
Gate 1 queries process

Strategic solution(s)	London Reuse
Query number	LOR002
Date sent to company	26/07/2021
Response due by	28/07/2021

Query

Thank you for response to query LOR001. Please provide a more detailed breakdown/cost comparison of the solution estimate using the WRMI tables where possible. Where this may not be possible (e.g., Mogden options), please use the next best data you have.

Solution owner response

Please find some detail and figures below to help clarify how the projected solution cost estimates have changed between those submitted or assessed in WRMP19 and the current Gate 1 submission.

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Date of response to RAPID	28/07/2021
Strategic solution contact / responsible person	[REDACTED] [REDACTED]

Summary of changes of project solution costs between WRMP19 and Gate 1 stages:

Between WRMP19 and Gate 1 the London Effluent Reuse SRO with its four schemes have been developed to an equivalent level of conceptual design. The solution development for Mogden Effluent Reuse and Mogden South Sewer schemes has been greater than for Teddington DRA and Beckton Effluent Reuse which were at a more advanced conceptual design stage at WRMP19.

The key differences between WRMP19 and Gate 1 solution costs are summarised below with further detail in the sub-headings following.

- Base **Capex** costs at Gate 1 are typically within a maximum of +/- 15% of the costs estimated during WRMP19. There have been a few scope additions such as additional chemical dosing systems and storage tanks within the treatment stages, and increased costs for items such as power supply to the Tunnel Boring Machines for conveyance scope.
- **Opex** values largely remained the same as at WRMP19 stage; however some notable changes in pumping costs for the conveyance elements are modified at Gate 1 which alter the AIC (Average Incremental Costs) due to refinement / increase of pump power estimates at Gate 1 compared to WRMP19.
- **Costed Risk** values varied between WRMP19 and Gate 1 along the same lines as the base capex changes. This is due to changes in base capex, development of solution scope leading to removed or new risk items and higher/lower probability percentages. **Optimism Bias** changed following the ACWG methodology published for use at Gate 1 and scaling back according to development of conceptual design, but largely decreased due to increased confidence in; “design complexity”, permits/consents, environmental variables and project management clarity.
- The **deployable output (DO) benefit** has been reduced at Gate 1 compared with WRMP19. For example, Beckton Effluent Reuse 300 MI/d scheme at WRMP19 had DO benefit of 268 MI/d compared to 252 MI/d at Gate 1 (6% reduction, therefore increase in comparable cost of Gate 1 solution).

- For consistency across all SRO's, the ACWG agreed that Net Present Value (NPV) and **AIC costings** would be completed via the same methodology for inclusion in the Gate 1 Report for direct comparison with the other schemes and SRO's; and with values expressed at WRMP19 stage. The WRMP19 stage assessed largely the same scheme sizes as are assessed at Gate 1, except for the Teddington DRA scheme (300 MI/d size at WRMP19 and only 150 MI/d maximum at Gate 1), for which we are therefore unable to show a comparison. The AIC values presented for WRMP19 are those published in or assessed for the WRMI tables with applied system element costs removed such that they are directly comparable to Gate 1 AIC values. The AIC values of the WRMP19 assessment are compared against the Gate 1 AIC values in table 1 below.

Base Capital (CAPEX) and Operational Expenditure (OPEX)

The Base Capex costs at Gate 1 are typically within +/- 15% of the costs estimated during WRMP19 as shown in table 1.

A slight increase (ca. 5%) in the base capex costs is expected as the Gate 1 base capex costs are created on a September 2020 cost base compared to a September 2017 cost base at WRMP19.

Operational expenditure values were updated based on more-detailed calculations to develop the power requirements for pumps and other mechanical / process assets at Gate 1. Some optimisation of these values provided some reductions in Opex values from WRMP19 assessment, but other items such as the power required for Tunnel Boring Machines were not included at WRMP19 and therefore led to increases in OPEX for tunnel elements.

Maximum utilisation assumptions largely remained the same between the two stages with the exception of a reduction in DO benefit (see below) which help provide a more accurate comparison for the AIC values. The two exceptions are the Mogden South Sewer scheme which has a higher minimum utilisation value at Gate 1 to keep the biological treatment processes operational at all times, and the Teddington DRA scheme which reduced the assumption at WRMP19 from a continuously operating scheme at full capacity, to a 3-month operating window.

Changes to Costed Risk and Optimism Bias

Costed risk values varied between WRMP19 and Gate 1 stages due to development of solution scope leading to removal of or new risk items and higher/lower probability percentages. The method of costing the risk items stayed the same via the

Quantitative Costed Risk Assessment but items were added / removed / edited based on scope development.

Risk entries for process and conveyance items were added following the Gate 1 assessments including items such as discharge of concentrate from reverse osmosis stream which had not been included in WRMP19 stage and obstructions underground / utility diversions where new conveyance items were added to the Gate 1 scope.

Optimism bias was also carried out in the same ACWG methodology at Gate 1 as at WRMP19, but updated guidance from the ACWG made changes to some of the standard and non-standard rates to maintain consistency across all SRO's. This resulted in some scaling back in overall optimism bias percentages.

Changes to Deployable Output Benefit

The DO benefit at Gate 1 is approximately 6% below that at WRMP19 due to recalculation of the DO following a Thames Water re-assessment of DO benefits for WRMP24. This has an impact on the AIC calculations due to the maximum resource benefit being slightly lower.

Net Present Value (NPV) and Average Incremental Costs (AIC)

For consistency across all SRO's, the ACWG agreed that Net Present Value (NPV) and AIC costings would be completed via the same methodology for inclusion at Gate 1 for direct comparison with the other schemes and SRO's; and with values expressed at WRMP19 stage. The WRMP19 stage assessed largely the same scheme sizes as are assessed at Gate 1, except for the Teddington DRA scheme (300 MI/d size at WRMP19 and only 150 MI/d maximum at Gate 1). No water network infrastructure and non-infrastructure costs were included in the WRMP19 or Gate 1 AIC costs assessed in the table below, so it is a direct comparison. The AIC values of the WRMP19 assessment are compared against the Gate 1 AIC values in table 1 below.

Table 1: Average Incremental Cost (AIC) Comparison Between WRMP19 and Gate 1 Stages (Schemes at Maximum Capacity size)

Maximum Capacity of Each Scheme					
All costs adjusted to 2017/18 prices for comparisons					
Option name	Units	Beckton Effluent Reuse (300 MI/d)	Mogden Effluent Reuse (200 MI/d)	Mogden South Sewer (50 MI/d)	Teddington DRA (150 MI/d)
Option benefit (WRMP19)	MI/d	268	180	49	N/A
Option benefit (Gate 1)	MI/d	252	169	46	134
Percentage Difference Gate 1 versus WRMP19	%	-6.3%	-6.5%	-6.5%	N/A
Maximum Utilisation – full capacity for 12 months of the year					
WRMP19 Average Incremental Cost (AIC)	p/m ³	115.8	121.04	130.50	N/A
Gate 1 Average Incremental Cost (AIC)	p/m ³	122.05	129.90	149.72	44.85
Percentage Difference Gate 1 versus WRMP19	%	+5%	+7%	+15%	N/A
Comments		Utilisation costs are higher due to the addition of some process elements and TBM power supply.	Utilisation costs are higher due to the addition of some process elements and increased pumping costs	Utilisation costs are a little higher due to additional RO return pipeline to Mogden STW.	No WRMP19 assessment of 150 MI/d size at WRMP19 therefore no %age comparison as the sizes are materially different.

Note: Allowing for circa 6% DO benefit decrease would indicate an expectation of increase in AIC between WRMP19 and Gate 1 aligning with Beckton Effluent Reuse and Mogden Effluent Reuse, with Mogden South Sewer increase higher due to additional infrastructure.