Gate 1 queries process

Strategic solution(s)	Severn Thames Transfer
Query number	STT002
Date sent to company	21/07/2021
Response due by	23/07/2021

Query

1) Please explain the extent to which options for pipeline routing have been considered at this stage, ahead of the route alignment review activities that have been scheduled for Gate 2.
2) Please explain why the 300, 400, 500Ml/d pipeline variants have been selected.
3) Please provide further detail on the modelling tools and assumptions used to derive the estimate of utilisation.
4) Please provide further detail on the assumptions and uncertainties in the DO calculation, and the specific activities under Gate 2 which will test these assumptions and resolve uncertainties.
5) Please provide the resilience metrics and scores alluded to in section 2.15, including conclusions on the resilience of the different SRO options.
6) Please explain the method used to determine the carbon footprint and provide detail on the options for carbon reduction alluded to in 5.38, including actions for Gate 2.

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 each of United Utilities, Severn Trent Water and Thames Water before information is released as per the requirements under the respective legislations. The content of this document 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. We continue to develop our thinking and our approach to the issues raised in the document in preparation for Gate 2.

1) **Please explain the extent to which options for pipeline routing have been considered at this stage, ahead of the route alignment review activities that have been scheduled for Gate 2.**

Answer

There are three pipelines on this SRO a) the Vyrnwy By-pass b) the interconnector pipeline and c) the pipelines associated with the canal transfer. When developing the routing of the various pipelines we have reviewed options from an environmental and engineering view point to be satisified that they characterised viable solutions and identified opportunities where the routing could be optimised. The initial preferred routes in Gate 1 will be further optimised by the work proposed in Gate 2.

2) **Please explain why the 300, 400, 500Ml/d pipeline variants have been selected.**

Answer

During the WRMP19 pipeline variants capacity ranges from 100Ml/d to 600Ml/d were reviewed. The 100Ml/d option was not considered cost effective for infrastructure of this scale while the 600Ml/d option was rejected on water quality and environmental grounds detailed in Thames Water's WRMP19 Appendix Q . The 300, 400 and 500Ml/d variants were the three capacities proposed from the WRMP19 screening process. As no new statement of need has been provided since WRMP19 these variants are still applicable. The anticipated initial statement of need will be provided in Gate 2 and it is necessary that we have sufficient options under consideration to accommodate any change in need from WRSE as a result of environmental ambition, climate change etc. At this time we have not received a requirement from WRSE for a smaller or larger capacity interconnector, although we are aware T2ST has. These variants were considered in Gate 1 to understand the maximum benefit of the scheme from the supported and unsupported flows. The 500Ml/d option also facilitates the addition of new sources should they be proposed in Gate 2. As stated in the report the canal is limited to 300Ml/d design capacity. This is to manage velocities for navigation and avoid the need for route-wide changes to the canal infrastructure (e.g. increased channel size, lockage arrangements).

3) **Please provide further detail on the modelling tools and assumptions used to derive the estimate of utilisation.**

Answer

Utilisation in the Gate 1 report is based on analysis completed by Thames Water using their water resource models considering 1 in 500 drought events, of when London calls for unsupported flow and/or support options. The need to initiate STT is based on control curves defined by the Lower Thames Control Diagram. Timing of this need for support is then compared with an historical set of flow data for the River Severn to understand when unsupported flow is available and when support options would need to be initiated to provide additional support. This assessment of unsupported flow is based on the updated River Severn Hands-off Flow. For Gate 2, this utilisation analysis will also consider the potential for additional need related to the Thames to Southern Transfer as well as the influence of stochastics on the timing and utilisation of STT. We will complete this work using Kestrel modelling of River Severn flows and WRSE Pywr model to calculate DO. A system model is

also being procured that will allow for joined up modelling of the whole system, permit full conjunctive use assessment of the benefits of STT and allow assessment of the preferred configuration of STT taking account of conjunctive operation.

The potential for utilisation of the sources has been based on drought resilience. However, transfer of flows outside droughts increases the utilisation of the scheme and can benefit cost effectiveness of the scheme for the South East; this will form part of the review in the Operational Working Group in Gate 2.

4) Please provide further detail on the assumptions and uncertainties in the DO calculation, and the specific activities under Gate 2 which will test these assumptions and resolve uncertainties.

Answer

The DO calculation uses the WRSE Pywr model to understand the additional benefit STT could provide to London and Affinity via the River Thames. The DO calculation for support options reduces their release volume by losses in the River Severn, River Avon, the interconnector (pipe or canal) and finally the River Thames. Assumptions and uncertainties related to calculating the DO for unsupported include: (a) the DO benefit as defined by WRSE Pywr models, (b) stochastics, (c) climate change impacts, (d) Hands off Flow and (e) abstraction during spate. Assumptions and uncertainties related to calculating the DO for support options [Vyrnwy release, Vyrnwy by-pass, Shrewsbury Redeployment, Mythe abstraction, Minworth effluent and Netheridge wastewater treatment works] include: (a) availability of support water and (b) impact of losses. During Gate 1 understanding of DO has been developed as a result of an agreement in principle with the EA/NRW covering the Put and Take arrangement, agreement on the Hands-off flow and spate conditions and also the losses assessment work carried out.

For Gate 2 we are investigating all these points, developing evidence to update any assumptions with more accuracy and reduce and clarify uncertainties as best we can. This work includes an assessment of loss estimation modelling results that we have received after completing the Gate 1 report, targeted additional climate change and DO modelling, and subsequent analysis of those modelling results. The system model described in the response to question 3 above will also assist in this matter. Following outputs from WRSE we may find a need for further revisions to the DO calculation.

5) Please provide the resilience metrics and scores alluded to in section 2.15, including conclusions on the resilience of the different SRO options.

Answer

This is a complex system providing resilience to the South East as a result of the new and diverse source options within the stystem. The resilience metrics were discussed with WRSE who calibrated them across all SRO's. [redacted]

The conclusions on the differing SRO options are that the canal holds risks associated with INNS and complexity of its operation in comparison to the pipeline transfer.

The resilience assessment highlighted areas where further work will be undertaken in Gate 2, as listed below

- Finalisation of the 'put and take arrangement' is needed to eliminate the risk of unavailability of water
- The complexity of the operation of the entire system and its relationship with the LTOA needs to be advanced

- The INNS risk for the canal transfer needs to be further understood

6) Please explain the method used to determine the carbon footprint and provide detail on the options for carbon reduction alluded to in 5.38, including actions for Gate 2.

Answer

Section 5.38 of the STT-P1-001-STT RAPID Gate 1 Report-D does not mention carbon reduction as relates to drinking water considerations in relation to Shrewsbury redeployment.

Carbon sequestration is mentioned in Sections 5.40 and 5.42. In these sections we mention the opportunities of the STT SRO to provide ecosystem services, namely air quality, recreation and tourism, water purification, natural hazard (flood) regulation, climate regulation, and carbon sequestration.

Construction and operational carbon impacts are provided at this stage by the Thames Water Engineering Estimating System (EES). The EES is a database containing capital project cost/carbon information against a common asset structure.

The system holds the cost for the construction against EES coding structure for all capital expenditure within infrastructure and non-infrastructure assets. Carbon was introduced and mirrors the cost model structure for infrastructure and non-infrastructure assets. The system holds over 6 Million embedded carbon values and each value is held against our common asset structure. As cost data is collected and imported into the system against the milestones stated above, the carbon is automatically calculated based upon code, volume, size and/or attributes unique to the project.

Gate 1 used generic industry standards in relation to construction material. It will be necessary to consider specific performance specifications of materials used as design progresses through Gate 2.

Gate 1 used generic industry standards in relation to carbon emission during construction and waste removal and high-level options to support decarbonisation. It will be necessary to consider decarbonisation efficiency as the project is progressed through Gate 2.

Based on published carbon sequestration figures, opportunities for carbon sequestration at a high level have been highlighted as part of the Natural Capital Assessment and associated Biodiversity Net Gain assessments during Gate 1. These opportunities have been recognised as having additional biodiversity benefits. By focusing on the interconnectivity and scale of options in the STT SRO, the benefits for carbon offset are likely to be greater than small scale more local site-based approaches that might follow mitigation.

Developing carbon offset opportunities through Gate 2 will be further considered, with natural sequestration investment likely to be a key focus. This could for example, include tree planting and other options to ‘green’ land known to support carbon sequestration

Further work in Gate 2 includes understanding scheme carbon emissions sources, challenging this as part of the engineering and design, identifying and accounting for new technologies and solutions related to both construction and waste disposal/reuse and an embedded carbon management process throughout the scheme’s development. This will be achieved by:

- A detailed capital programme produced relative to assets and material. This should focus on scheme ‘hotspots’ to inform key areas for decarbonisation.
- Design principles embedded that directly demonstrate how key activities will support scheme decarbonise in conjunction with supply chain engagement.
- Carbon planning embedded into procurement including material specification criteria.
- Carbon management approaches that identify carbon reduction opportunities and include an approach to demonstrate success following implementation.

- Develop links between regional resource management planning and company planning that work toward the most efficient way of developing and implementation of decarbonisation measures.

As part of the agreements with the Task and Finish Group, carbon mitigation/offsetting will be investigated in Gate 2.

Date of response to RAPID	23/07/2021
Strategic solution contact / responsible person	[redacted] AskSTT@jacobs.com