
Accelerated gate two queries process

Strategic solution(s)	Desalination
Query number	SDE003
Date sent to company	24/12/2021
Response due by	10/01/2022

Query

1. What are the proposed activities to Gate 3 to assess conjunctive use of the solution sub-options in the context of wider company and regional solutions?
 2. Please describe the methodologies/approaches used to calculate the utilisation estimates for the scheme under a 1 in 200 and 1 in 500 drought resilience level.
 3. Please provide evidence that wider resilience benefits of the solution sub-options (such as wider flood or drought resilience and catchment management approaches to improve water quality) have been considered.
 4.
 - a) What frameworks and guidance are being followed to reduce whole life carbon through the option choice, design and development of the solution?
 - b) What innovative technologies and approaches have been considered to reduce the whole life carbon of the solution?
 - c) To what extent have you explored mitigation vs offsetting as approaches to reducing carbon, including any specific mitigations that have been considered?
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Solution owner response

1. What are the proposed activities to Gate 3 to assess conjunctive use of the solution sub-options in the context of wider company and regional solutions?

Desalination was not presented at Gate 2 as a developable option, as detailed in Southern Water's Interim Submission on the 27th September 2021. Therefore, there are no activities proposed to assess conjunctive use of the solution sub-options in the context of wider company and regional solutions. The Option has also been removed from the WRSE modelling as a near future option at this location. E.g. before 2040.

2. Please describe the methodologies/approaches used to calculate the utilisation estimates for the scheme under a 1 in 200 and 1 in 500 drought resilience level.

Results from the 2000-year [REDACTED] water resources model run are tabulated in a spreadsheet to show volumes transferred as a daily timestep in MI/d. Results captured include

- Portsmouth Water [REDACTED] bulk transfer
- [REDACTED] bulk transfer
- Sandown Water Recycling Plant output
- Portsmouth Water [REDACTED] existing bulk transfer
- Havant Thicket potable water bulk transfer via [REDACTED]
- Desalination plant output.

Results for a specific parameter (such as desalination plant output) are then calculated for each year in the 2000-year run to show

- the maximum daily output or transfer volume
- the sum of the volume transferred over the year
- the number of days the plant or transfer operated above its minimum (i.e. sweetening) flow.

These results are then sorted by value (lowest to highest) and assigned a return period based on their relative ranking in value. For example, the 1 in 200-year return period for maximum daily transfer volume will be the tenth-highest value of maximum daily transfer volumes, as 2000 years divided by 200 equals 10. Similarly, a 1 in 50-year return period is defined as the fortieth-highest value as 2000 years divided by 50 equals 40.

The results are then tabulated in the Gate 2 submission document according to their relevant return period.

The 2000-year [REDACTED] model run gives results suitable up to a 1 in 200-year drought only. The above analysis has not been carried out for a 1 in 500-year drought.

3. Please provide evidence that wider resilience benefits of the solution sub-options (such as wider flood or drought resilience and catchment management approaches to improve water quality) have been considered.

As part of Southern Water's ongoing review, studies have been carried out to assess resilience through several lenses. This was summarised in Annex 1 Desalination, Section 2.2.9.

The results of the resilience studies were included as part of the Multi-Criteria Decision Analysis (MCDA), a best practice approach for economic appraisal defined by HMT Green Book, which tested the rankings of the SROs under different assumed weightings to the National Significant Infrastructure criteria.

The resilience Model considers a number of 'shocks and stresses' as part of the assessment, which include:

- a. **Raw Water Loss:** This assesses the non-availability of raw water delivered to the treatment works through the source water being untreatable (either due to quality or quantity issues). Typically this will include aspects such as river contamination, impounding reservoir algal blooms and elevated nitrates in groundwater.
- b. **Severe Flood:** This assesses the sites in flood risk locations where they are exposed to fluvial, coastal, or surface water flood risks. The effects of climate change are expected to increase the risk to SW's sites from environmental flooding.
- c. **Contamination:** This assesses the risk of contamination of clean water caused by infiltration of contaminants into the water process or network (downstream from the source). This will include events such as service reservoir infiltration from pollutants.
- d. **Critical Asset Failures:** This assesses how the option supports the wider resilience on the system in the event of a single point of failure of a critical asset which could lead to the loss of supply.

The model the model uses two sets of deployable output figures, based on either:

- Desalination Plant – BAU, or
- Desalination Plant – Stressed (at 75Ml/d and 61Ml/d peak output flows)

The objective of the BAU options is to test the SRO for resilience against normal operating conditions and the objectives of the stressed options are to test for resilience against a 1 in 200-year drought situation. Both Havant Thicket Sub-Options rely on the treatment at [REDACTED], hence in the model they are considered as '[REDACTED] Dependant', as the model is based on Water Supply Works (WSW) output.

Our resilience reports are available for review if required.

4. a) What frameworks and guidance are being followed to reduce whole life carbon through the option choice, design and development of the solution?
- b) What innovative technologies and approaches have been considered to reduce the whole life carbon of the solution?
- c) To what extent have you explored mitigation vs offsetting as approaches to reducing carbon, including any specific mitigations that have been considered?

Southern Water will be looking to adopt the All Company Working Group guidance on Carbon.

The process undertaken to prepare the capital carbon emissions estimates for each of the options is based on PAS2080. The monetised cost of carbon was calculated using the traded and non-traded carbon price forecasts from the Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal.

Carbon from the perspective of natural capital is related to climate regulation Environmental and Social Safeguards (ESS). A key element of most safeguard systems is the use of a categorisation system for identifying environmental and social risk, applied at an early stage in a project cycle. Assessing carbon in this context involves calculating the change in carbon sequestration as a result of land use change, and calculating its value, so that the risk associated with the project can be calculated. The assessment carried out to date has been high level, consistent with the stage of scheme design, and suitable to enable like for life comparison of the options. The level of detail in the assessment will be developed so as to influence the development of the solution as the design matures, with the aim of reducing whole life carbon in the selected option.

Under Southern Water's commitment to net zero operational emissions by 2030, the operational emissions will need to be treated in accordance with our committed net zero carbon hierarchy (avoid and reduce, replace, remove and offset). In addition, Southern Water will also be considering embedded carbon within this SRO Project and will again apply the carbon hierarchy (avoid and reduce, replace, remove and offset).

As part of the option choice, a Multi-Criteria Decision Analysis (MCDA) tool was used as a best practice approach for economic appraisal defined by HMT Green Book. The MCDA incorporates capital carbon, operational carbon and whole life carbon (referred to in the MCDA as embodied carbon and operational carbon) as well as the high level assessment of carbon sequestration after impacts of construction and biodiversity net gain are considered (referred to in the MCDA as the climate regulation (NC)) as key 'Environmental' sub criteria that affect the overall National Significant Infrastructure of the scheme. The MCDA also tested the rankings of the SROs under different assumed weightings to the NSI criteria.

b) What innovative technologies and approaches have been considered to reduce the whole life carbon of the solution?

The carbon assessments carried out for the feasibility design have set the initial carbon estimates for the sub-options. As the design develops, we will apply the carbon hierarchy (avoid and reduce, replace, remove and offset) to reduce the whole life carbon associated with the selected option.

Examples of areas where we are considering ways to reduce carbon are:

- The Water Recycling Plant’s Reverse Osmosis Membranes, by recovering energy from the flow pressure, and
- the Transfer Pumping Station (from [REDACTED] to the Water Recycling Plant) could potentially be powered by the [REDACTED] Combined Heat and Power Plant (CHP).
- The pipeline routing to reduce the over static pumping head

Southern Water is bringing specialist carbon manager into the team to help challenge the design to further reduce the whole life carbon impact.

c) To what extent have you explored mitigation vs offsetting as approaches to reducing carbon, including any specific mitigations that have been considered?

Given the current level of maturity within the SRO project, carbon is a consideration, however, formalisation of mitigation vs offsetting as a means to manage the carbon impact of the scheme over the duration of the asset life has yet to be completed. Southern Water will be considering embedded, operational and whole life carbon within this SRO Project and will again apply the carbon hierarchy of: avoid and reduce, replace, remove and offset.

Date of response to RAPID	10/01/2022
Strategic solution contact / responsible person	[REDACTED] [REDACTED]