Gate 1 queries process

Strategic solution(s)	Severn Trent Sources
Query number	STS002
Date sent to company	21/07/2021
Response due by	23/07/2021

Query

1) Figure 4.2 shows two routes for the Netheridge to Deerhurst pipeline, please clarify which route is used for the costings.
2) Is there a risk that Netheridge DWF and/or Mythe unused temporary abstraction could be required by STW to meet potential deficits, or critical period peaks, beyond the planning horizon of the STW WRMP19? Please expand on whether this has been considered.
3) The report refers to STT investigations that consider the impacts on downstream waterbodies of no longer receiving the 35 Ml/d Netheridge discharge. Could you please expand on the findings of these investigations, and indicate whether the needs of the downstream waterbody (e.g. during low flow conditions) may hinder the avaliability of the discharge to use as support for STT instead.
4) The report refers to the temporary nature of the ability of Mythe treatment works to provide the additional 15 Ml/d support to STT. Could you please provide indication as to the likely duration of this support, the reliability of this duration being met, and that these assumptions have been shared with STT.
5) Please provide a key for the resilience metrics in Table 10.2, and some explanation of how these compare and differ between the options presented. Please expand on any actions proposed for Gate 2, that may use these scores to further determine resilience of the options.

Solution owner response

In all cases the documents submitted to RAPID contain information that is commercially confidential. Please ensure that appropriate steps and safeguards are

observed in order to maintain the security and confidentiality of this information. Any requests made to RAPID or any organisation party by third parties through the Freedom of Information Act 2000, the Environmental Information Regulations 2004, or any other applicable legislation requires prior consultation and consent by Severn Trent Water Limited in relation to Severn Trent Sources SRO before information is released as per the requirements under the respective legislations. The content of the requested documents is draft and relates to material or data which is still in the course of completion in travel to Gate 2, and should not be relied upon at this early stage of development and is liable to further change as more information comes to light as a result of further investigations. We continue to develop our thinking and our approach to the issues raised in the document in preparation for Gate 2.

Query 1

Figure 4.2 shows two routes for the Netheridge to Deerhurst pipeline, please clarify which route is used for the costings.

Query Response

The route shown as Option 2 in Figure 4.2 has been used for the costings.

Our working assumption is that the discharge will be located just downstream of the proposed STT SRO Deerhurst WTW abstraction point. Option 2 route is some 2km shorter than Option 1 and therefore presents the best value option in terms of CAPEX and embodied carbon.

We have not yet rejected the option to discharge directly to the Deerhurst WTW. Option 1 route, curtailed at the WTW, may become the best value solution if the direct discharge is feasible. This will be confirmed for our Gate 2 submission.

Query 2

Is there a risk that Netheridge DWF and/or Mythe unused temporary abstraction could be required by STW to meet potential deficits, or critical period peaks, beyond the planning horizon of the STW WRMP19? Please expand on whether this has been considered.

Query Response

We cannot rule out the possibility that Netheridge and/or Mythe may be required as part of the STW / WRW best value plan to resolve our own supply deficits.This will be investigated during the regional planning reconciliation exercise.

Both Netheridge and Mythe have been considered as potential supply side options. Netheridge is currently not considered to be an efficient supply side option given it’s

location at the extremity of the WRZ. Mythe is considered to be a potentially efficient scheme and we have allowed for this in our approach to costing of the SRO. As described in paragraph 4.4 of the STS SRO Gate 1 Report, we have included within our submission the notional cost of 'backfilling' the 15 Ml/d using another supply side option.

Our preferred plan to resolve our own supply demand deficits within the Strategic Grid Water Resource Zone (WRZ), within which these two options are located, is still under development as part of the WRMP24 process.

Query 3

The report refers to STT investigations that consider the impacts on downstream waterbodies of no longer receiving the 35 Ml/d Netheridge discharge. Could you please expand on the findings of these investigations, and indicate whether the needs of the downstream waterbody (e.g. during low flow conditions) may hinder the avaliability of the discharge to use as support for STT instead.

Query Response

Gate 1 assessments investigated the relocation of 35 Ml/d from Netheridge WwTW to the lower River Severn locally downstream of the STT intake to the pipe interconnector for intermittent periods of typically 30 days, up to ~100 days, notably in June to November, particularly in the July, August & September period. Overall operation would be in the order of ~15% of dates at times of low flows in the lower River Severn. With a local scale take-and-put arrangement at Deerhurst, assessment of hydraulic information has identified neutral flow effects in the freshwater River Severn.

Due to the large tidal range of the Severn Estuary and the small volume proposed for diversion and discharge in the freshwater River Severn, negligible changes to water flow within the river reach during operation are anticipated. Therefore, no likely significant effects on water quality and migratory fish species are anticipated.

At Gate 1, the WFD compliance assessment concluded in its Level 1 screening that the intermittent 35 Ml/d reduction from Netheridge WwTW to the upper Severn Estuary has a negligible flow effect in the estuary. Therefore the effluent flow reduction in the transitional water body is WFD compliant.

Gate 2 investigations will update/develop the required models to provide robust information on hydrological, hydraulic and geomorphological impacts of different operational scenarios of the STT to inform the environmental assessments. Data are

currently being collected pre-Gate 2 in the form of hydromorphological walkovers, fish barrier assessments and a water quality monitoring programme.

Query 4

The report refers to the temporary nature of the ability of Mythe treatment works to provide the additional 15 Ml/d support to STT. Could you please provide indication as to the likely duration of this support, the reliability of this duration being met, and that these assumptions have been shared with STT.

Query Response

The 'temporary nature' of the 15 Ml/d Mythe licence transfer option refers to the flexible licencing arrangements that we are proposing. The solution would allow the 15 Ml/d to be temporarily transferred to the interconnetor intake for use by STT when needed, but, at other times, it would remain available for use at Mythe by STW. This is consistent with similar flexible licencing arrangements we have with South Staffordshire Water and Dwr Cymru Welsh Water. This does not affect our ability to operate the transfer.

As described in the STS SRO Gate 1 submission, paragraph 4.2, Mythe WTW can abstract and treat raw water near to the 120 Ml/d limit, but only for short durations due to restrictions in the treatment process. These restrictions limit the sustainable output of the works to 105 Ml/d and consequently limit the deployable output benefit contribution to the Strategic Grid Water Resource Zone (WRZ).

STT SRO assessed data for the period from 1920 to 2010. This showed that the STT full capacity would only be required for ~15% of the time. For the remainder of the time, the abstraction would be available to STW.

There is no constraint on the availability, or duration of the proposed licence transfer as there is no restriction on our abstraction licence, i.e. there is no distinction between Average and Peak abstraction.

As detailed in Query 2 above and described in paragraph 4.4 of our submission, we have allowed for 'backfilling' the 15 Ml/d licence transfer. We have chosen to make this a temporary transfer to maintain our ability to use the 15 Ml/d abstraction for short durations at times of our own need when not required for STT SRO operation. This maximises the benefit of the scheme for both Severn Trent and Thames customers.

We can confirm that these assumptions have been shared with the STT project team.

Query 5

Please provide a key for the resilience metrics in Table 10.2, and some explanation of how these compare and differ between the options presented. Please expand on any actions proposed for Gate 2, that may use these scores to further determine resilience of the options.

Query Response

At this stage of the scheme development, we have not sought to distinguish between the options based on the resilience benefits metrics. The primary driver when considering the options will be the choice of STT SRO interconnector, i.e. pipeline or canal transfer. Once this has been decided we will then determine the optimum discharge location for the preferred transfer. We will then review the resilience benefits metrics.

A brief description of each resilience benefits metric, along with the scoring guidance notes is provided below. These are extracts from the 'WRSE Resilience Assessment Updated Technical Appendix V3' which can be provided in full if required.

All of the STT source SROs were calibrated across the individual SRO project teams to ensure a consistent approach to scoring of the metrics. The scores were then agreed with the team who developed the Resilience Framework on behalf of WRSE ensuring consistency across all SROs.

Metric R1 – Uncertainty of option supply/demand benefit.

- Estimate % difference between 10th percentile and mean of option benefit (%)
- For each option a 90% confidence interval range is evaluated and the range fed back as guidance to companies.
- Score 1-5 for each option based on the relative uncertainty for each of the option types.

Metric R3 – Risk of failure of planned service due to other physical hazards.

- This metric is most similar in concept to *outage*, but it is evaluated for new sources or demand management measures.

Metric R3 Scoring Guidance Notes

Score	Description	Notes and Application
1	**Notably vulnerable.** The location or nature of the scheme means that it is towards the upper end of risk. For PWS assets this means they are	Where risks have been deliberately and reliably designed out (e.g. fluvial floodplain protection) then options should not be placed in this

Score	Description	Notes and Application
	at a similar level of risk to those existing assets within the top 20% of outage scores, or they rely on systems that are notably vulnerable to a particular hazard type. Options that rely on multiple, exposed, in-sequence assets to function (e.g. multiple booster pumping stations) should be placed in this category.	category. This category should generally be used for sites where there is a clear, notable risk and should apply to around 10% to 20% of the options.
2	**Vulnerable.** This includes option types that are known to suffer from higher than 'typical' outage risks, options that have critical assets that do not have redundancy backup, or options and strategies where there is significant uncertainty around the level of risk that they face. Options that incorporate exposed critical assets where there are concerns over repair times could be placed in this category.	Overall, no more than 40% of options should fall into this category or notably vulnerable as above. Uncertainty in the option design is likely to be a key factor over the selection of this category. The precautionary principle should be applied where there are long transfer/supply routes or constraints on land availability that mean the option could have to be placed in a more vulnerable location.
3	**Typical asset.** Options that are typical of existing water company water resource schemes in terms of vulnerability and exposure will fall into this category.	Options and assets will be typical of existing water company arrangements in terms of duty/standby, number and exposure of sequential critical assets etc. Options where there are some uncertainties over location and nature can fall into this category, provided the uncertainties do not mean that critical assets could be vulnerable or exposed.
4	**Less vulnerable.** These options/strategies will tend to be relatively well defined and their nature or level of redundancy means that they are less vulnerable than a typical resource option.	Schemes need to be reasonably well defined, or relate to asset types that are inherently low vulnerability in low exposure locations, to be included in this category. *Demand management strategies will tend to fall into this category by default, although some may be vulnerable to weather related events.*
5	**Notably less vulnerable.** These options/strategies will be well defined and there are no notable vulnerabilities in the design, location or makeup to the scheme/strategy.	Schemes require a good degree of certainty about placement, lack of critical asset points etc to be in this category. Simpler schemes that supply raw water to existing, well established treatment and distribution systems that are known to be low risk could be a typical example. *Simpler, distributed demand management strategies that are unlikely to be significantly disrupted by shock events could be placed into this category*.

Metric R5 – Catchment & raw water quality risks.

This assessment relates to the risk of disruption to supplies as a result of water quality events during times where there is resource stress (drought, freeze/thaw etc).

Metric R5 Scoring Guidance Notes

Score	Description	Notes and Application
1	**Notably vulnerable.** Equivalent to schemes scoring in the worst 20% of catchments.	Desalination schemes where there is a high variability in water quality other than the typical tidal cycle will fall into this category. Schemes where there are large unknowns and potential concerns over raw water quality should be placed into this category.

Score	Description	Notes and Application
2	**Vulnerable.** Equivalent to schemes scoring in the 20% to 40% category.	Desalination schemes with a large, but predictable variability in turbidity etc fall into this category. Schemes where there are large unknowns/no reasonable DWSP equivalent but where there are no exceptional concerns should be placed in this category.
3	**Typical asset.** Equivalent to schemes scoring in the 40% to 60% category. *Demand management strategies score a 3 by default (they replace the need for water on a generalised basis).*	Schemes where there are come uncertainties, but it is very unlikely that risks would be notably high should be placed in this category.
4	**Less vulnerable**. Equivalent to schemes scoring in the 60% to 80% category.	Need to be reasonably confident that the catchment with the DWSP score is a good representation of the catchment served by the scheme. Schemes that improve catchment risks by a single point score here.
5	**Notably less vulnerable.** Equivalent to schemes scoring in the 80% to 100% category.	Need to be very confident that the catchment with the DWSP score is a good representation of the catchment served by the scheme. Schemes that significantly improve catchment risk (i.e. by 2 or more points) score here.

Metric R7 – Risk of failure of planned service due to exceptional events.

This metric covers those shocks that tend to be either societal in nature, or affect the supply chain or supporting services.

Metric R7 Scoring Guidance Notes.

Score	Description	Notes and Application
1	**Notably vulnerable.** The nature of the option means that it is towards the upper end of risk. Schemes/options in this category will tend to be notably vulnerable to more than one type of event – i.e. the nature of power supplies, availability of chemicals, dependence on remote control for remote assets etc have the potential to combine to cause significant problems. For networks it is likely that demand/weather shocks will be the largest risk and this category would apply to a scheme that is reliant on existing infrastructure that is known to be stretched during such events.	Very complex schemes that score poorly under metric A3 are more likely to fall into this category, and there may be synergy between the two metrics. *Demand management strategies are unlikely to fall into this category, except where they are known to be vulnerable to unexpected societal changes, such as those caused by the COVID-19 pandemic.*
2	**Vulnerable.** As above, but where there is only one notable risk, or where there are uncertainties over network capacity/redundancy.	Overall, no more than 40% of options should fall into this category or notably vulnerable as above. Uncertainty in the option design is likely to be a key factor over the selection of this category. *Higher risk demand management strategies that contain some vulnerability to societal change, or vulnerabilities or significant unknowns in relation to data or network loss, or where they rely on supply chain or delivery arrangements that are vulnerable to medium term disruptions (pandemic/civil unrest/economic shock etc) could be placed in this category.*

Score	Description	Notes and Application
3	**Typical asset.** Options that are typical of existing water company water resource schemes in terms of vulnerability and exposure will fall into this category. Demand management strategies will only fall into this category if they rely on the more complex elements of existing customer interactions, or they are a 'mixed bag' with some medium term vulnerability in their ability to deliver during events such as pandemics/civil unrest/economic shock.	Options and assets will be typical of existing water company arrangements in terms of duty/standby, number and exposure of sequential critical assets etc. Options where there are some uncertainties over location and nature can fall into this category, provided the uncertainties do not mean that critical assets could be vulnerable or exposed. *High tech demand management strategies where there is relatively little experience of mass operation will tend to be placed in this category*
4	**Less vulnerable.** These options/strategies will tend to be relatively well defined and their nature or level of redundancy means that they are less vulnerable than a typical resource option. Demand management strategies that are not particularly vulnerable to data issues, cyber attack, or where events such as pandemics/civil unrest/economic shock will only have a short term, transient impact on delivery and implementation should be placed in this category.	Schemes need to be reasonably well defined, or relate to asset types that are inherently low vulnerability in low exposure locations, to be included in this category. *Demand management strategies that rely on well proven technologies, but where there is potential uncertainty about their effectiveness in the face of societal events will tend to be placed in this category.*
5	**Notably less vulnerable.** These options/strategies will be well defined and there are no notable vulnerabilities in the scheme/strategy.	Schemes require a good degree of certainty about placement, lack of critical asset points etc to be in this category. Simpler schemes that supply raw water to existing, well established treatment and distribution systems that are known to be low risk could be a typical example. Simpler demand management strategies that are unlikely to be significantly disrupted by societal shock events could be placed into this category.

Metric A3 – Operational Complexity and Flexibility

This metric is intended to focus on how the intervention affects the ability of the PWS to adapt, reconfigure and recover when shock events mean that normal modes of operation are disrupted.

Metric A3 Scoring Guidance Notes

Score	Description	Notes and Application
1	**Notably complex.** These interventions will tend to be both inflexible due to operational constraints on use (e.g. desalination water not suitable for transfer outside the intended area) *and* they either rely on multiple institutions to run, require specialist supply schemes/complex procedures to re-start after a failure event or are difficult to access to effect repairs.	This score is applied to supply side schemes where there is obvious inflexibility and complexities in the management/operation of the resource. *Not generally used for demand management*.
2	**Complex.** These interventions will tend to be both inflexible due to operational constraints on use (e.g. desalination water not suitable for transfer outside the intended area) *or* they either rely on multiple institutions to run or require	This score is used for schemes with single complex issues, or a number of lesser operational risks (e.g. difficulties in transfer combined with blending constraints). *Demand management can score within this category, but only in exceptional circumstances (e.g. it could result in significant*

Score	Description	Notes and Application
	specialist supply schemes/complex procedures to re-start after a failure event.	*amounts of 'locked in' supply capability as a result of demand reductions causing existing sources to become under-utilised, but where this is not certain enough to include as a change in Deployable Output).*
3	**Typical asset.** These interventions are 'typical' of a surface water type source in terms of complexity and management. Control curves, group licences, environmental procedures, transfers may be involved, but any co-operation needs across multiple institutions is unlikely to result in failure of the source to adapt or re-start. Typical transfers where there is some availability of workaround and storage fall into this category.	Use for schemes that represent typical PWS operation (clear, unambiguous asset management and operation agreements), some flexibility in the area and nature of supply etc), where any constraints (e.g. blending need) are straightforward and unlikely to significantly constrain scheme operation. *Demand management strategies will tend to score a 3 by default (they replace the need for water on a generalised basis), unless there is a clear risk that they will result in significant 'locked in' capacity for water company existing sources.*
4	**Less complex**. Interventions that involve typical, routine operational arrangements where group and annual licences are straightforward to manage, the site can be manually operated if required and there is reasonable connectivity/storage with the existing network	As for 3) above, but schemes need to be free from complex multi-institutional agreements, and have limited constraints on operation and use of the water in a flexible way.
5	**Notably less complex.** Intervention is simple to manage, with limited interdependencies and an ability to deploy across multiple areas	To fall into this category the scheme must have no obvious operational constraints, be free from complex multi-institutional arrangements, and the scheme should be notable in its ability to support various parts of the network without difficulty or operational constraint.

Metric E1 – Modularity and Scalability

This metric is relatively straightforward, and reflects the ability of a given option to be delivered in a staged way that limits investment risk and provides opportunity to either scale back or extend development if the intervention is proving to more/less viable following further investigation and initial development.

Metric E1 Scoring Guidance Notes

Score	Description	Notes and Application
1	**Notably inflexible.** Option is fixed and binary without any real opportunity to scale back or extend development once the scheme has started.	Some reservoirs, where there is no real choice or flexibility around the source water availability, fall into this category. *Similarly, demand management strategies that present an either/or approach where the benefits are not well known until key policies are in place and large-scale implementation has started (e.g. Water Efficient Labelling) could fall into this category.*
2	**Fairly inflexible.** Option is fairly fixed and can only be changed in relatively minor ways once development has started.	As above, but there is some flexibility -e.g. reservoirs where there is flexibility around water sources, 'binary' demand management initiatives that can be effectively trialled before full scale implementation etc.
3	**Typical scheme.** The scheme will become well defined prior to full	'Typical' resource schemes where assets can be re-sized or adjusted once constraints are fully

Score	Description	Notes and Application
	implementation, but can be scaled and adjusted as the detailed design is being developed.	understood, and there is some opportunity for modular development of certain components (e.g. treatment streams). Demand management initiatives where changes can be made as the rollout progresses, but the scale and scope of the initiative is reasonably fixed, fall into this category.
4	**Fairly flexible.** Some modular development is possible and/or the intervention is scalable in response to external factors.	Schemes where there are relatively few 'hard constraints' so development can be pursued in a relatively modular way, and there may be some scope to extend or scale back the size of the scheme as required. Many demand management initiatives will tend to fall into this category as they may have expectations on their maximum size, but ultimately can be scaled back as required if they are not providing to be effective.
5	**Notably flexible.** Scheme is fundamentally modular and there is significant opportunity for scaling as required.	Probably limited to options such as desalination where development can be fully modular, or demand management initiatives where there is full flexibility in scale and the ability to adapt the initiative as better information becomes available

Metric E3 – Reliance on External Organisations to deliver changes.

This metric is intended to reflect the risk that a scheme cannot practically be delivered because of dependencies on multiple institutions to implement, or uncertain approvals and delivery mechanisms that rely on third parties.

Metric E3 Scoring Guidance Notes

Score	Description	Notes and Potential Data Sources
1	**High risk.** The scheme has known, significant challenges and relies on third party organisations to approve or deliver the scheme using processes that are not yet well established.	Complex schemes that required support and consent of multiple actors and institutions where there are significant uncertainties over delivery mechanisms and future working arrangements. *Demand management schemes that require major policy or regulatory changes that have not yet been committed to.*
2	**Increased risk.** The scheme has known challenges and is relying on some third party organisations to approve or deliver the scheme. The processes involved are reasonably well defined, but non-statutory or have little precedent.	Complex schemes that require the support or consent of institutions other than the planning authorities, with associated risks to scope. *Demand management schemes that require minor external policy support or legislation, which has not yet been committed to, or where there is a need to develop technologies externally that are not yet available.*
3	**Typical scheme.** Although the intervention or scheme faces challenges to approval or implementation, this is through well known processes with mature institutional arrangements.	Schemes that could involve bilateral trade, but do not rely on multiple institutions and will follow standard planning application routes (DCO or conventional) where there is likely to be some opposition. *Typical demand management schemes that only require existing policy support and follow known and well-practiced regulatory processes.*
4	**Lower risk.** The scheme is not only reliant on well-known processes with mature institutional arrangements, but the likelihood of challenge and major	Typical supply schemes where expected objection risks are low. *Typical demand management schemes where there is broad support and customers and customer representatives are likely to be supportive.*

Score	Description	Notes and Potential Data Sources
	delay is low due to a lack of opposition or widespread support.	
5	**Negligible risk.** The scheme is highly unlikely to experience substantive challenge or delay.	Smaller supply schemes that are carried out within permitted development rights, or where there is clear planning support and no known opposition. *'Flagship' demand management schemes with strong policy and/or customer support where delivery mechanisms are similar to existing, well tested approaches.*

Date of response to RAPID	23/07/21
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