per the Final Determination requirement. The earliest deployable output (DO) for Minworth STT will be 2031 and for Minworth GUC will be 2028, which is in advance of those transfer options.

1.15. The new assets required at Minworth could be phased to meet either the individual need of each transfer SRO, or a combination of the two. The combined option represents an increase in the scope of this SRO since PR19. The increase in scope has resulted in additional work to consider the combined option which we have undertaken without seeking additional funding.

1.16. Minworth offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

1.17. The key benefit of using Minworth SRO as a source for another SRO transfer is that wastewater is still being produced and fed into Minworth for treatment at all times. Therefore, it is very resilient to drought, which improves the resilience of the subsequent transfer SRO.

1.18. Care has been taken to ensure efficient and relevant spend on agreed activities to advance this project. We have delivered our gate-1 submission efficiently at 18% below the Final Determination allowance.

1.19. We have welcomed the opportunity to consider a Direct Procurement for Customers (DPC) procurement route. We have carried out Test 1 (size) and Test 2 (discreteness). Minworth passes Test 1 for STT but fails for GUC. It is marginal for Test 2 for all options. We will continue to explore our procurement options prior to gate-2 and, if necessary, undertake DPC Test 3 (value for money). See Chapter 6 for further details.

1.20. Further work is required to refine the proposal for gate-2 and, in particular, confirm:

- the level of additional treatment required for discharge to the receiving waterbodies for each SRO;
- the exact discharge location at the River Avon for the STT SRO; and
- the maximum supply capacity of the scheme, taking account of the environmental and navigational impacts. These include reducing the discharge flow to the River Tame and forward flow to the River Trent, and increasing flow in the receiving waterbodies. This analysis will determine whether both transfer SROs could be supported concurrently, and considers the interaction with the South Lincolnshire Reservoir (SLR) SRO. This is critical to understanding one of our top risks (Regional Planning Reconciliation - see RSK003, Chapter 9) and the associated scenario planning undertaken by the Regional Control Group.

Quarterly Dashboard Alignment

1.21. We confirm that all the statements above are in accordance with those previously reported in quarterly dashboards and where they vary this is as a result of work undertaken in the development of the scheme.

2. Solution Description

Outline of the Solution

Structure of report sections

2.1. The nature of the Minworth SRO is unique in that it is a potential source of raw water for two transfer SROs: STT SRO and GUC SRO. Each of these has a single option configuration.

2.2. To ensure we can offer the best value solution, we have considered a third, combined option to supply both transfer SROs concurrently. This combined option has two sub-option configurations. This has added a further layer of complexity, so we include Table 2.1 below to guide the reader to the appropriate section for each of the three option configurations.

Table 2.1: Chapter breakdown for each SRO

	Support STT SRO	Support GUC SRO	Support both SROs
Outline of the solution	2.12 – 2.15	2.16 – 2.18	2.20 – 2.21
Option configuration	4.3 – 4.7	4.8 – 4.10	4.12 – 4.16
Operations	4.17 – 4.19	4.2 – 4.23	4.24
Planning considerations	7.3	7.4	7.6

Maximum supply capacity and option configuration

2.3. Minworth offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

2.4. The maximum supply capacity of Minworth SRO has not yet been determined. Further environmental and hydrological investigations are required to fully understand the impacts on the waterbodies involved in the two transfer SROs. These include:

- River Tame and River Trent (STT and GUC SROs) – reducing the existing discharge to the River Tame with potential ecological and navigational impacts;
- Canals (GUC SRO) – increasing flow in the canal network with potential ecological, navigational and flooding impacts; and
- River Avon (STT SRO) – increasing flow in the River Avon with potential ecological, navigational and flooding impacts.

2.5. The investigations to determine the maximum supply capacity will be completed for the gate-2 submission. For this gate-1 submission we have considered the engineering requirements for the following scheme configurations:

- STT SRO supply of 115 Ml/d with additional treatment processes and a pipeline to allow discharge to the River Avon.
- GUC supply of 50 Ml/d and 100 Ml/d with an additional treatment process to allow discharge to the canal network.
- Combined supply to STT and GUC SROs of 165 Ml/d and 215 Ml/d. Individual additional treatment processes to allow discharge to each receiving waterbody. Pipeline for 115 Ml/d to the River Avon.
- Combined supply to STT and GUC SROs of 165 Ml/d and 215 Ml/d. Combined treatment processes to allow discharge to the waterbody with the most stringent discharge consent. Pipeline to the River Avon with a branch connection to the canal network.

2.6. The pipelines associated with the individual GUC SRO discharges do not form part of this feasibility assessment. Please refer to the GUC SRO gate-1 submission for details regarding options and costings for pipelines associated with the individual canal discharges.

2.7. For all options, we have considered the additional treatment processes required at Minworth WwTW to meet the likely discharge consent for each of the receiving waterbodies which are expected to be different for the River Avon and the canal network. This assessment seeks to ensure there will be no deterioration to the published WFD status in terms of physio-chemical elements. Ongoing environmental investigations will determine ecological elements (see Chapter 5).

2.8. We have instigated an enhanced water quality sampling programme which will better inform the design of the additional treatment process(es) required for each receiving waterbody.

2.9. There could be other supply configurations to support the transfer SROs, either individually or in combination, up to the maximum supply capacity. The decision to undertake further feasibility work will be made as we improve our understanding of the environmental and hydrological impacts, and the actual need determined by the Water Resources South East (WRSE) water resource modelling.

2.10. For the purpose of the cost elements of this submission, we have only included details for the two individual configurations: STT SRO and GUC SRO.

2.11. The new assets required at Minworth WwTW could be phased to meet either the individual need of the two transfer SROs, or a combination of the two. The combined option represents an increase in the scope of this SRO since PR19.

Option configurations

Outline for STT SRO

2.12. Minworth SRO provides one of several sources of raw water flow augmentation to support the abstraction for the STT SRO, which seeks to transfer water from the River Severn catchment to the River Thames catchment.

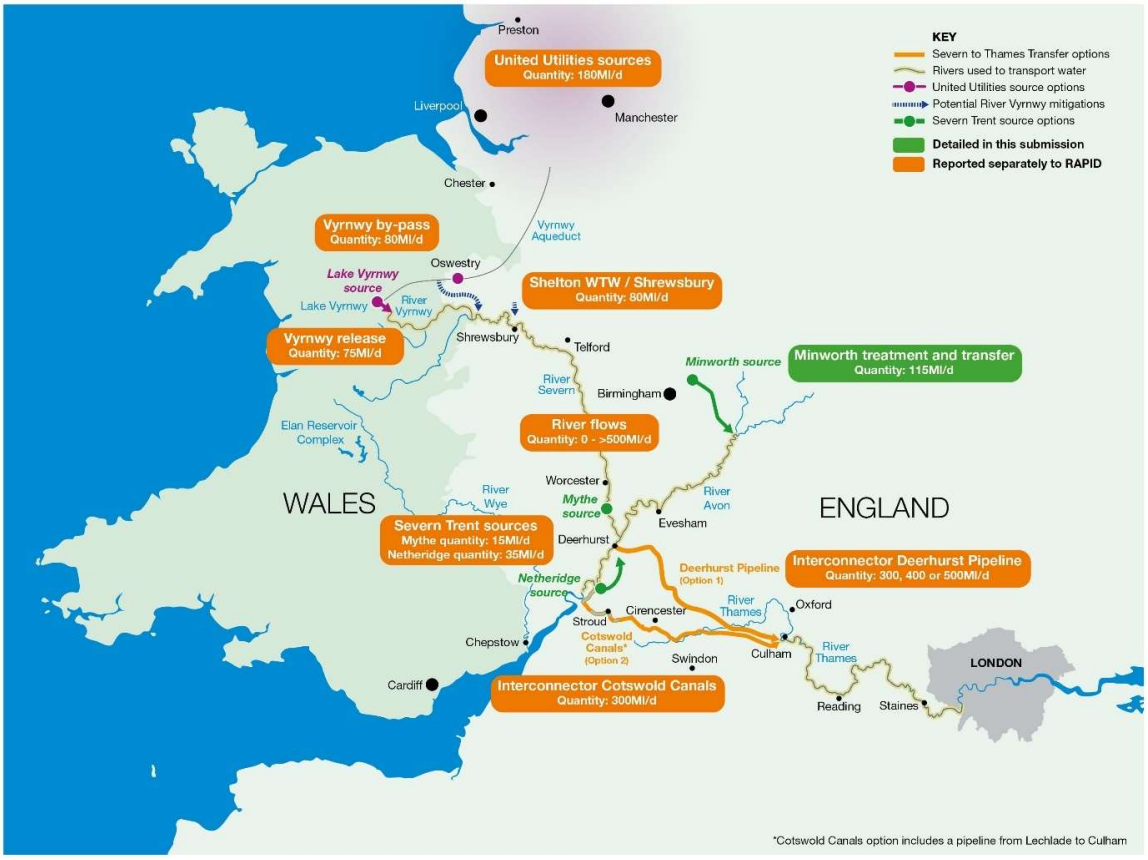
2.13. Minworth WwTW discharges treated wastewater to the River Tame, a major tributary of the River Trent. New assets, detailed in Chapter 4, will allow additional treatment and diversion of up to 115 Ml/d to be discharged to the River Avon, a major tributary of the River Severn.

2.14. The concept design for the STT SRO and System are described in its own gate-1 submission. The STT System, including the raw water sources, is shown in Figure 2.1.

2.15. Pipeline options for the STT SRO have been assessed to allow discharge locations both upstream and downstream of Warwick. The environmental and flow studies associated with the River Avon have been undertaken by the STT SRO. At the time of this gate-1 submission, these studies did not include a flood risk assessment for the discharge upstream of Warwick. This will be completed to inform the gate-2 submission, when we will reconsider the preferred discharge location. We have therefore based our submission, including all cost parameters, on the discharge downstream of Warwick.

Figure 2.1 STT SRO System

(Diagram for illustrative purposes only)

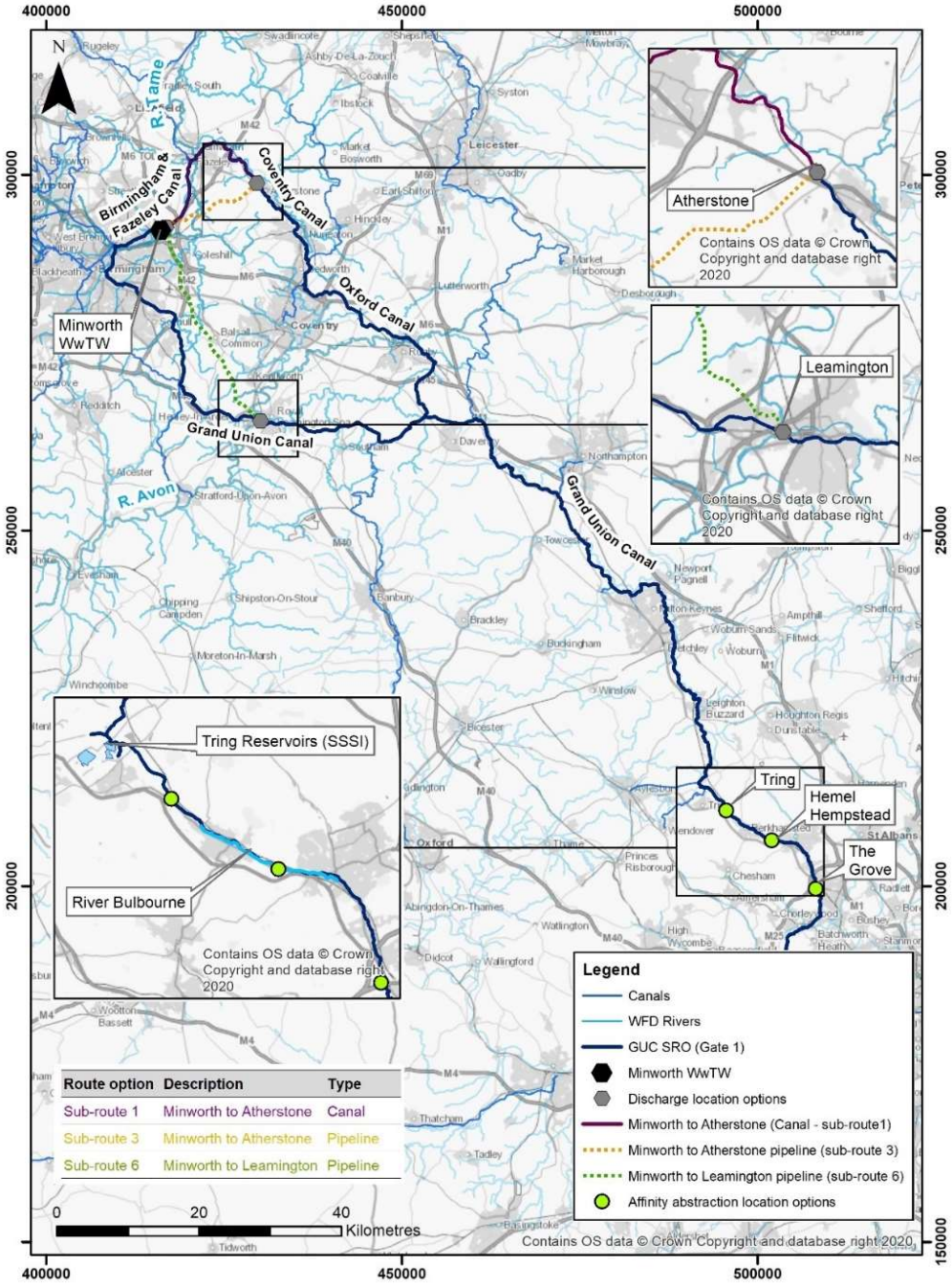


2.16. Minworth SRO will provide the sole source of raw water flow augmentation to support the GUC SRO System at its proposed abstraction point in the Affinity Water (AfW) supply area.

2.17. New assets will allow the additional treatment, if required, and the diversion of up to 100 Ml/d of the existing discharge to be diverted to the Canal & River Trust's (the Trust's) canal network for onward transfer to the GUC. This is further detailed in Chapter 4.

2.18. The concept design for the GUC SRO System is described in its own gate-1 submission. The GUC SRO System, including the location of the raw water source, is shown in Figure 2.2.

Figure 2.2: GUC SRO System
(Diagram for illustrative purposes only)



Outline for combined STT and GUC SRO options

2.19. We have considered two combined option configurations to support both SROs concurrently if the environmental and hydrological investigations demonstrate this to be a viable solution. Both configurations have been sized to provide 165 Ml/d and 215 Ml/d support options.

2.20. We have not yet undertaken the detailed cost benefit analysis associated with the two combined options. Further environmental, engineering and cost analysis will be undertaken as part of our gate-2 activity if either of the options is considered viable.

Overall Costs

2.21. The costs associated with each option detailed in this SRO are shown below in Table 10.1 in Chapter 10. All costs are presented in 19/20 prices. OPEX figures for the 10% sweetening flow include running costs for the scheme (e.g. electricity, power and chemicals scaled back, as well as full costs for staffing and operational maintenance). OPEX figures for the maximum flow are based on a volumetric rate.

2.22. Severn Trent Water (STW) costs have been presented to the WRSE model for options appraisal as a fixed annual charge and a variable charge, as these are trades of water from one company to another.

2.23. Forecast costs to each gateway are detailed in Table 2.3.

Table 2.3: Summary of costs for each gateway

	Gate 1	Gate 2	Gate 3	Gate 4
Ofwat allowance for each gate	£0.9m	£1.35m	£3.15m	£3.6m

Resource Benefit of the Solution

2.24. Minworth SRO offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

2.25. As a raw water source SRO, this scheme has no direct deployable output benefit. The deployable output benefit will be realised through the transfer SROs and is assessed by WRSE's water resource modelling. Please refer to Chapter 2 of the STT and GUC SRO gate-1 submissions for details.

2.26. As detailed in Section 2.4, the maximum supply capacity available has not yet been determined and is subject to further investigations in gate-2. Options have been developed to provide up to 115 Ml/d for STT SRO and up to 100 Ml/d for GUC SRO.

Summary of Social, Environmental and Economic Assessment

2.27. Our studies in gate-1 have shown there is an interaction between the Minworth discharge and the environmental and hydrological elements of the Rivers Tame and Trent. This will form a key part of our gate-2 submission to enhance our understanding through extensive field studies.

2.28. The nature of this option means that, at scheme level, there are limited opportunities for social, environmental and economic benefits. Net gains will largely be realised through in-combination effects of the transfer SROs. Please refer to Chapter 2 of the transfer SRO gate-1 submissions for details.

2.29. Environmental appraisals, undertaken as part of the transfer SROs, have confirmed that the scheme is feasible. Although the assessment identified several 'Major Negative' effects, no showstopper has been revealed.

2.30. A number of the 'Major Negative' effects have already been mitigated by the proposed option configurations, and we will continue to consider further mitigations during our gate-2 activity.

2.31. Some of the potential impacts identified are temporary in nature and largely unavoidable while construction works take place.

2.32. Environmental assessment of the scheme is detailed in Chapter 5.

2.33. Non-water resource benefits identified include reducing the flood risk where construction intersects with current areas of known flood risk for the GUC SRO, and increased employment through construction and the operational phases of both transfer SROs.

Drinking Water Quality Considerations

2.34. No specific drinking water quality considerations have been assessed at scheme level. The assessment of any potential impacts on both the abstractions for the receiving SROs and other abstractions on route have been the subject of Drinking Water Safety Plan (DWSP) catchment risk assessments undertaken by each receiving SRO study. No deterioration in DWSPs has been identified as a result of the proposed discharges.

2.35. Drinking water quality considerations have been assessed at the STT SRO System and GUC SRO System level in accordance with the All Company Working Group (ACWG) Treated Water Methodology. The individual DWSPs will be advanced iteratively in our gate-2 investigations. See Chapter 5 of the transfer SROs' gate-1 submissions for details.

Wider Resilience Benefits

2.36. The wider resilience benefits of the Minworth raw water source will be realised as part of the receiving SRO systems. At scheme level, Minworth SRO source is considered to be a resilient option because wastewater is a resilient source, i.e. STW customers produce wastewater for treatment at Minworth at all times.

2.37. At the 215 Ml/d maximum supply capacity considered, the diverted raw water source represents less than 50% of Minworth's discharge. This flow will be available under most scenarios and is therefore considered to be one of the most robust sources of raw water available to either of the potential receiving SRO systems.

Interactions with other Solutions

2.38. As a raw water source providing flow augmentation for a new abstraction, there is a direct interaction between Minworth SRO and the receiving SROs (STT and GUC). The extent of this interaction is dependent upon the transfer SRO's operational strategy. This is discussed in Chapter 6 below.

2.39. The diversion of Minworth raw water source to either the canal network or the River Avon will reduce the flow in the River Tame with a potential impact on the downstream system. The extent of this impact will be determined by future studies to inform the STT, GUC and SLR SROs gate-2 submissions and the Water Resources West (WRW), Water Resources East (WRE) and WRSE regional plans.

2.40. There are no direct interactions with other SROs providing raw water to the STT SRO (Severn Trent Sources (STS) and United Utilities (UU) Vyrnwy Release and its mitigation options). The Minworth SRO source will be capable of deployment either completely independently of, or in combination with, these other raw water sources.

2.41. The interactions of the STT and GUC SROs in terms of alternatives to, or in-combination options with other solutions, are described in their respective gate-1 submissions.

Meeting the National Framework Requirements

2.42. The National Framework explores England's long-term water needs and aims to increase supplies and move water to where it is needed. We believe the Minworth SRO represents a robust, reliable and resilient source to help deliver resilience to the 1 in 500-years drought.

2.43. The Minworth SRO will be reflected in the regional plans for the donor region, WRW, and the recipient region, WRSE.

3. Outline Project Plan

Overview

3.1. The scheme is proceeding to plan with all key milestones met to date, including submissions to regional planning. Subject to timely decisions on scheme progression, a stated requirement from regional planning and Water Resources Management Plan 24 (WRMP24), the scheme remains on track to deliver through the gated process. It will be construction ready in AMP8, as per the Final Determination requirement.

3.2. It is evident from our work across multiple SROs that there is a difference in the level of maturity of investigations to date. The lack of flow data and environmental data from investigations on the Rivers Tame and Trent present a potential risk to the timeline. This can be mitigated within the overall programme, but will prove a challenge post gate-1 and could impact on gate-2 submission.

3.3. Significant interaction with other SROs leads to multiple consenting and procurement options, both of which affect the timeline for this outline plan. Advice has been sought to establish potential timelines and any limitations. In order to be as clear as possible at the gate-1 stage, we will consider the 'most likely' timeline and provide the earliest possible date to ensure that all milestones can be met and preparatory work begins in time to meet the required timelines. There is an inherent risk to these dates should the 'most likely' route not be followed.

3.4. Figures 3.1 and 3.2 below show an outline plan for the 'most likely' timeline for Minworth STT (treatment and pipeline) and Minworth GUC (treatment only) to construction. The 'most likely' timeline is chosen to account for the critical path, which includes planning & consenting and procurement routes, then to align construction to the potential 'case of need' profile for receiving SROs. An earliest possible delivery date is also provided below, but it is expected that this would incur additional cost downstream and would not be the optimum timeline for delivery. The 'most likely' construction ready date for Minworth STT is Q3 2029 with a deployable output date of Q2 2034. For Minworth GUC, the construction ready date would be Q3 2029 with a deployable output date of Q1 2032. In all scenarios, Minworth SRO could be complete prior to the required date of receiving SROs.

3.5. Further consideration will be given to the benefit of any combined Minworth STT and Minworth GUC procurement and/or consenting options in readiness for gate-2, when there is a greater understanding of the requirement and timeline for supply to both SROs. Consideration will also be given to a modular approach to supply for GUC during gate-2, when we have a better understanding of the Water Resources South East (WRSE) modelling and likely demand profile for the related schemes.

3.6. Further detail for DPC and Development Consent Order (DCO) options are outlined in Chapters 6 and 7. Our 'most likely' scenario is in line with this advice and includes a DCO with no DPC for Minworth STT and a Town and Country Planning Act 1990 (TCPA) route with no DPC for Minworth GUC.

3.7. Further detail on activities required to gate-2 can be found in Chapter 15.

3.8. Through gate-1 we have not discovered any showstoppers and recommend this SRO proceed to gate-2.

Phasing of Key Activities and Decisions

3.9. The critical path is through environmental and engineering investigations, planning/consenting and procurement. There is some considerable variation depending upon the planning/consenting and procurement routes selected. The 'most likely' and 'earliest possible' dates for delivery are outlined for each element below in Table 3.1, but these will be developed further in line with receiving SROs. The 'earliest possible' date given is the earliest date following the currently advised planning / consenting and procurement routes.

3.10. Further work will be undertaken during gate-2 to understand the potential utilisation of the scheme and any impact on the timeline for delivery.

3.11. It is possible that Minworth STT could be delivered earlier if a TCPA route were followed rather than a DCO.

3.12. The earliest date for Minworth GUC is given as full delivery. This is subject to further discussions during gate-2 on modularity which may bring delivery of partial output forward.

3.13. Analysis of the longest possible dates shows that Minworth SRO can be ready to supply STT SRO or GUC SRO before either scheme would be ready to receive the output.

Table 3.1: The 'most likely' and 'earliest possible' dates for delivery

		Most likely	Earliest Possible Date
Minworth STT	Construction Start	DCO & No DPC **Q3 2029**	DCO & No DPC **Q1 2027**
	Deployable Output	**Q2 2034**	**Q3 2031**
Minworth GUC	Construction Start	TCPA & No DPC **Q3 2029**	TCPA & No DPC **Q2 2025**
	Deployable Output	**Q1 2032**	**Q1 2028**
Minworth Both	For further consideration in gate-2		

3.14. Planning/consenting and procurement activities are broadly aligned to the RAPID gates on our 'earliest possible' path, but some flexibility may be required to ensure the optimum point for decision making beyond gate-2 for the 'most likely' path. Should a different route be followed for planning/consenting or procurement, it is possible that these gates would not align. We propose to work with RAPID during gate-2 to understand any potential changes and align future gate dates, in order to deliver these schemes in line with the statement of need for receiving SROs.

3.15. Key decision points / critical path:

- Sufficient information needs to be obtained from draft regional plans and completed environmental investigations to determine the ability of Minworth SRO to serve either or both STT SRO and GUC SRO if required. This information is required by June 2022 to allow a recommendation to be made to RAPID at gate-2. Continued discussions with the Environment Agency (EA) via the National Appraisal Unit (NAU) will be critical to progress, due to the limited amount of environmental data that will be available.
- Approval to proceed from RAPID at gate-2 to allow progression of DCO pre-application and TCPA application in line with plan.
- Decision needed on appropriate procurement route for Minworth as its own SRO.
- National Policy Statement for Water Resources needed via approval of WRMP24, providing statement of need for DCO application. This approval is post gate-2 and any delay may delay application for DCO.

Assumptions

3.16. Assumptions made and dependencies considered for the 'most likely' timeline are outlined in Table 3.2 below.

Table 3.2: Assumptions and dependences for 'most likely' timeline

Assumption	Dependency	Commentary
No delay or pause between gates		There is no delay or pause between gates, RAPID decisions, or in output from the regional planning and WRMP process.
Outputs from regional planning are not delayed		Outputs from regional planning are not delayed, allowing key decisions on supply to other SROs, and subsequent consenting and procurement routes to be chosen in agreement with the regulator in a timely manner.
No critical issues identified during		No critical issues identified during environmental investigations and engagement to delay or prevent use of the scheme. It is also assumed that the environmental

Assumption	Dependency	Commentary
environmental investigations		investigations identified will provide sufficient valid information to allow these decisions to be made.
Key stakeholder issues and concerns during gate-2 and beyond can be addressed		Issues and concerns arising from key stakeholders during gate-2 and beyond can be addressed and, where necessary, mitigated within the timescales ahead of DCO application. Based on experience of similar schemes and advice provided relating to DCO, we believe the timelines provided to be sufficient for the stakeholder engagement activity for a scheme of this scale.
Time estimates are reasonable		Time estimates are given based on best advice received to date. Further analysis of the schedule will be completed at gate-2.
Further development of approach to consenting and procurement will be undertaken during gate-2		Further development of the most appropriate approach to consenting and procurement for this scheme will be undertaken during gate-2. Advice varies on both the most appropriate routes and the timelines for them, but best estimates are included with further clarification and analysis to be completed for gate-2.
No delays in NSIP status, DCO application and no additional challenges or enquiries		There is no delay in receiving Nationally Significant Infrastructure Project (NSIP) status if required. DCO is granted on first application with no additional conditions imposed, no requirement for additional public enquiry, and no legal challenges. Time has been allowed for judicial review and any compulsory land purchase, should it be required.
	Changing procurement legislation	Changing procurement legislation may impact the estimated timeline for procurement activity. The current timeline is based on recent STW experience of similar programmes.
No additional planning approval or land purchase required		Minworth GUC is for treatment only, no additional planning approval is required for a pipeline and no land purchase is required.
	Shared deliverables with other SROs are received in time.	All deliverables shared with other SROs (e.g. environmental investigations and analysis shared with STT or GUC) will continue to plan and be received in time for progression of Minworth SRO.
Enough information received from draft regional plans and draft WRMP to submit a TCPA application		In order to meet the earliest possible date, enough information is received from draft regional plans and draft WRMP to submit a TCPA application for Minworth GUC before final publication. Adequate information would also be required to begin DCO Pre-Application stage and stakeholder engagement for Minworth STT.

Figure 3.1: Minworth STT – 'most likely' timeline

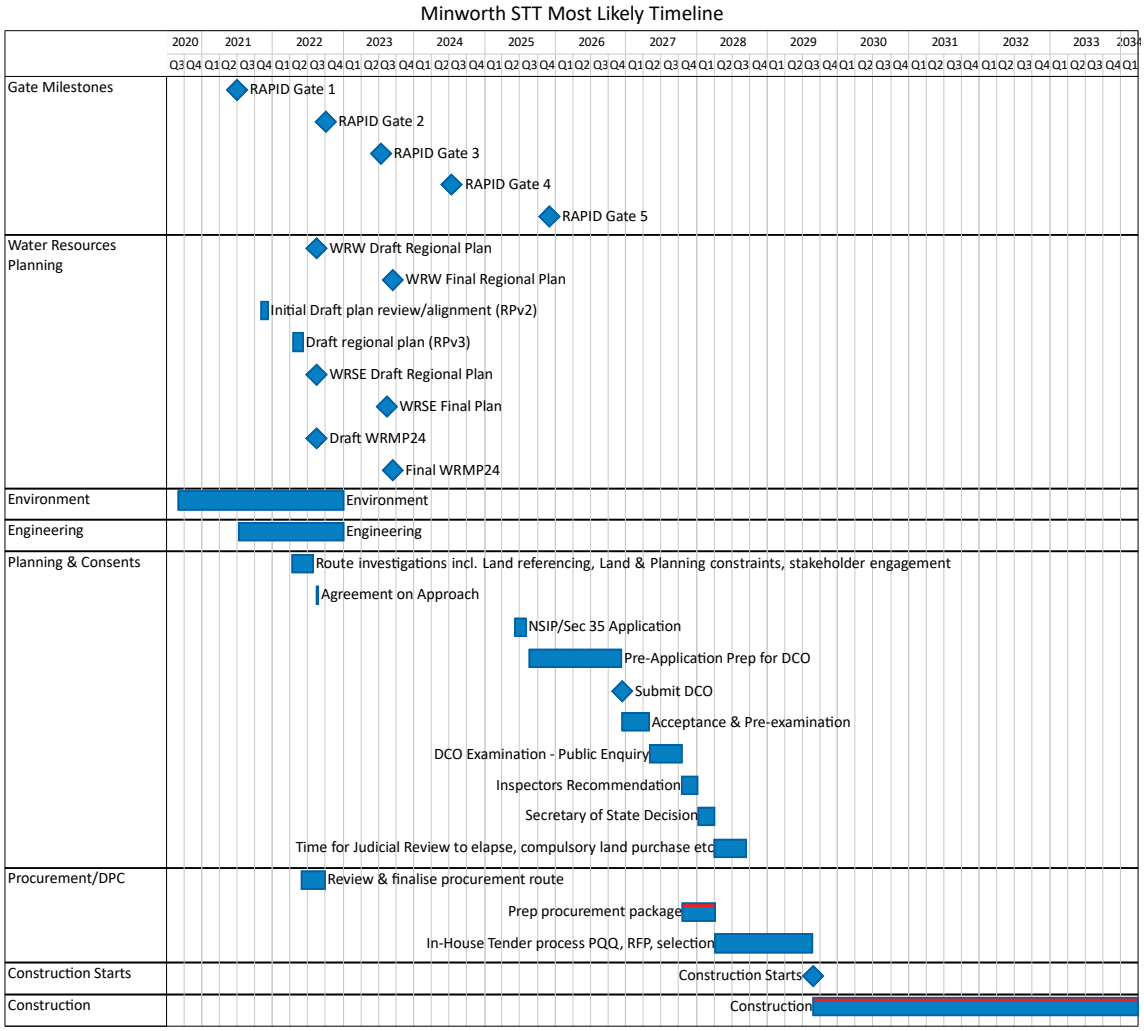
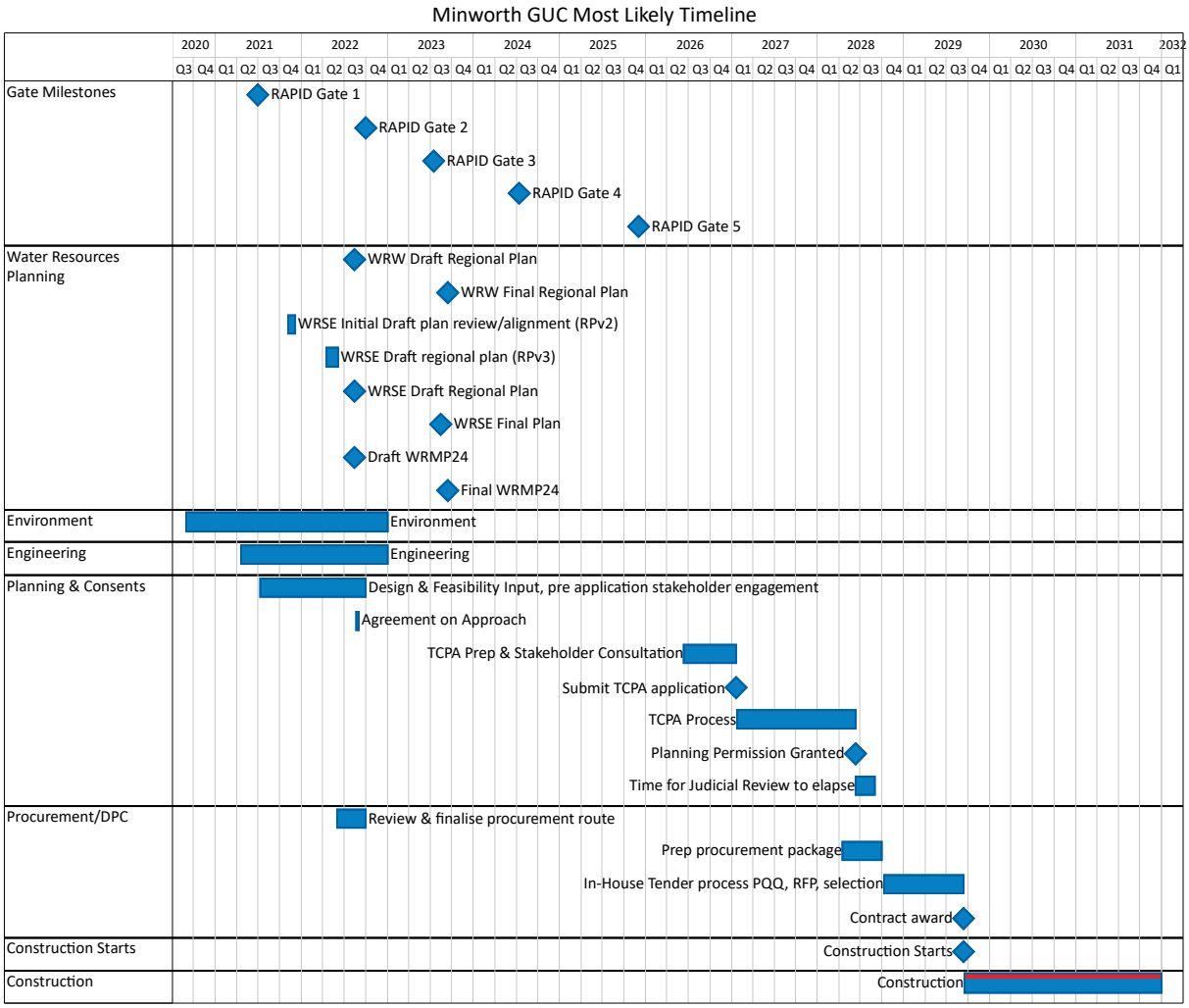


Figure 3.2: Minworth GUC – 'most likely' timeline



4. Technical Information

Option Configuration

Minworth WwTW – river / canal flow augmentation with treated wastewater

4.1. With greater understanding developed in gate-1, we have seen the treatment needs and costs increase for Minworth STT, but decrease for Minworth GUC.

4.2. River flow augmentation with treated wastewater is the process of diverting treated wastewater from its existing discharge point to a new discharge point. This can either improve the environmental status of the receiving waterbody or increase the amount of water available for direct abstraction to increase potable water supply.

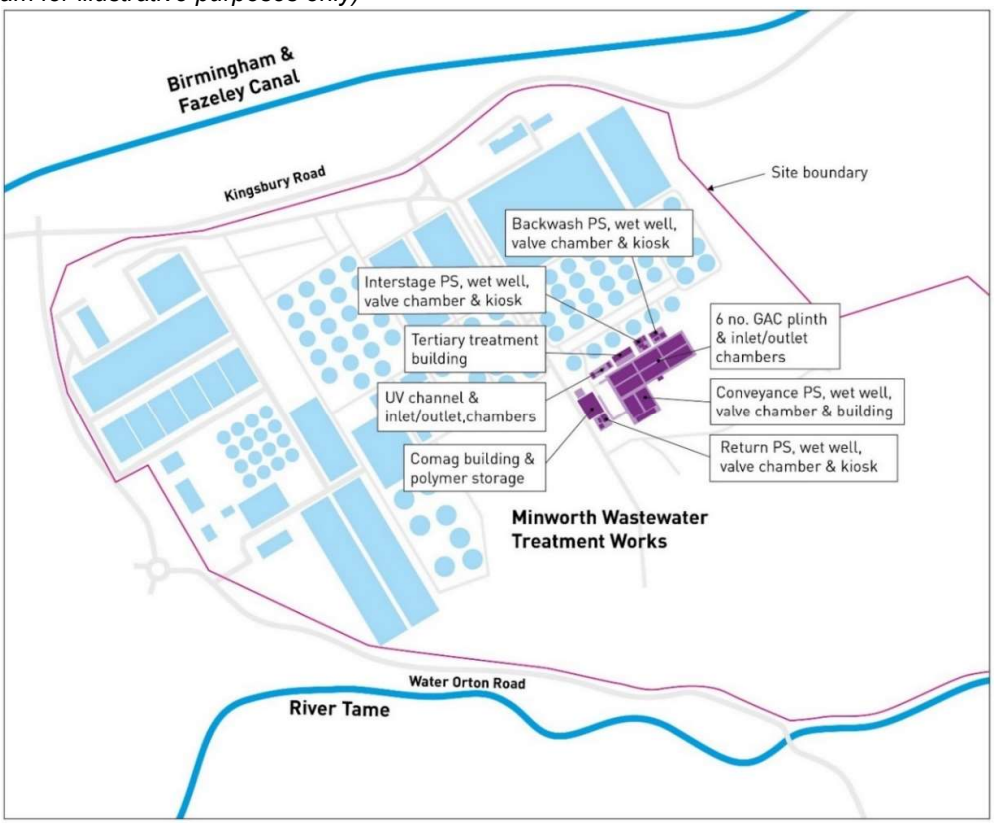
4.3. The diversion of treated wastewater discharges must not be detrimental to either the waterbody which currently receives the discharge, or the waterbody being considered for augmentation. The environmental and navigational status, and the drinking water quality considerations of existing downstream abstractors must not be affected.

Minworth SRO for STT SRO

4.4. For Minworth SRO to support the direct river abstraction by STT SRO, additional treatment processes are required at Minworth WwTW. A pipeline and associated pumping station to transfer the raw water source for discharge to the River Avon are also required.

4.5. Following analysis and review of available treated wastewater quality and receiving water quality data, we have determined that additional treatment will be required at Minworth WwTW to ensure there is no detrimental impact on the current WFD status of the River Avon. The proposed treatment assets are shown in Figure 4.1.

Figure 4.1: Minworth SRO treatment for STT SRO
(Diagram for illustrative purposes only)

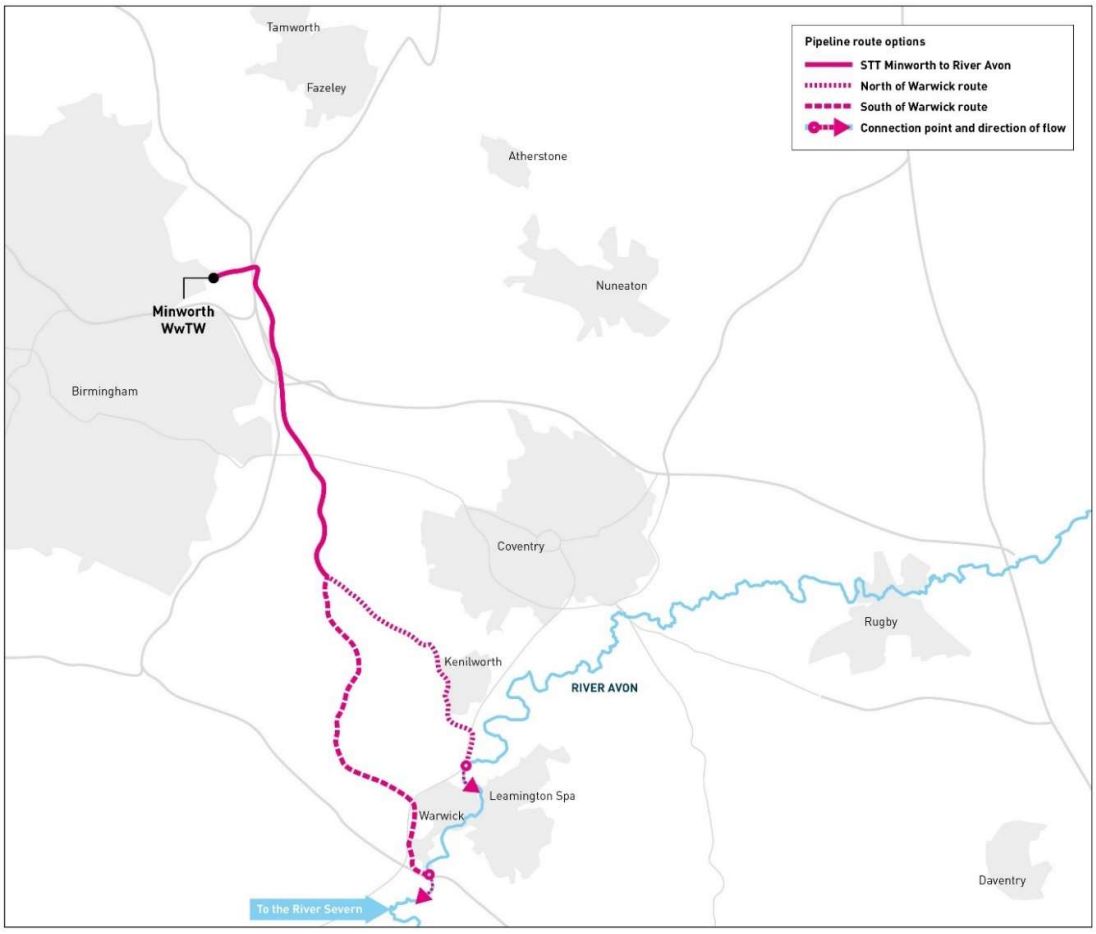


4.6. Historic publicly available water quality data for the River Avon indicates there is a risk that an additional treatment process will be required to remove trace organics. This is a change to the original PR19 scope resulting in increased costs. This is a significant sum which we have decided to include in the submitted costs rather than rely on costed risk or Optimism Bias. The need for the additional treatment process will be reviewed in detail for gate-2.

4.7. The pipeline to the River Avon includes three no-dig crossings of the High Speed 2 (HS2) railway line. These will be substantial undertakings, requiring careful planning and collaboration with the HS2 operator.

4.8. As stated in Section 2.15, this submission is based on the discharge location south of Warwick to mitigate the potential risk of flooding in Warwick.

Figure 4.2 Minworth SRO pipeline for STT SRO
(Diagram for illustrative purposes only)



Minworth SRO for GUC SRO

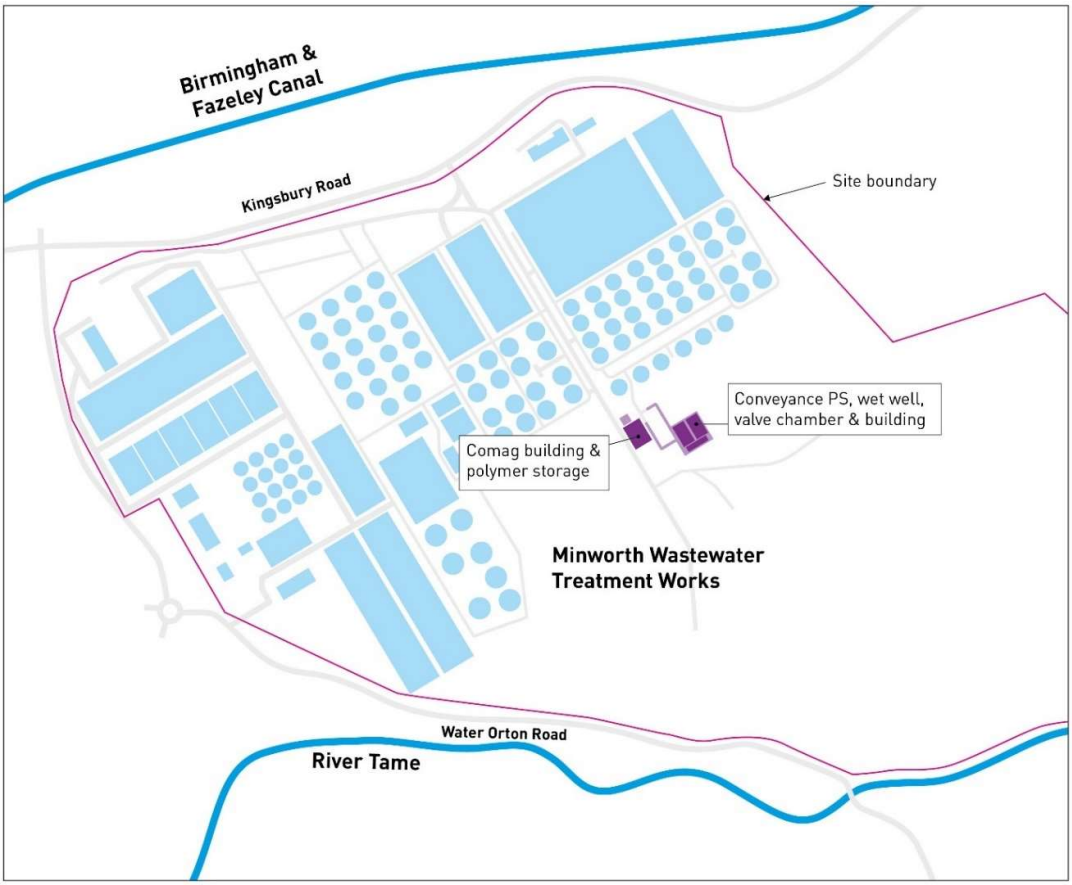
4.9. The scope of Minworth SRO to support GUC SRO covers only the additional treatment process at Minworth WwTW required to meet the likely discharge standard for the canal network. Refer to the GUC SRO gate-1 submission for details of the pipelines, associated pumping station and canal transfer upgrades.

4.10. Following analysis and review of treated wastewater quality and receiving water quality data, we have determined that an additional tertiary treatment process will be required at Minworth WwTW, to ensure there is no detrimental impact on the current published WFD status of the canal network. The level of proposed treatment has reduced compared to that allowed in PR19.

Overall scheme costs have therefore been reduced. The proposed treatment assets are shown in Figure 4.3.

4.11. We have assessed the additional treatment required on the basis of the historical WFD designation. GUC SRO has commissioned further analysis of the water quality sampling results to inform discussions with the Environment Agency (EA) about the appropriate designation, based on the most recent water quality sampling. The impact of this analysis on the proposed treatment for the Minworth SRO will be reviewed in detail for our gate-2 submission.

Figure 4.3 Minworth SRO treatment for GUC SRO
(Diagram for illustrative purposes only)



Minworth SRO for combined STT / GUC SROs

4.12. As stated in Section 2.2, we have considered option configurations to support both transfer SROs concurrently.

4.13. The first combined option would consist of treatment assets to treat the wastewater to the required standard for discharge to the receiving waterbodies. These assets would be sized to treat the whole flow of 215 Ml/d to meet the discharge standard for the canal network. A flow of 115 Ml/d would then pass through additional treatment processes to meet the higher discharge standard for the River Avon. There would be individual pipelines and pumping stations to transfer 100 Ml/d to the canal network, detailed in GUC SRO, and 115 Ml/d to the River Avon.

4.14. Both the additional treatment processes and pipelines would be capable of being operated either individually or in combination, as required to meet the transfer SROs' needs.

4.15. The second combined option is based on a shared pipeline and pumping station which would split the 215 Ml/d flow between the canal network and the River Avon. This would require all the wastewater to be treated to the higher discharge standard appropriate to the River Avon.

4.16. It is recognised that the second combination would be 'over-treating' the proportion of the raw water required for the canal discharge standard. However, there may be cost efficiencies

available by installing a larger combined pipeline, and this may therefore be a cheaper option than individual pipelines and the cost of upgrading sections of the canal network.

Operations and Maintenance Considerations

Minworth SRO for STT SRO

4.17. Thames Water Utilities Ltd (TWUL) has stated that normal operation of the STT SRO will only be required under drought scenarios, although these could be for durations of up to 18 months under the worst historical drought conditions. The STT SRO System will not be operated as either a 'business as usual' primary supply, or a second source resilience supply to cover asset failure or pollution scenarios in the TWUL area.

4.18. For this submission, and input to the Water Resources South East (WRSE) water resource modelling, we have assumed we will maintain a 10% sweetening flow to maintain the Minworth SRO in a state of readiness. OPEX costs, electricity, chemical use and operational carbon have been stated on this basis.

4.19. We may be given sufficient notice to allow the Minworth SRO assets to be recommissioned on an as-needed basis, avoiding the need for a hot standby (rapid ramp-up of output) or sweetening flow mode of operation. This will be considered in detail as part of the overall STT SRO System Operational Strategy for the gate-2 submission.

Minworth SRO for GUC SRO

4.20. Affinity Water (AfW) has indicated that it is unlikely at this stage that Minworth SRO will be used to supply the GUC SRO under 'business as usual' conditions, but this understanding will be progressed at gate-2. The primary focus of the system is to cover a drought resilience scenario by increasing AfW's average deployable output.

4.21. AfW has also indicated that it wishes to explore the possibility of using the system as a second source resilience supply to cover asset failure or pollution scenarios within its existing supply system. This would require a hot standby / sweetening flow mode of operation.

4.22. For this submission, and input to the WRSE water resource modelling, we have assumed we will maintain a 10% sweetening flow to maintain the Minworth SRO in a state of readiness. OPEX costs, electricity, chemical use and operational carbon have been stated on this basis. This reconciles with the water modelling carried out by AfW for SROs operation and is similar to the assumptions used for the other SROs that are being developed by AfW.

4.23. Severn Trent Water (STW) and AfW will undertake detailed investigations to consider options for the GUC SRO System operational strategy to maximise the benefit to AfW customers delivered by the overall system. This will be completed for our gate-2 submissions.

Minworth SRO for combined STT / GUC SROs

4.24. The combined option configurations will be capable of operating to meet the individual need of either of the two transfer SROs, or in combination. The operational strategy will mirror that developed for each of the individual transfer SROs. For the shared treatment and pipeline option, the control philosophy will be developed to ensure Minworth SRO is maintained in the required state of readiness under all scenarios.

Maintenance considerations

4.25. The newly constructed treatment and pumping station assets will require a full schedule of preventative maintenance activity. This will ensure STW can meet contractual obligations to provide raw water support as required by either of the two transfer SROs.

4.26. Pipelines and discharge structures will be covered by walkover inspections and valve exercising.

4.27. Existing assets will continue to be covered by a full schedule of preventative maintenance activity.

Design Life of the Asset

4.28. Details of the design life of the asset assumptions included in cost estimates are detailed in Table 4.1.

Table 4.1: Design life of asset assumptions

Design life of asset groups			
Instrumentation, control & automation	Mechanical & electrical	Building & civils	Pipelines
10-year replacement	20-year replacement	60-year replacement	80-year replacement

Initial Costing and Benchmarking

4.29. As stated in Chapter 10, CAPEX estimates were produced using a combination of STW cost models and bottom-up cost estimation by a STW cost consultant.

4.30. The STW cost model for the high-value pipelines was developed for the submission of STW's PR19 WRMP and Resilience Programme, which collectively totalled £676m. The model was assured as part of our PR19 governance process and independently benchmarked by our PR19 cost consultant.

4.31. The only amendment to the cost model has been the price base uplift to account for inflation, and the model continues to be used as part of STW's Green Recovery and WRMP24 submissions.

4.32. As a further check on the validity of STW's pipeline cost model, we compared the Minworth SRO pipeline to the River Avon to the forecast outturn cost for STW's AMP6 Birmingham Resilience scheme. This showed a variance of 9%, with the SRO costs being higher. We consider this variance to be reasonable at this stage of the project and will continue to improve certainty of cost during gate-2.

Initial Water Resource Benefit

4.33. Minworth SRO offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

4.34. As stated in Section 2.25, the water resource benefit and deployable output benefit assessment is detailed in the transfer SROs' gate-1 submissions.

4.35. Minworth SRO will provide a resilient source of water to the transfer SROs, which will result in an increase in the receiving water company's deployable output in drought scenarios.

Initial Data Provided to Regional Groups

4.36. The following information was provided to WRSE for the March 2021 water resource modelling exercise:

- Fixed annual charge £m
- Variable OPEX charge £/Ml
- Variable electricity kWh/Ml
- Fixed embodied carbon tCO_2e
- Variable operational carbon tCO_2e/Ml
- Construction duration
- Scheme capacity
- Resilience metrics (please refer to Section 10.13 for details)
- Environmental metrics

4.37. The same information will be submitted for the Water Resources West (WRW) regional plan through STW's WRMP24 company submission.

5. Environmental and Drinking Water Quality Considerations

High Level Environmental Statement

5.1. Our studies in gate-1 have shown there is an interaction between the Minworth discharge and the environmental and hydrological elements of the River Tame and River Trent. To enhance our understanding further, extensive field studies are planned in gate-2.

5.2. Chapter 5 outlines findings from the environmental investigations to date, and the outputs from the Invasive Non-Native Species (INNS) risk assessment, ACWG Treated Water Methodology, and ACWG Environment & Raw Water Quality Methodology. An overview of our findings at gate-1 can be found in Section 5.17, covering the environmental investigations and monitoring, the desktop studies of environmental, social and economic valuations, and carbon accounting and resilience.

5.3. The impacts on the receiving waterbodies are considered in the STT SRO and GUC SRO gate-1 submissions. The focus in this submission is the environmental and drinking water quality considerations for the Minworth site, STT pipeline route and the impacts of diverting the Minworth discharge away from the waterbodies that currently receive it (River Tame, River Trent and Humber Estuary).

5.4. Minworth SRO is in the early stages of development. While some SROs are supported by multiple years of environmental data, some of the data we rely upon for the Minworth SRO only started being collected in April 2020.

5.5. Through gate-1, we have not discovered any showstoppers that would prevent delivery of this scheme, and we recommend this SRO proceed to gate-2.

5.6. This section presents the recommendations for further investigations in gate-2. We recognise that we will only have one year of monitoring data by gate-2 for some environmental items and that longer data sets are required to allow a full assessment.

5.7. The work carried out to date, and the ongoing work packages, have been scoped in conjunction with relevant stakeholders and regulators, e.g. the Environment Agency (EA) and the Drinking Water Inspectorate (DWI).

Environmental Investigation

5.8. The ACWG Environmental & Raw Water Quality Methodology requires Strategic Environmental Assessment (SEA), Habitats Risk Assessment (HRA), Water Framework Directive (WFD), Biodiversity Net Gain and Natural Capital assessments. The key outputs are detailed below.

5.9. A key requirement of this SRO is to understand the impact of reducing the treated wastewater from Minworth WwTW into the River Tame when the transfers are active. Initial data gathering and modelling exercises and their findings are set out in Section 5.20. These will be built on during gate-2.

Strategic Environmental Assessment

5.10. An SEA is a high-level appraisal that covers pre- and post-mitigation risks for the environment, as well as the social and economic effects of the scheme. At gate-1, we have carried out a SEA-style appraisal, following the ACWG approach, rather than a formal SEA. The outputs will be utilised when considering construction operational effects during gate-2. The SEA looks at 14 criteria and scores them from 'Major Positive' to 'Major Negative', with 'Moderate', Minor' or 'Neutral' impacts also attributable. The assessments consider the risks pre and post the application of mitigations that are currently within the engineering scope.

5.11. The SEA assessment has been carried out for the three Minworth options (STT 115 Ml/d, GUC 100 Ml/d and Combined 215 Ml/d). Table 5.1 shows the outputs of the SEA with the currently designed mitigations (embedded). The table also highlights where the next phases of detailed design for gate-2 will need to include additional mitigation measures to minimise negative environmental impacts.

5.12. With embedded mitigations in place, the only 'Major Negative' impact is based on the operational carbon use of the scheme. This does not take in to account carbon offsetting, which will be designed to ensure the scheme complies with the ACWG carbon strategy, set out in Section 5.27.

Table 5.1: Outputs of the SEA with the currently designed mitigations (embedded)

Effect description	Unmitigated assessment	Mitigated assessment	Relevant SRO	Stage impacted
Biodiversity effects during construction as the scheme crosses two Sites of Special Scientific Interest (SSSIs) and is close to other designated areas.	Major Negative	Minor Negative	STT 115 Combined 215	Construction
Effects on WFD biodiversity objectives during operation, due to effects of discharge reduction from Minworth WwTW on the downstream Rivers Tame and Trent. A 'Major Negative' flow effect with risk to WFD deterioration in five river waterbodies.	Major Negative	Moderate Negative	STT 115 Combined 215 GUC 100	Operation
Effects on flows in the Rivers Tame and Trent.	Major Negative	Moderate Negative	Combined 215 GUC 100	Operation
Effects on WFD objectives during operation, due to effects of discharge reduction from Minworth WwTW on the downstream Rivers Tame and Trent	Major Negative	Moderate Negative	Combined 215 GUC 100	Operation
Effects on climatic factors due to the expected level of operational carbon resulting from the proposed scheme.	Major Negative	Major Negative	Combined 215 GUC 100	Operation
Impacts on local air quality due to increased HGV movements and other activities associated with construction. Part of the scheme would be within an Air Quality Management Area.	Moderate Negative	Moderate Negative	STT 115 Combined 215 GUC 100	Construction
Effects on heritage assets during construction due to the proximity of scheduled monuments, listed buildings and registered parks and gardens.	Moderate Negative	Minor Negative	STT 115 Combined 215	Construction
Potential effects on the health and wellbeing of the local community during construction of the proposed development.	Moderate Negative	Minor Negative	STT 115 Combined 215	Construction
Contributing to a resilient water supply. The additional water resource from this scheme will provide essential water supply infrastructure to help support a sustainable socio-economy.	Major Positive	Major Positive	STT 115 Combined 215 GUC 100	Operation
This scheme provides additional water resource and will during operation assist the reliable transfer of water, therefore reducing the vulnerability to drought risks associated with climate change and improving resilience to the likely effects of climate change.	Major Positive	Major Positive	STT 115 Combined 215 GUC 100	Operation
Potential economic opportunities during construction.	Moderate Positive	Moderate Positive	STT 115 Combined 215 GUC 100	Operation

5.13. In line with the requirements set out by RAPID, this SEA for gate-1 does not take into account the combined effects with other SROs, plans being developed as part of water companies' WRMPs, or third-party plans. The SEA will be revisited at gate-2 and updated to include combined effects.

Habitats Regulation Assessment

5.14. The HRA screening has indicated that the Minworth combined (215 Ml/d) element has a risk of causing a 'Likely Significant Effect'. Therefore, further assessment was required in the form of a Stage 2 Appropriate Assessment to identify if the element can meet the requirements of the integrity test.

5.15. The Stage 2 Appropriate Assessment concluded that there is no longer a risk of these adverse effects on the site integrity of the Humber Estuary Special Areas of Consideration and Ramsar site.

5.16. Detailed monitoring will be undertaken in gate-2 to further understand the hydrological, water quality and geomorphological dynamics along the River Tame and River Trent. This will investigate if the expected reductions in flow could impact on qualifying habitats and species and to what extent.

Environmental investigations and INNS assessment

5.17. During dry conditions, Minworth WwTW contributes circa 65% of the total flow within the River Tame. This flows into the River Trent and then into the Humber Estuary. The Minworth SRO is investigating how reducing the treated wastewater from Minworth WwTW into this system would impact the hydrology, environment and ecology downstream of the discharge point. These investigations have largely been carried out in collaboration with the SLR SRO, as both SROs are considering the impacts on the same river system.

5.18. A hydrological, environmental and ecological literature review and gap analysis has been completed on the River Tame, River Trent and Humber Estuary. This investigated what information is currently available for this river system. It also identified gaps in knowledge where improved information is needed to assess the impact of Minworth SRO. The study did not identify any showstoppers to prevent the scheme progressing. We have started to address the gaps in knowledge that this work identifies through a combination of monitoring, modelling and further desk studies, which will continue through gate-2. These work packages are detailed in Chapter 15.

5.19. A high level INNS screening has been carried out as part of the literature review, which meets the National Appraisal Unit's (NAU's) request of January 2021. Data was requested from the EA, the Local Environmental Records Centre and other relevant groups. This data was used to map the prevalence of INNS on the River Tame and Trent. Minworth SRO will reduce the discharge to the River Tame, so there is no increased risk to this receptor from this SRO. The risk to the receiving waterbodies is assessed within the respective SRO gate-1 submissions.

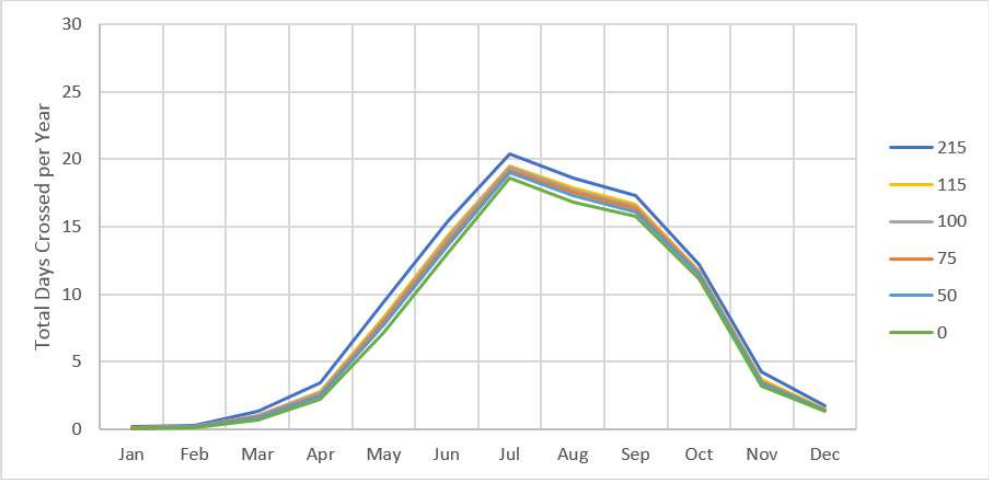
Flow assessments in the River Tame and River Trent

5.20. Given Minworth WwTW contributes to flow in the River Tame, it is important to assess how reducing this discharge affects this river. In 2020, Severn Trent Water (STW) updated its flow models of the River Tame and River Trent as part of WRMP24 planning. Minworth SRO has taken the outputs of this modelling and applied the reduced discharge rates to provide an initial high-level review of the predicted flow impacts on this river system. The models show that the effect of the reduced discharge is greater in the River Tame than in the River Trent, with the impact reducing as other sources of water (tributaries, discharges) join the river.

5.21. A key point on the River Trent is at North Muskham, downstream of Newark-on-Trent where a Hands-off Flow (HoF) is in place. The updated model showed that even a reduction in discharge of 215 Ml/d would result in only a minor increase in frequency of the HoF being crossed. As expected, the lower discharge reduction volumes have an even smaller impact, as shown in Figure 5.1.

5.22. The change in flow within the River Tame and River Trent has the potential to impact the ecology and environment. Investigations in gate-2 will further develop the understanding of flow impacts on important sections of the river. We will assess how intermittent or sustained variations in the discharge from Minworth WwTW could affect them.

Figure 5.1: North Muskham – monthly average number of days that the HoF would have been crossed for each Minworth discharge reduction scenario (scenario values are reductions in flow in Ml/d)



Environmental, Social and Economic net gain

5.23. The site footprint of the Minworth SRO is small, located mainly on the WwTW, with a pipeline connection to the River Avon. The scope for environmental, social and economic net gains will largely be realised through combined effects with the SRO(s) that Minworth supplies, due to the relatively limited scope for improvements at Minworth WwTW.

5.24. The methodology used to assess the natural capital baseline and benefits incorporates the five key ecosystem services defined by the EA in their WRMP guidelines: Biodiversity and Habitat, Climate Regulation, Natural Hazard Regulation, Water Purification and Water Regulation. Benefits identified include reducing the flood risk where construction intersects with current areas of known flood risk, and increased employment through construction and the operational phases of the project. It is anticipated that additional opportunities for benefits will be identified as the design progresses.

5.25. Assessments have been carried out for each of the Minworth options to identify the Net Biodiversity Unit Loss. The potential habitat loss has been used to calculate the offsetting requirements to achieve an approximate 10% net gain for habitats and hedgerows for each grouping has been calculated as c.35ha new habitat and 0.26-0.52km of hedgerow.

5.26. Potential areas of environmental, social and economic risk have been highlighted within the SEA in Section 5.10. These will be removed or mitigated through the design process. Opportunities for the offsetting of environmental deterioration, where unavoidable, will be considered if necessary.

Carbon Assessment

5.27. The carbon ambition has been set by an SRO-led task-and-finish group, consisting of the water companies with SROs, Water UK, RAPID and Ofwat. The Minworth SRO will be aligned with this stretching target. The ambition covers Scope 1,2 & 3 carbon:

- Scope 1 & 2 align with the Water UK ambition to 2030.
- Scope 3 aligns with the UK's 2050 ambition, but recognises there is more to do on standardisation.

5.28. Calculation of the embodied carbon has been carried out for the Minworth SRO. The calculation takes into account the carbon embedded in construction, as well as operational carbon for the next 80 years. The assessment provides a starting point and we will reduce carbon through design and mitigate through future gates as necessary.

Resilience

5.29. Minworth offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

5.30. A key advantage of the Minworth SRO is the resilience of the source of supply. Minworth WwTW treats wastewater from Birmingham and the surrounding area. There is a high level of resilience associated with Birmingham's supply and, consequently, the wastewater produced within the network. This is described in more detail in Section 2.36.

Water Quality Considerations

5.31. As this SRO will redirect Minworth-treated wastewater, there are a number of potential water quality considerations to be taken into account. From a drinking water perspective, the site has been included in the ACWG Treated Water Methodology assessment as a source for both STT and GUC SROs.

5.32. Minworth-treated wastewater is included in both the STT and GUC water quality monitoring programmes, due to the different timing and parameter lists of their respective monitoring. The difference between the receiving waterbody and the water quality at Minworth WwTW will dictate treatment requirements. Sampling in gate-1 has shown that the transfer for STT SRO will require greater levels of treatment than the GUC SRO, due to the quality of water in the receiving waterbody.

5.33. The forward-looking water quality monitoring plans for Minworth discharge, the River Tame, the STT SRO and the GUC SRO, were developed collaboratively with the EA and the DWI and guided by the outputs from the ACWG Treated Water Methodology assessments. The monitoring will be used to inform the drinking water treatment needs for the receiving SROs, as well as any environmental mitigations that may be required.

5.34. We have held quarterly feedback sessions with regulators to provide updates on the progress of the monitoring. These will continue through gate-2, and will be an opportunity to add or remove any parameters or locations, as necessary.

5.35. A further drinking water assessment has been carried out on Bristol Water's Purton Water Treatment Works (WTW). This is the only WTW downstream of the proposed discharge point in the River Avon, representing a slight change in source water for the treatment works. This found that there is no increase in the likelihood of risk for existing parameters of concern at Purton WTW and no new parameters of concern introduced by the transfer.

WFD

5.36. We have carried out a WFD assessment out in line with the ACWG Environmental & Raw Water Quality Methodology, completing the two-level screening (Level 1 basic screening, Level 2 detailed screening) set out by the ACWG methodology.

5.37. The Level 2 WFD assessment found that the STT 115 Ml/d option is compliant with WFD objectives. However, the investigations did show that the combined 215 Ml/d option leads to five waterbodies becoming at risk of being non-compliant due to the following issues: Fish, Macroinvertebrates, Dissolved oxygen and Ammonia.

5.38. We will investigate the reduction in discharge into the River Tame and River Trent during gate-2 to ensure there is no risk of lowering the WFD status of the waterbody. The outputs from modelling described in Section 5.20 provided a high-level view of how flows in the River Tame and River Trent would be impacted by reductions in input. We will build on this through gate-2 through further modelling and incorporation of field and desk-based environmental investigations.

6. Initial Outline of Procurement and Operation Strategy

Procurement

6.1. Guidance provided by RAPID is that all schemes are assumed to meet the PR19 criteria for Direct Procurement for Customers (DPC). If they do not, this has to be explained.[1]

6.2. DPC is a set of changes to a water company's conditions of appointment (Licence) to support the competitive procurement of infrastructure from a third party (the Competitively Appointed Provider or CAP). The CAP is awarded a contract to design, build, finance, operate and maintain (DBFOM) the asset for a set period of time, before the residual asset (if any) is taken in-house by the water company.

Assessment for DPC

6.3. In assessing the Minworth scheme for DPC, we have identified three potential options where Minworth would be built to supply alternative transfer schemes: the STT SRO at 115 Ml/d, or the GUC SRO at 50 Ml/d or 100 Ml/d. The decision on which transfer scheme Minworth supplies, and when, is subject to the results of the Water Resources South East (WRSE) review. Minworth may eventually serve both the STT and GUC SROs, but it is highly unlikely it will be built to serve both at the same time.

6.4. Ofwat provides a methodology for assessing schemes for DPC in its guidance on what constitutes an eligible DPC project.[2] The assessment is in three stages:

- Test 1: Size – is the scheme above the £100m whole-life TOTEX threshold?
- Test 2: Discreteness – can the scheme be considered 'discrete'?
- Test 3: Value for money – does the scheme delivered under DPC represent value for money against the 'in-house' delivery counterfactual?

6.5. For the size test, TOTEX estimates will be developed at a later stage, once the scheme utilisation can be determined following a new WRSE case of need. However, initial CAPEX estimates can provide some guidance as to the likely outcome.

6.6. The CAPEX estimate for the option where Minworth supplies the STT is £250m. This reflects the additional treatment processes required to supply the STT, and the requirement for a pipeline to connect Minworth to the STT SRO. This indicates that the option where Minworth supplies STT will pass the size test under the option currently under consideration.

6.7. CAPEX estimates for the two options where Minworth supplies the GUC SRO range from £10m to £14m. This indicates that the option where Minworth supplies GUC will not pass the size test under any options currently under consideration.

6.8. For the discreteness test, we considered six criteria in order to determine the potential impact of a third party (the CAP) on existing assets and operations. The criteria are: the physical asset location; the number of interfaces; the overlap in processes; the impact on service delivery; the flexibility of the asset; and the control required over the asset. Based on the information currently available, the Minworth SRO (both for the STT and GUC) may or may not pass the discreteness test.

6.9. There are concerns around overlapping operations with the existing assets and the need for high levels of coordination and monitoring. This is balanced by the new assets being relatively self-contained and situated at the end of the process, with a single connection to the existing assets. Further work needs to be undertaken to understand the technical solution to validate the discreteness test.

6.10. As agreed with RAPID, we have not undertaken the value for money test at gate-1.

6.11. Figure 6.1 below summarises the results of the initial assessment for Minworth (STT) and Minworth (GUC).

[1] https://www.ofwat.gov.uk/publication/rapid-standard-gate-one-submission-template/

[2] https://www.ofwat.gov.uk/publication/delivering-water-2020-final-methodology-2019-price-review-appendix-9-direct-procurement-customers/

Figure 6.1: DPC eligibility assessment

Scheme	Test 1: Size	Test 2: Discreteness	Test 3: Value for Money	Result: Suitability for DPC
Minworth (STT)	Passes based on current information	Requires further scheme development	Not undertaken in gate-1	Requires further scheme development, additional analysis and Value for Money test
Minworth (GUC)	Does not pass based on current information	Requires further scheme development	Not undertaken in gate-1	Not suitable for DPC based on size

6.12. In summary, we have welcomed the opportunity to consider a DPC procurement route. Minworth passes Test 1 for STT but fails for GUC. It is marginal for Test 2 for all options. We will continue to explore our procurement options prior to gate-2 and, if necessary, undertake DPC Test 3 (value for money).

Tender point

6.13. Ofwat has identified four potential points in the scheme's lifecycle where it may be appropriate to put a DPC project out to tender: 'very early'; 'early'; 'late'; or 'split' with separate CAPs appointed at the 'early' and 'late' stage[3].

6.14. Based on precedents from other infrastructure procurements, we consider that an 'early' or 'late' tender may be the most applicable models. An early tender may provide for greater innovation but comes with potentially longer lead times. A late tender may better fit with the current RAPID gate process. Further consideration as to the appropriate tender point will be given at future gates.

Alternatives to DPC

6.15. Should, ultimately, Minworth not be considered suitable for DPC, we have considered a range of alternative procurement options:

- Non-DPC DBFOM: the scheme could be procured through a third party under a DBFOM contract but outside of the DPC framework. This would remove the DPC approval process and potentially simplify the procurement, but it would add a number of risks. In particular, it could lead to a potential mismatch in appointing the water company's revenues, both for the life of the contract and on termination or expiry.
- New licensed entity: an alternative to a DBFOM contract (either DPC or non-DPC) could be the creation of a new licensed entity to finance, construct and operate the asset. This may help reduce the risk to the appointing water company by having the New Licence Co.'s revenues (subject to its own price control) as a pass through and the licence remaining in place for the life of the asset.
- In-house delivery: the scheme could also be procured by a water company using existing procurement processes and funding arrangements. Based on a TOTEX allowance, the water company could appoint a contractor and fund milestone payments by raising additional debt on its balance sheet.

6.16. In Chapter 3, we set out an indicative programme for procuring the scheme in-house. We will continue to review this, and the appropriate procurement route and programme impact will be confirmed at gate-2 once further information on the solution is available.

6.17. Regardless of the selected options, the project will be construction ready in AMP8, as per the Final Determination requirement. The earliest DO for Minworth STT will be 2031 and for Minworth GUC will be 2028, which is in advance of those transfer options.

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

Operations

6.18. As a raw water source to support the STT and GUC SROs, utilisation of Minworth SRO will be dictated by the receiving SRO's stated requirements. For details of the expected utilisation, please refer to Chapter 6 of the respective gate-1 submissions.

6.19. We have not yet determined the exact mode of operation for Minworth SRO with either of the two transfer SROs. We will continue to refine the operational strategy with the STT SRO and GUC SRO project teams to ensure that deployment of the source can be achieved in the required timescales to meet the SRO System control requirements.

6.20. We will consider the following modes of operation:

- Normal Operation: assets operating in automatic control, delivering raw water to meet the receiving water company's supply requirements.
- Hot Standby: assets operating such that they can rapidly ramp up production to meet an emergency deployment need.
- Cold Standby: assets operating such that they can be returned to normal operation within a few days. This may involve a minimum sweetening flow being produced to maintain a state of readiness.
- Maintenance: assets are not operating to allow scheduled maintenance activity to be undertaken.
- Non-operational: assets out of service requiring recommissioning to return to normal operation in a few weeks.

6.21. For gate-2, GUC SRO will review the operation of Affinity Water's (AfW's) existing network to determine the required ramp-up times and capability of the newly constructed SRO assets, if the decision is made to provide a new resilience capability.

6.22. For the purposes of this submission, we have assumed we will operate a 10% sweetening flow to maintain the assets in a state of readiness. This will be reviewed for gate-2 when we have finalised STT SRO and GUC SRO requirements and undertaken a best value analysis if 'Non-operational' mode is acceptable.

Supporting evidence:	References/hyperlinks only
1. https://www.ofwat.gov.uk/publication/rapid-standard-gate-one-submission-template/	2. https://www.ofwat.gov.uk/publication/delivering-water-2020-final-methodology-2019-price-review-appendix-9-direct-procurement-customers/
3. Ofwat, Delivering Water 2020: Our methodology for the 2019 price review, Appendix 9: Direct procurement for customers (December 2017)	

7. Planning Considerations

Minworth SRO

7.1. We have looked at the possible consenting routes for options to serve the STT, GUC or both projects. Submitting planning applications and using permitted development rights under the TCPA is the typical consenting route for new water infrastructure. However, the national significance of the STT and the GUC projects means that consenting options for Nationally Significant Infrastructure Projects (NSIP) need to be considered.

7.2. The options for Minworth do not automatically meet the NSIP criteria, but the national significance of the STT and GUC offers potential to use this consenting regime. The potential consenting routes for each of the three options are detailed below, with preferences stated.

Minworth STT

7.3. Our preferred route is to seek acceptance of the project as a NSIP via Section 35 of the Planning Act 2008. The complexity of delivering a circa 37km pipeline in this location (crossing HS2, motorways and development land) means this consenting route would provide certainty of

timeframe, with the benefit of other consents if required. This and the alternative options are listed below.

- Preferred option: a DCO under Section 35 of the Planning Act 2008 after seeking designation of the project as a NSIP by Defra.
- Alternative option 1: planning permissions under TCPA (potentially utilising permitted development as well), coupled with a Compulsory Purchase Order under the Water Industry Act 1991 if required.
- Alternative option 2: associated development to the STT DCO.

Minworth GUC

7.4. Our preferred route is to seek planning permission under the TCPA. This is due to the scale of the Minworth site, the extent of Severn Trent Water (STW) ownership, and extensive positive planning history. We would expect permission to be granted within six months of submission of a planning application, with minimal risk of refusal and/or being 'called in' by the Secretary of State.

7.5. An alternative option is to include this as associated development to the GUC DCO.

Minworth Both (Combination of Minworth STT and Minworth GUC)

7.6. Our preferred route in this case would be to follow the preference above for Minworth STT. It is possible that both projects may be sanctioned but do not come forward at the same time. If this materialises, it is likely that the individual approaches for the two projects discussed above will be followed, although we would look to use one single consenting process where possible, depending on timescales for delivery.

Gate-1 Summary of Minworth SRO Consenting Options

7.7. Our preferred options for the three scenarios are listed above. Following the TCPA route is preferred for Minworth GUC, but the other two options present far more complexity. Therefore, it is expected that we would need to utilise the NSIP process to ensure timely delivery of these options.

7.8. The final decision on the consenting route(s) will take account of numerous considerations including evaluation of the specific consenting risks of delivering the project, the comparative timescales, when individual project elements are needed, stakeholder relationships, and landowner considerations regarding access to land.

8. Stakeholder Engagement

8.1. This chapter summarises the results of the customer and stakeholder engagement conducted in the approach to gate-1.

8.2. The Minworth SRO draws mixed views from customers. In general, the more informed customers become regarding recycled water as a source, the more they recognise the benefits. Views in more recent engagement appear more positive compared to those we have seen historically. Severn Trent Water (STW) customers were particularly supportive of 'sharing' this resource, but recipient customers have concerns over impacts (specifically water quality). There is therefore a strong requirement to provide appropriate information and assurances that these issues will be addressed.

8.3. Customers are also clear that any plans for moving resources across regions should be communicated clearly and in the context of wider water resources planning. Customers want to see a mix of options to meet the deficits; including demand options, which they see as the most pragmatic solution.

8.4. From a stakeholder perspective, most of the engagement has naturally focused on the transfer routes rather than the Minworth source in isolation. Key specifically for Minworth will be the continued water quality sampling and analysis, which we have worked closely with the DWI to progress.

8.5. Engagement with other stakeholders is ongoing and, although no current 'show-stoppers' have been identified, continued detailed engagement will be crucial as the scheme develops and we understand construction, storage, and treatment.

Listening to Customers

8.6. We participated in a research programme coordinated by Water Resources South East (WRSE), in collaboration with other SROs and involving ten water companies, to examine customers' understanding of water resources and the need for regional solutions. This approach ensured cost efficiency and comparability of feedback across regions and solutions. We sought feedback on the scope and the approach from representatives from the participating water companies' Customer Challenge Groups (CCGs), the Consumer Council for Water (CCW) and RAPID. The programme comprised three parts:

Part A: Evidence Review	Part B: Deliberative Research	Part C: Customer Survey
• Insights compiled from PR19, WRMP19 and recent customer research. • 120 documents submitted by the ten companies. • Consolidated view of the customer evidence structured around: (i) resilience outcomes; (ii) demand measures; (iii) supply side solutions; and (iv) the wider policy context.	• Conducted with household customers from all ten participating companies. • Implemented online between August 2020 and January 2021 with approximately 80 customers. • Range of discussion topics and exercises to understand views on: (i) water resources and the risk of emergency drought restrictions; (ii) resilience planning; (iii) supply and demand options; and (iv) sharing resources and strategic options.	• Representative online survey of customers in the WRSE region carried out in Autumn 2020 to measure preferences for: (i) demand and supply options; and (ii) alternative regional plan profiles. • Approximately 2,300 household customers and 350 non-household customers. • Results are a direct input to the WRSE regional plan investment model.

Customers' feedback – headline messages

8.7. The research provided evidence of customers' understanding of the need for regional water resource solutions and the level of support, in principle, for sharing water resources and the Minworth source:

- Proposals to share water between regions are seen in a positive light by customers. It was highlighted by customers that they need to view SROs in the context of other options and schemes, and with a general understanding of the regional planning context.
- Participants in the STW group were supportive of the proposed transfers to the South East as they felt they could help others with little detriment to their own supply. However, some customers reacted strongly to the possibility of changes in taste and water hardness because of a switch to alternative sources. Engagement on these concerns will be key to gaining customer support.
- Recycling schemes draw mixed views from customers. In general, the more informed customers become, the more they recognise the benefits of water recycling. But even with a positive framing around recycling water, customers have concerns over impacts. There is a strong requirement to provide appropriate information and assurances that these issues will be addressed.

Stakeholder Engagement at a Regional Level

8.8. Minworth SRO is a key component of the WRSE, Water Resources West (WRW) and Water Resources East (WRE) regional plans. For gate-1, we have focused our stakeholder

engagement on these regional groups, to ensure stakeholders are fully informed of the wider context of the schemes, and to minimise stakeholder fatigue.

8.9. WRW is building an ambitious, long-term, multi-sector adaptive water resources plan that will be shaped by consultations with stakeholders and customers. It has developed an innovative online portal to facilitate ongoing consultations and gather quantitative and qualitative data. In 2020/21, this portal has been utilised to engage on the building blocks of the plan. Further consultation is planned throughout 2021/22.

8.10. WRSE has an ongoing engagement and consultation programme to support the development of the South East regional plan and the South East water companies' WRMP24s. In 2020, the focus of the programme was on the building blocks of the plan (including planning policies and technical methods) and in 2021 broadened to focus on feasible solutions, the approach and tools to determine the best value plan. Public consultation on the draft is planned for early 2022.

8.11. WRE's approach for developing the regional plan involves co-creating the plan with members through a series of board meetings and 'planning conferences' where members will discuss and select their preferred portfolio of options through visual trade-offs through a simulator, and compromise on the most cost effective and optimum set of options for the 2050s..

Minworth-specific engagement

8.12. In general, the Minworth source is positively supported by stakeholders as a scheme to support both the STT and GUC transfers. We have met regularly with key stakeholders such as the Environment Agency (EA), Natural England, the Drinking Water Inspectorate (DWI) and the canal & River Trust (the Trust) to share development and enable input into studies. We have also had some early discussions with Historic England and the Cotswold Canal Trust.

8.13. The key areas of concern are from the DWI in terms of emergent contaminants and the EA in terms of the interaction the transfer routes have with other rivers. Details of engagement regarding the possible transfer routes can be found in the gate-1 submissions for the STT and GUC SROs.

8.14. As the scheme develops further towards gate-2, we will engage with our stakeholders to ensure a robust assessment of risks and issues, and to maintain a continuous dialogue. Importantly, we need to work closely with the relevant local authorities regarding planning of construction, storage and treatment on site.

8.15. Next steps for engagement as we progress towards gate-2 are detailed in Chapter 15.

9. Key Risks and Mitigation Measures

9.1. The risk scoring is completed based on the definitions given in Table 9.1. The mitigation status column in the risk register has adopted the RAPID report definitions shown in Table 9.2.

9.2. We actively maintain a project risk register for the Minworth SRO, which records risks and tracks mitigation actions. Key risks, defined as those with a high residual risk or those where mitigation plans are off-track, are reviewed by the Minworth SRO project board on a monthly basis. We have identified seven key risks in Table 9.2, all of which have previously been included in RAPID quarterly reports.

9.3. Construction phase risks were also considered, using industry standard Monte-Carlo approaches. These include uncertainties in the levels of treatment required, quantities of treated wastewater requiring additional treatment and potential additional costs related to pipeline routes (e.g. motorway, railway and HS2 crossing points). Only the HS2 risk has been included in the main project risk register at this stage.

9.4. We do not believe any of the risks identified in Table 9.2 are showstoppers, and will continue to actively monitor them as we proceed with the project beyond gate-1. We will continue to develop our mitigation plans to ensure that risks are effectively managed.

Table 9.1: Risk score matrix

Probability of risk occurring

Impact of risk occurring	1	2	3	4	5
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5

Table 9.2: Key risks

RAPID Report Reference	Short Description	Detailed Description	Risk Score	Mitigation Strategy	Category	Mitigation Status	Residual Risk
RSK015 & RSK018	Capacity to Divert treated wastewater from Minworth away from the River Tame and Trent	Downstream impacts on the River Tame or Trent caused by diverting treated wastewater may be unacceptable due to environmental, navigational or regulatory restrictions.	16	Plan for further environmental investigation and modelling in stage-2 to understand these constraints more fully. Continue to work closely with regulators and stakeholders.	Environment	Stable	12
RSK003	Regional Plan Reconciliation	Risk that the regional plans will not align, and that a difference will exist in the selection of the SROs across the regional plans. This is a gate-2 risk, but one we believe is essential to start thinking about now.	16	Active engagement with regional groups. Scenario planning work is currently being undertaken in case this risk is realised.	Planning	Stable	12
RSK016	Potential for HS2 to landlock Minworth	Construction of HS2 and the Curzon Street Station spur could limit potential routes into Minworth resulting in additional costs and time for pipeline construction,	16	We are working with the STW HS2 liaison team to understand the timelines and options for mitigation. This will continue into gate-2.	Engineering	Stable	12
RSK005	Cost benefit analysis and social net gain valuations	Risk that current cost benefit analysis methodology does not adequately account for emerging views on social net gain valuation.	9	Continue to engage with ACWG to ensure that consistent approach is taken to this.	Environment	Stable	6
RSK009	Carbon Neutrality approach	Lack of clarity around carbon neutrality requirements could lead to inconsistent costing across SROs and deliverables that do not meet RAPID's expectations.	12	This is being managed by a task-and-finish group, to provide a consistent approach.	Environment	Stable	6
RSK012	Dependency on STT System modelling and appraisal	Dependency on the outcome of STT analysis: There is a need to model the system at the upstream end of the interconnector to calculate the yield for various source configurations with associated cost, resilience and environmental characteristics.	9	STT is planning to develop a system model over the coming months. This risk should be mitigated once the model is available to remove uncertainty.	Other	Stable	6

RAPID Report Reference	Short Description	Detailed Description	Risk Score	Mitigation Strategy	Category	Mitigation Status	Residual Risk
RSK008	COVID-19 Impact	The potential for impact upon water company staff, contractor availability and the provision of resources. In the event of future waves, this may become an impact upon delivery to the programme timeline.	12	Mitigation involves early identification of resources required and trying to ringfence supplier resources where possible. Working systems put in place to allow working from home to continue. Continue to monitor risk.	Planning	Stable	6

10. Option Cost/Benefits Comparison

Summary of Solution Costs

10.1. CAPEX and OPEX cost for the treatment and conveyance elements of Minworth SRO were produced in accordance with the ACWG Cost Consistency Methodology Revision C. This included the assessment of project risk and optimism bias in line with the HM Treasury Green Book.

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

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

10.4. CAPEX and OPEX costs are combined to produce the NPVs based on an 80-year contract period.

10.5. CAPEX and OPEX cost estimates have been converted to a fixed annual charge and a variable charge based on actual support flow deployed. These charges, along with scoring of agreed resilience metrics detailed below, have been entered into the Water Resources South East (WRSE) cost modelling exercise to identify the best value plan for customers.

10.6. Table 10.1 summarises costs for the individual option configurations attributable to each of the two transfer SROs, and for the combined options. Financing costs have been calculated in accordance with the ACWG Cost Consistency Methodology purely for comparison purposes. 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-2 submission.

10.7. At this stage, the combined option cost is simply a summation of the two individual options. Further gate-2 assessments will allow this option and associated costs to be refined.

Table 10.1: Option NPVs and annual incremental costs (AICs)[1]

Option Name	Units	Minworth STT	Minworth GUC	Minworth GUC	Minworth Combined	Minworth Combined
Option benefit	Ml/d	115	50	100	165	215
Total planning period option benefit (NPV)	Ml	1,229,781	534,687	1,069,375	1,764,468	2,299,156
Total planning period indicative capital cost of option (CAPEX NPV)	£m	331.7	22.3	30.6	354.0	362.3

Option Name	Units	Minworth STT	Minworth GUC	Minworth GUC	Minworth Combined	Minworth Combined
Sweetening Flow						
Total planning period indicative operating cost of option (OPEX NPV)	£m	65.7	1.3	1.5	67.0	67.2
Total planning period indicative option cost (NPV)	£m	397.4	23.6	32.1	421.0	429.5
Average Incremental Cost (AIC)	p/m³	32.3	4.4	3.0	23.9	18.7
Maximum Flow						
Total planning period indicative operating cost of option (OPEX NPV)	£m	116.1	3.5	4.2	119.6	120.3
Total planning period indicative option cost (NPV)	£m	447.8	25.8	34.8	473.6	482.6
Average Incremental Cost (AIC)	p/m³	36.4	4.8	3.3	26.8	21.0
Carbon						
Embodied carbon	(tCO_2e)	22,629	136	436	22,765	23,065
Operational carbon - Maximum flow	(tCO_2e)	3,011	235	282	3,246	3,293
Operational carbon - Sweetening flow	(tCO_2e)	301	24	28	325	329

Options Considered

10.8. The Minworth source can be used either independently or in combination with other sources. There is otherwise a limited degree of optionality available. In the case of Minworth SRO, the STT SRO has determined that the source forms part of the best value plan to meet the level of abstraction needed to provide the level of additional resource offered to the WRSE regional plan. For further information, refer to Chapter 10 of the STT SRO gate-1 submission. Minworth SRO is the sole source of raw water available to support the GUC SRO abstraction. Options for the conveyance route to the canal network are detailed in Chapter 2 of the GUC SRO gate-1 submission.

10.9. There are options available in terms of treatment process and discharge locations for both transfer SROs. These have been selected to meet the environmental and engineering constraints in each case, to deliver what we believe to be the best value solution for customers in the South East.

10.10. The benefits offered by the Minworth source represent our best estimate of the maximum supply capacity available for supporting each SRO whilst meeting the need of each water company. The newly constructed assets at Minworth will include a control system allowing flow variations up to its maximum output, to allow each transfer SRO system to deliver the required benefit in a particular drought scenario.

10.11. If selected, the Minworth SRO source element could be delivered as a standalone scheme within a single AMP, and could be operational by 2031 if required. There is no benefit delivery until the receiving SROs are commissioned. We are planning on the basis that Minworth SRO will be timed accordingly, so that customers in the South East are not charged for assets which cannot be deployed.

10.12. Investigations regarding the application of DPC and DCO arrangements are ongoing and detailed in Chapters 6 and 7, including the possibility of these being applied at either element or system level. The outcome could ultimately drive the final delivery date of Minworth SRO. See Chapter 3 for details of our outline delivery plan.

Resilience Benefits Metrics submitted to WRSE

10.13. The WRSE regional modelling team produced an initial assessment of the resilience benefits of each SRO based on the generic type of solution. These were then adjusted after discussion with each SRO project team to reflect the specific details of each SRO. The final assessment of each metric for STT SRO is in Table 10.2 below. Note that Minworth SRO does not have individual metrics for GUC SRO.

Table 10.2: Resilience benefits metrics for Minworth STT SRO

Resilience Metric	STT SRO Interconnector	Score
R1 - Uncertainty of option supply/demand benefit	Pipeline	3
	Canal	3
R3 - Vulnerability to physical hazards	Pipeline	2
	Canal	1
R5 - Catchment/raw water quality risks (incl. climate change)	Pipeline	3
	Canal	2
R7 - Risk of failure due to exceptional shocks	Pipeline	3
	Canal	2
A3 - Operational complexity	Pipeline	2
	Canal	1
E1 - Scalability and modularity	Pipeline	1
	Canal	1
E3 - Reliance on external bodies	Pipeline	1
	Canal	1

Supporting evidence:	References/hyperlinks only
1.	NPVs & AICs are based on whole-life CAPEX & OPEX estimates used to derive the fixed annual and variable charges for water trading. These charges are derived from the STW Water Trading Model based on an 80-year contract period.

11. Impacts on Current Plan

Current Supply-Demand Balance Impacts

11.1. The impact of the STT SRO and GUC SRO Systems on the receiving water companies' current supply-demand balances are detailed in Chapter 11 of their gate-1 submissions. As a robust, reliable and resilient source of raw water, Minworth SRO will increase the deployable output of each of the receiving water companies as part of the two transfer SROs.

11.2. There are no impacts on the Severn Trent Water (STW) or Affinity Water (AfW) current supply-demand balance detailed in WRMP19. However, we have determined that the scheme could be delivered ahead of the schedule proposed in WRMP19 if required.

11.3. The scheme has no impacts on other solutions contained in either AfW's or STW's existing AMP7 delivery plans.

12. Board Statement and Assurance

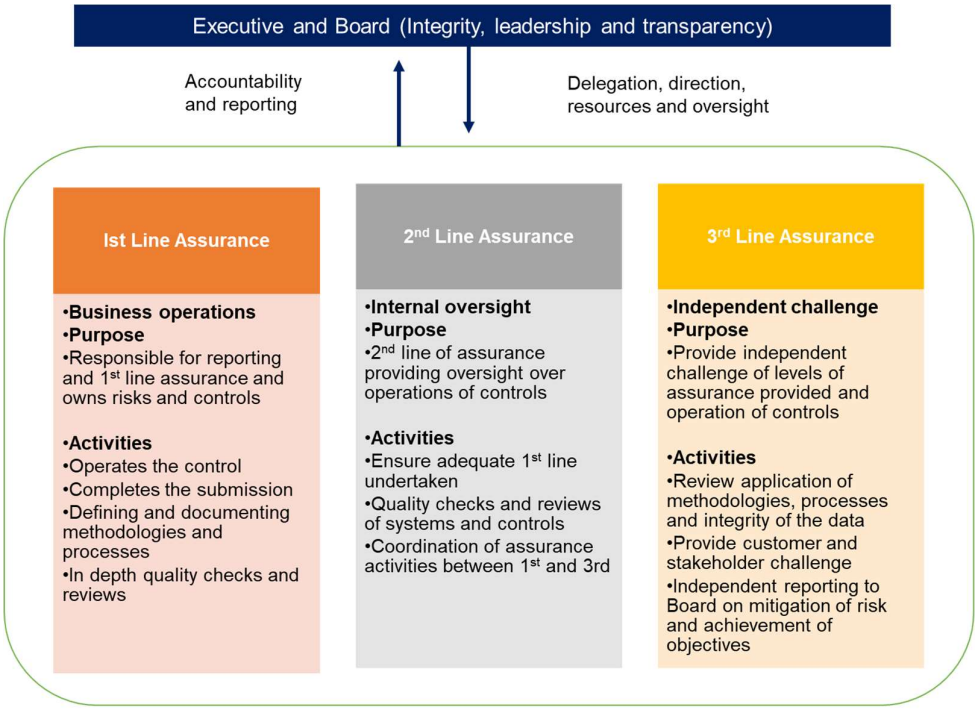
Assurance Approach

12.1. The Board Statements are provided in the covering letter to this gate-1 submission. The boards support our recommendation for progression of this SRO. The views of the respective boards are aligned, and they have signed one board statement to reflect this.

12.2. The assurance framework used for this submission has been developed jointly by Severn Trent Water (STW) and Affinity Water (AfW).

12.3. 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, STW: Appendix A1[4])[5], and is based on a shared understanding of the three lines of assurance model shown in Figure 12.1.

Figure 12.1: Our risk assessment and assurance approach



12.4. It is also consistent with the assurance requirements laid out in Ofwat's Company Monitoring Framework[6].

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

[5] AfW: https://www.affinitywater.co.uk/docs/corporate/plans/appendix-11-governance-and-assurance.pdf

[6] The latest iteration of Ofwat's Company Monitoring Framework can be found on their website through the following link: http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/

12.5. 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 only.

12.6. Following a competitive tender, we appointed an external assurer. The third-line assurance statement confirms it 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-1. The board statement is supported by the assurance statement, and there are no outstanding material issues to be resolved prior to gate-1. 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).

12.7. We constantly look to improve our assurance approach and will conduct a 'lessons learnt' exercise before we finalise our assurance approach for gate-2.

Supporting evidence:	References/hyperlinks only
4. STW: https://www.stwater.co.uk/content/dam/stw/regulatory-library/stw-risks-strengths-weaknesses-assurance-plan-20-21-final.pdf	5.AfW: https://www.affinitywater.co.uk/docs/corporate/plans/appendix-11-governance-and-assurance.pdf
6. The latest iteration of Ofwat's Company Monitoring Framework can be found on their website through the following link: http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/	

13. Solution or Partner Changes

13.1. There are no proposed changes to the scheme solution partner organisations.

13.2. There are no proposals for a solution substitution. As detailed in Section 2.2., we will continue to assess the viability of supporting both transfer SROs concurrently.

14. Efficient Spend of Gate Allowance

Evidence of Efficient Spend to Submission on Gate Activities

14.1. The Final Determination allowance for Minworth SRO was £9m (in 17/18 prices), with a 10% allocation to gate-1, equating to £900k. We anticipate that our gate-1 outturn will be £781k, based on actual costs incurred to 31 March 2021, combined with forecast expenditure to 05 July 2021. This equates to £741k in 17/18 prices, providing a saving of 18% compared to the Final Determination.

14.2. Care has been taken to ensure efficient and relevant spend on agreed activities to advance this project.

14.3. We can confirm that our gate-1 expenditure has been assured by our external assurance providers.

14.4. To achieve this saving, opportunities have been sought to:

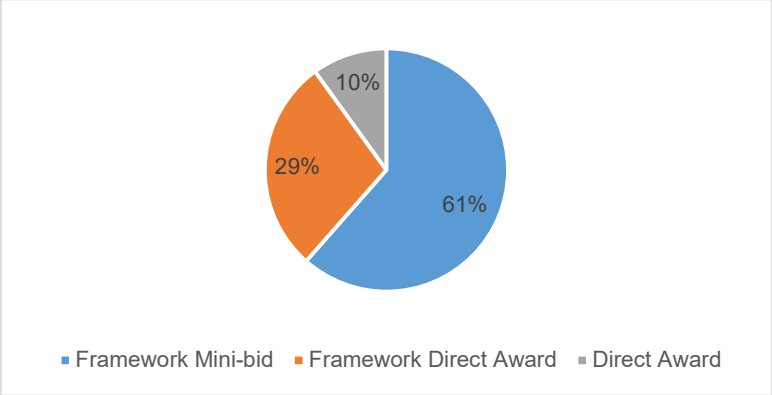
- Undertake work internally where appropriate. AfW and STW have small teams working fulltime across the two SROs for which we are partners, with support from other specialist internal and external staff as required. Internal recharging to the scheme has been proactively monitored and robustly challenged to ensure that the SRO has not paid business-as-usual costs. Examples of this include WRMP modelling, where we are utilising the existing STW model of the River Tame and River Trent. Note that this SRO is only funding additional work such as scenario runs on the River Tame and River Trent to model the downstream impact of diverting Minworth-treated wastewater.

- Utilise established supplier frameworks from both of the 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. Opportunities have been sought to competitively tender work within frameworks where time allows. In total, 90% of external spend (excluding company costs) has been through framework suppliers.
- Identifying opportunities for collaborative procurement with other SROs where appropriate. Examples of this include aspects of environmental monitoring work completed jointly with the GUC and SLR SROs (e.g. River Tame and River Trent Ecological GAP analysis, where we contributed 19% of the total cost for the study).

Table 14.1: Summary of forecast spend by workstream

Work-stream	Total Gate-1 Spend	20/21 Financial Year Spend		21/22 Financial Year Spend		% of total spend
		20/21 prices	17/18 prices	21/22 prices	17/18 prices	
Programme	£105,377	£72,089	£68,910	£33,288	£31,294	13%
Engineering	£127,969	£118,629	£113,397	£9,341	£8,781	16%
Environment	£387,201	£134,100	£128,186	£253,101	£237,940	47%
Planning	£26,266	£26,266	£25,108	£-	£-	3%
Legal	£23,693	£11,970	£11,442	£11,723	£11,020	3%
Assurance	£29,611	£10,717	£10,244	£18,894	£17,762	4%
Stakeholder	£29,135	£8,711	£8,327	£20,424	£19,200	4%
Procurement	£5,339	£1,185	£1,133	£4,154	£3,905	1%
Third Party Costs	£46,752	£4,000	£3,824	£42,752	£40,191	6%
Total	£781,343	£387,668	£370,571	£393,675	£370,094	

Figure 14.1: Summary of spend by procurement method (excluding internal costs and third-party costs)



Forecast Spend to Gate-2

14.5. Our Final Determination allowance to gate-2 is £1.35m, based on a 15% allocation of £9m total funding.

14.6. We have developed a gate-2 budget through engagement with workstream leads and external stakeholders including the Environment Agency (EA), National Appraisal Unit (NAU), Natural England and the Drinking Water Inspectorate (DWI). We have referenced the gate-2 requirements published in the Final Determination, and mapped activities and deliverables to

achieve those outcomes. A detailed programme for gate-2 can be viewed in Chapter 15. This is a forecast and is based upon a number of assumptions, dependencies and risks (as referenced in Chapter 9).

15. Proposed Gate-2 Activities

Proposed Gate-2 Activities

15.1. Our overarching objective for gate-2 is the efficient production of a gate-2 submission that meets the quality and timescale requirements set out by RAPID.

15.2. The outcome of our gate-2 activity will be a detailed conceptual design report, which will allow us to move forward to gate-3 if the scheme is selected to progress.

15.3. Working collaboratively with our SRO partners, we will undertake further data collection to support more detailed modelling and engineering feasibility work. These further investigations will allow us to identify the optimum option configuration to meet the need of the two transfer SROs, as confirmed by the Water Resources South East (WRSE) water resource modelling.

15.4. Our gate-2 activities will improve certainty of outcome and cost estimates, and develop a detailed programme for delivery.

15.5. The workstreams and key activities we plan to undertake to achieve our objective are detailed in Table 15.1 below.

Table 15.1 - Work Breakdown Structure for gate-2

Level 1 - Workstream	Level 2 - Key activities	Level 3
Governance	Programme management	
	Procurement for gate-2	
	Assurance	
	Board approvals	
Environment	Water Quality Monitoring Ph2 with Atkins - GUC	
	Water Quality Monitoring Tame & Trent (incl proc lead time)	
	Ecological investigations Ph2b (inc proc lead time) - GUC	
	Ecological monitoring - Tame & Trent,	
	Flow reduction investigations Tame & Trent Ph2 (modelling)	
	Non-water resources benefits package (including flood risk & natural capital) Ph2 - GUC	
	Non-water resources benefits package (including flood risk & natural capital) Ph2- Minworth	
	Environmental assessment - STT	
	Environmental monitoring - STT	
	Water resources analysis - STT	
	Treated water methodology gate-2 update	
	Environment & raw water quality methodology – gate-2 update	
	Completion of all studies to support gate-2	
	Narrowing the corridor further investigations (if required)	
	Investigations required to support stakeholder consultation	

Level 1 - Workstream	Level 2 - Key activities	Level 3
Engineering	Procurement for engineering reports	
	Capital works	Ground investigations
		Site surveys
		SEA
		Report
	Pipeline route	Pipeline route optimisation
		Site walkover
		Tunnel alignment
		Flood risk assessment
		Archaeological assessment
		Land assessment
		Cost - updated estimate
	Wastewater treatment plant	Power assessment
		Proposed operations review
		Update tertiary treatment requirements
		Costing update
	Climate change mitigation proposals	
	Analysis/review of reports	
	Utilisation Planning	
	Narrowing the corridor further investigations (if required)	
	Investigations required to support stakeholder consultation	
Stakeholder	Customer research (Incl. Tier 2)	
	Engagement re regulatory. plans, selection and prioritisation of solutions	
	Engagement with EA & DWI, plus NE	
	Engagement with CCW/CCGs re customer engagement	
	Further engagement with the Trust and Historic England	
	Early engagement with local authorities re planning and other issues	
Planning & Consents	Route investigations including land referencing, land & planning constraints, stakeholder engagement	
	Defra Engagement - Test Sec 35 appetite	
	Design and feasibility input, pre application stakeholder engagement	
	Further advice planning / consenting route	
Procurement / DPC	Further advice DPC Procurement options	

Gate-2 Customer and Stakeholder Engagement

15.6. To date, stakeholder engagement has focused on Tier 1 stakeholders' key areas of concern. For gate-2, the focus will widen to include Tier 2 stakeholders, and include the following activities, as illustrated in Figure 15.1:

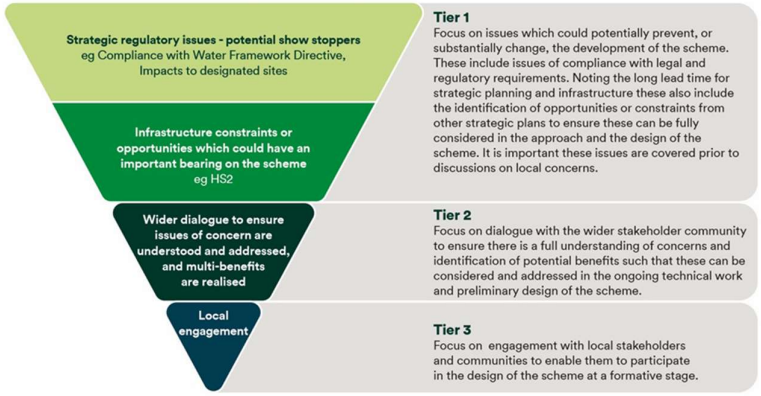
- Engagement with the wider stakeholder population regarding the development of the regional plans, the selection and prioritisation of solutions, and the reconciliation of plans across the region.
- Engagement with the EA and the DWI on the technical studies underway. More detailed engagement with NE as scheme specifics become more established.
- Engagement with CCW and CCGs to share the planned customer engagement work.
- As more details of the design of the schemes are developed, early engagement with local authorities will focus on concerns such as planning application.

Penalty Assessment Criteria, Incentives and Consideration of Solution Delay Impact

15.7. We do not propose any changes to the penalty assessment structure for gate-2.

15.8. Whilst there are a number of environmental and engineering aspects which require further development, at this stage AfW and STW do not anticipate any solution delay impacts and are confident that the gate-2 delivery date of October 2022 can be achieved.

Figure 15.1: Tiered approach to engagement



16. Conclusions and Recommendations

Conclusions

16.1. For STT SRO, scheme costs have increased as a result of more detailed investigations into the scope of work required to deliver the benefits of the scheme. Some of these additional costs may be mitigated through further detailed investigations in gate-2.

16.2. For GUC SRO, scheme costs have reduced as a result of more detailed investigations into the scope of work required to deliver the benefits of the scheme.

16.3. Our studies in gate-1 have shown there is an interaction between the Minworth discharge and the environmental and hydrological elements of the Rivers Tame and Trent. This will form a key part of our gate-2 submission to enhance our understanding through extensive field studies.

16.4. The project will be construction ready in AMP8, as per the Final Determination requirement. The earliest DO for Minworth STT will be 2031 and for Minworth GUC will be 2028, which is in advance of those transfer options.

16.5. The new assets required at Minworth could be phased to meet either the individual need of each transfer SRO, or a combination of the two. The combined option represents an increase in the scope of this SRO since PR19.

16.6. Minworth offers a robust, reliable, and resilient source of raw water to support the STT and/or GUC transfer SROs.

16.7. Care has been taken to ensure efficient and relevant spend on agreed activities to advance this project. We have delivered our gate-1 submission efficiently at 18% below the Final Determination allowance.

16.8. We have welcomed the opportunity to consider a DPC procurement route. We have carried out Test 1 (size) and Test 2 (discreteness). Minworth passes Test 1 for STT but fails for GUC. It is marginal for Test 2 for all options. We will continue to explore our procurement options prior to gate-2 and, if necessary, undertake DPC Test 3 (value for money).

16.9. Further investigations are required to determine the maximum supply capacity which could be made available to either or both transfer SROs.

Recommendation

16.10. Through gate-1 we have not discovered any showstoppers and recommend this SRO proceed to gate-2.

16.11. AfW and STW boards support the recommendation for solution progression made in this submission.