Gate two query process

Strategic solution(s)	Minworth SRO
Query number	MIN007
Date sent to company	14/12/2022
Response due by	16/12/2022

Query

1. Out of the options for flow rates (57 Ml/d, 115 Ml/d, 172 Ml/d and 230 Ml/d) 230 Ml/d was selected to base the majority of this SRO assessment on. Can you point to information or provide clarification on the uncertainty and likelihood of the required flow from Minworth being 230Ml/d to GUC and STT. Especially as the 115 Ml/d for STT isn't required until 2060.
2. Can you supply or point to more information on the expected utilisation for GUC and STT? Especially the profile during drought conditions for supply to STT SRO. Currently table 4.2 supplies the period of support during the 1 in 500 year event in days, but doesn't suggest the what the utilisation rate is. Possibly this information was supplied in footnote 3, which is missing from the table.
3. Please provide more details on which activities will be planned in gate 3 either by yourself or which inputs are you expecting from GUC and STT in gate 3 with regards to refining utilisation figures. This should include how uncertainty will be reduced or what assumptions will need be made and what the effect of these assumptions will be.
4. The regional plan (table 12) has the following flow rates: For GUC – 50Ml/d in 2031 and 50Ml/d in 2040 and for STT – 58Ml/d 2050 and 57 Ml/d in 2055. The SRO has got for GUC 58 Ml/d in 2031, and a further 57 Ml/d in 2040 and for STT SRO at 115 Ml/d in 2060. According to the additional information received by Ofwat the timing of STT is 2060, but can you please explain the difference in flow for GUC?
5. Can you please point to where there is information and evidence of the wider resilience benefits of this SRO, or justification of why these are limited.

6. As Minworth treatment plant will be producing significant carbon, the justification of how Minworth has come to be part of best value plans is considered important. Please supply or point to information on the following:
   - How carbon has been considered in the best value planning approaches, metrics and decision making
   - More information on carbon reduction and SRO cost, for example has carbon reduction been able to drive down solution costs?
   - The level of uncertainty associated with the solution carbon assessments at this point in the process and how will this uncertainty be expected to reduce as solutions are refined through the gated process.

   If any of this information is being assessed in other SRO's (GUC/STT) please draw out the relevant information for these assessments.

Solution owner response

Q1 Out of the options for flow rates (57 Ml/d, 115 Ml/d, 172 Ml/d and 230 Ml/d) 230 Ml/d was selected to base the majority of this SRO assessment on. Can you point to information or provide clarification on the uncertainty and likelihood of the required flow from Minworth being 230Ml/d to GUC and STT. Especially as the 115 Ml/d for STT isn't required until 2060.

A1 Our Gate 2 plan is based on the phased requirement for 230 Ml/d from Minworth detailed in WRSE's published best value plan. Any uncertainty around the total flow of 230 Ml/d is attributable to the needs in WRSE's plan.

It should be noted that the original Minworth scheme outlined in PR19 was for a 100 Ml/d feed to GUC or 115 Ml/d feed to STT. The Minworth scheme is now investigating the potential to supply both GUC and Minworth with a 115Ml/d, thereby totalling a potential long term transfer of 230Ml/d. As detailed in section 4.3, the feed to GUC was increased from 100 Ml/d to 115 Ml/d as further water resource modelling during gate two identified a need to increase the level of raw water support provided to deliver the Deployable Output required by Affinity Water.

As detailed in section 3.8, the maximum total supply capacity is considered to be 230 Ml/d to avoid unacceptable environmental impacts on the River Tame and River Trent. Our environmental investigations have been and will continue to test this assumption through Gate 3 and investigate mitigations such as increased storage

Minworth SRO is based on a phased delivery of the assets required to deliver the support required by each transfer SRO. This will be further reviewed in Gate 3, working collaboratively with the transfer SRO project teams, to ensure we optimise the delivery of the new assets at Minworth. At present, the phased delivery is based on asset delivery to meet the following transfer SRO support need:

2031 58 Ml/d to GUC
2040 57 Ml/d to GUC
2060 115 Ml/d to STT

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

The uncertainty is caused by the fact that we have not concluded the water resource management process, there are several options under consideration. At this stage, we don't know which ones will be required or when, until regional planning is concluded.

Q2 Can you supply or point to more information on the expected utilisation for GUC and STT? Especially the profile during drought conditions for supply to STT SRO. Currently table 4.2 supplies the period of support during the 1 in 500 year event in days, but doesn't suggest what the utilisation rate is. Possibly this information was supplied in footnote 3, which is missing from the table.

A2 GUC SRO

For GUC utilisation detail beyond that detailed in Table 4.1, we would refer you to GUC response to GUC Query GUC004, which is included below for ease of reference:

- The utilisation rate of the scheme will vary depending on the severity of the demand or drought event. SRO utilisation is heavily focused on the summer period for Affinity Water. The annual average take is around 27% of DO for an SRO that does not have a minimum operational 'turnover' rate.
- Whereas a scheme like GUC has a constant 'turnover rate' to ensure treatment processes are operational when the scheme is required to be used

at 100% utilisation rate. This minimum turnover rate of c25% increases the annual average take to just over 40% and to over 50% for a 1 in 500 drought event.

- Affinity Water produced a short technical report to explain Deployable Output calculations and SRO utilisation. This was not originally part of our Gate 2 suite of annexes, but we have made it available alongside this query and will upload to our respective websites when we publish query responses. The report is titled GUC Annex A4.2 Evaluation of SRO Scheme Utilisation.

STT SRO

The missing footnote 3 text omitted from Table 4.2 of the Minworth gate 2 submission should state 'the realisation number represents one version of the stochastic sequence'.

For STT utilisation detail, we would refer you to STT response to STT Query STT006 which provides further clarification. The relevant table from the response is included below for ease of reference:

- The more detailed breakdown of utilisation for the individual sources at the time of the Gate 2 submission is provided below :

Source	Based on historical flow data (1920 – 2010)	Based on stochastically generated flow data (climate drivers from 1950 – 97)
Netheridge	6.20% with unsupported transfer and 22.30% with sweetening flow and support options	6.20% with unsupported transfer and 22.30% with sweetening flow and options
Lake Vyrnwy	6.20%	7.80%
Minworth (for larger support requests)	2%	2%

Source phasing is provided in Table 4.2 of the STT gate 2 submission.

Further utilisation detail is expected from the STT project team during Gate 3 as stated in section 4.9 of the STT Gate 2 submission. It is noted in the STT Gate 2 report that further information / update will be provided to the Regions to inform regional modelling in 2023. The updated model output may change the STT utilisation of the sources in the final regional plans. There are no obstacles or barriers to this information, but we need to reflect that the process will evolve in 2023/gate 3. In practical terms, this will simply allow us to refine our OPEX costs to match the STT utilisation profile

as Minworth WwTW utilisation is unconstrained within the scheme capacity. This will be reviewed at the mid-gate checkpoint.

Q3 Please provide more details on which activities will be planned in gate 3 either by yourself or which inputs are you expecting from GUC and STT in gate 3 with regards to refining utilisation figures. This should include how uncertainty will be reduced or what assumptions will need be made and what the effect of these assumptions will be.

A3 The additional activities required to refine the utilisation figures for GUC and STT will be undertaken by the relevant transfer SRO project team. We anticipate this will involve further water resource modelling based on the need defined by WRSE regional water resource modelling.

In practical terms, any changes to utilisation uncertainity / assumptions will simply allow us to refine our operational regime and corresponding OPEX costs to match the transfer SRO utilisation profiles as Minworth WwTW utilisation is unconstrained within the scheme capacity.

Q4 The regional plan (table 12) has the following flow rates: For GUC – 50Ml/d in 2031 and 50Ml/d in 2040 and for STT – 58Ml/d 2050 and 57 Ml/d in 2055. The SRO has got for GUC 58 Ml/d in 2031, and a further 57 Ml/d in 2040 and for STT SRO at 115 Ml/d in 2060. According to the additional information received by Ofwat the timing of STT is 2060, but can you please explain the difference in flow for GUC?

A4 The values in the WRSE paper (table 12) relate to the amount of water available going into customer supply. The values in the Minworth SRO Gate 2 paper show the capacity of the scheme. The difference between the two is accounting for losses along with other water resource storage considerations. The above is discussed in paragraph 4.3 of the gate 2 submission.

Table 1.1 of the Minworth gate 2 submission (reproduced below) shows outputs from Minworth (in the LH columns) and the deployable output in the south east (in the RH columns):

Table 1.1: Minworth WwTW outputs

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

* Based on draft WRSE regional plan (November 2022)

Q5 Can you please point to where there is information and evidence of the wider resilience benefits of this SRO, or justification of why these are limited.

A5 As stated in section 1.13 of the Minworth gate 2 submission, the key benefit of using Minworth SRO as a source for both GUC and STT SROs is that wastewater is produced and fed into Minworth WwTW for treatment under all conditions. From a climate change adaption perspective, it is therefore very resilient to drought, improving the resilience of both subsequent transfer SROs.

The primary driver of the GUC SRO is drought resilience, but as detailed in section 4.5 of the Minworth gate 2 submission, once in place the inter-regional transfer will provide a resilient source of water for Affinity Water and The Trust. This will provide an additional operational resilience capabilty. STT SRO has not been developed to provide operational resilience.

The scheme will provide a minimum of 10% Biodiversity Net Gain as required by the Environment Act 2021. The SRO has investigated, monitored and modelled the River Tame and River Trent system to understand how the environment could be affected by any changes and to look at where improvements could be made to generate ecosystem resilience. Examples are detailed in section 6.35 of the Minworth gate 2 submission.

As detailed in section 6.39 of the Minworth gate 2 submission, we plan to consider the development of wetlands to provide a wide range of other environmental benefits, such as flood resilience and water purification.

As stated in section 3.36 and 4.16 of the Minworth gate 2 submission, STW are in the process of considering a potential dual benefit for both the GUC and STT components to deliver a water resource benefit within the STW region. This involves a complex interface between the SROs and existing / potential WRMP schemes which will be developed during the Gate 3 stage.

Q6 As Minworth treatment plant will be producing significant carbon, the justification of how Minworth has come to be part of best value plans is considered important. Please supply or point to information on the following:

- How carbon has been considered in the best value planning approaches, metrics and decision making
- More information on carbon reduction and SRO cost, for example has carbon reduction been able to drive down solution costs?
- The level of uncertainty associated with the solution carbon assessments at this point in the process and how will this uncertainty be expected to reduce as solutions are refined through the gated process.

If any of this information is being assessed in other SRO's (GUC/STT) please draw out the relevant information for these assessments.

A6 The current level of treatment is the worst case scenario. There are potential opportunities through gate 3 to reduce the level of treatment required to the levels consistent with current legislation. This will inevitably reduce CAPEX, OPEX and carbon impacts of the proposed solution.

The best value planning approaches, metrics and decision making are generally terms we associate with individual company WRMPs and regional water resources groups. Each group and their member water companies have jointly developed advanced decision-making methods and decision support tools. These are used to develop the regional best value plans which are compared to the least cost plans.

In this respect, it is WRW and WRSE processes which have considered the carbon impact of Minworth, along with the relevant transfer SRO. Each individual SRO submits CAPEX, OPEX and Carbon details for entry into the regional water resources group investment modelling.

At project level, we have undertaken an options appraisal exercise to determine the preferred pipeline route. This considered the embodied and operational carbon as one of the evaluation criteria as part of the decision analysis methodology.

The treatment processes proposed for Minworth are based on the requirement to meet the aniticipated discharge standard for the receiving water courses. These were derived from EA guidance on environmental

permitting. Alternative processes were considered and rejected, though these would have resulted in even higher carbon impacts.

The requirement to add more advanced treatment at Minworth to allow the water to be discharged into the receiving water courses, compared to its current discharge into the River Tame, is responsible for the majority of construction and operational carbon in the SRO.

As stated in section 6.43 of the Minworth gate 2 submission, our design has considered carbon reduction opportunities and allowed us to compare a Gate 2 'unmitigated' solution with a mitigated solution. The carbon reduction impact of this process is detailed in Table 6.3 of the Minworth gate 2 submission. Although we believe this has resulted in a lower whole life cost solution, we have not quantified this so we are unable to provide details. We will ensure that we can quantify the carbon and cost saving for our Gate 3 submission.

As detailed above, the stringent WQ discharge requirements, as stipulated in the EA guidance, represents the biggest single factor resulting in the significant construction and operational carbon impact. It is this aspect which has the most significant uncertainty and as detailed in section 3.20 of the Minworth gate 2 submission, we intend to discuss this with the NAU during Gate 3 to explore opportunities to reduce the overall level of treatment, which would result in significant reduction in carbon. The potential saving is detailed in section 3.18 of the Minworth gate 2 submission as 63,953 tonnes of carbon dioxide equivalent.

As we further develop the concept design for Minworth, we will refine our carbon calculations and continue to seek carbon reduction opportunities.

Date of response to RAPID	16/12/22
Strategic solution contact / responsible person	[redacted] Minworth@severntrent.co.uk

Author name and email address redacted