Thames to Affinity Transfer SRO

Technical Supporting Document A2b

Cost Report

Beckton Reuse Indirect Option

Notice

Position Statement

- This document has been produced as the part of the process set out by RAPID for the development of the Strategic Resource Options (SROs). This is a regulatory gated process allowing there to be control and appropriate scrutiny on the activities that are undertaken by the water companies to investigate and develop efficient solutions on behalf of customers to meet future drought resilience challenges.
- This report forms part of suite of documents that make up the 'Gate 2 submission.' That submission details all the work undertaken by Thames Water and Affinity Water in the ongoing development of the proposed SROs. The intention of this stage is to provide RAPID with an update on the concept design, feasibility, cost estimates and programme for the schemes, allowing decisions to be made on their progress and future funding requirements.
- Should a scheme be selected and confirmed in the companies' final Water Resources Management Plan, in most cases it would need to enter a separate process to gain permission to build and run the final solution. That could be through either the Town and Country Planning Act 1990 or the Planning Act 2008 development consent order process. Both options require the designs to be fully appraised and in most cases an environmental statement to be produced. Where required that statement sets out the likely environmental impacts and what mitigation is required.
- Community and stakeholder engagement is crucial to the development of the SROs. Some high level activity has been undertaken to date. Much more detailed community engagement and formal consultation is required on all the schemes at the appropriate point. Before applying for permission Thames Water and Affinity Water will need to demonstrate that they have presented information about the proposals to the community, gathered feedback and considered the views of stakeholders. We will have regard to that feedback and, where possible, make changes to the designs as a result.
- The SROs are at a very early stage of development, despite some options having been considered for several years. The details set out in the Gate 2 documents are still at a formative stage and consideration should be given to that when reviewing the proposals. They are for the purposes of allocating further funding not seeking permission.

Disclaimer

This document has been written in line with the requirements of the RAPID Gate 2 Guidance and to comply with the regulatory process pursuant to Thames Water's and Affinity Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solution presented in this document be taken forward, Thames Water and Affinity Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

Contents

Appendix A WRMP 24 Tables 5a and 5b A-1

Figures and Tables

1. Executive Summary

1.1 Estimates for base capital cost, costed risk, optimism bias and operational cost are summarised in Table 1-1. which also provides a comparison to Gate 1. It should be noted that the Gate 1 values have been adjusted to a 2020/21 cost base to allow for comparison with Gate 2.

Table 1-1: Cost estimates (2020/21 cost base) and comparison to Gate 1 equivalents

Option Name	Units	BRI 100 Ml/d	BRI 50 Ml/d
Option Benefit	MLD	100	50
Capex (20/21)			
Base Capex	£m	324	272
Costed Risk	£m	91	70
Optimism Bias	£m	56	43
Total Gate 2 Capex	£m	471	385
Total Gate 1 Capex	£m	241	150
Change G1 to G2	%	96%	157%
OPEX (20/21)			
Gate 2 Fixed	£m/annum	1.0	0.6
Fixed: G1 to G2	%	2%	15%
Gate 2 Variable	£/ML	107	108
Variable: G1 to G2	%	8%	2%

1.2 Net Present Value (NPV) and Average Incremental Cost (AIC) has been estimated for the BRI working solution using the ACWG standard methodology, based on HM Treasury Green book with a declining schedule of discount rates (HMT Green Book: Annex 6, Table 8) and an 80-year assessment period. Estimates for the NPV and AIC for the BRI working solution are provided in Table 1-2.

Table 1-2: NPV and AIC estimates and comparison to Gate 1 equivalents

Option Name	Units	LTR 100 Ml/d	LTR 50 Ml/d
Option Benefit (DYAA)	MLD	100	50
Total planning period benefit	Ml	680,000	340,000

Option Name	Units	LTR 100 Ml/d	LTR 50 Ml/d
Total planning period indicative capital cost (CAPEX NPV)	£M	394	318
Estimated Utilisation *			
Total planning period indicative operating cost (OPEX NPV)	£M	47	25
Total planning period indicative total cost (NPV)	£M	441	343
Average Incremental Cost (AIC)	p/m3	57	87
Maximum Utilisation (100%) **			
Total planning period indicative operating cost (OPEX NPV)	£M	90	47
Total planning period indicative total cost (NPV)	£M	484	365
Average Incremental Cost (AIC)	p/m3	63	94
Gate 1 AIC (20/21)	p/m3	51	65

Note * 40% utilisation is assumed for these calculations to enable comparison between options: 1 in 500 year deployable output for 365 days / year, and 40% of the estimated maximum variable operating cost, based upon output of long-term water resources modelling. There is no comparative AIC for Gate 1 as these utilisation calculations were not available at Gate 1.

Note ** 100% utilisation is assumed for these calculations to enable comparison between options: 1 in 500 year deployable output for 365 days / year, and estimated maximum variable operating cost.

2. Introduction

2.1 This report summarises the methodology and results of the costing assessment for the Beckton Reuse Indirect (BRI) option of the Thames to Affinity Transfer (T2AT) Strategic Regional Option (SRO) scheme. The approach has been developed in line with the All Company Working Group (ACWG) guidance on cost consistency.

2.2 To ensure a degree of consistency across the different SROs, the ACWG has provided guidance and a spreadsheet template for capturing the Quantitative Costed Risk Assessment (QCRA) and calculating Optimism Bias (OB)[1].

2.3 This report should be read in conjunction with the Technical Supporting Document (A1b) - Concept Design Report which details the working solution and assumptions, upon which the costs are based. These reports are supporting documents to the Gate 2 submission to RAPID for the T2AT scheme. The list of documents that make up the submission, along with a short synopsis of the contents may be found in the main T2AT RAPID Gate 2 report.

2.4 Capex and Opex estimates are based on 2 sources.

- Bottom-up costs for most civil components including the pipeline.
- LRMC cost curves for items not captured via the bottom-up costs, primarily mechanical and electrical process components where limited bottom-up data was available. Cost curves are derived by Affinity Water and incorporated in their Long-Range Marginal Cost (LRMC) tool.

2.5 Net Present Value (NPV) and Average Incremental Cost (AIC) have been derived from the Capex and Opex estimates using the standard calculation template provided by the ACWG. NPV and AIC have been calculated for 100% utilisation and the current Estimated operational utilisation scenario for the assets.

2.6 Note that this transfer option is dependent on Beckton Effluent Reuse option of the London Reuse SRO feeding additional recycled water into the River Lee and Affinity's Connect 2050 programme implementing downstream infrastructure. London Reuse SRO is a separate SRO in its own right. Costs associated with SESRO are not captured within this report.

2.7 Investment profiles are indicative only to facilitate multi-solution decision making and will be refined at Gate 3.

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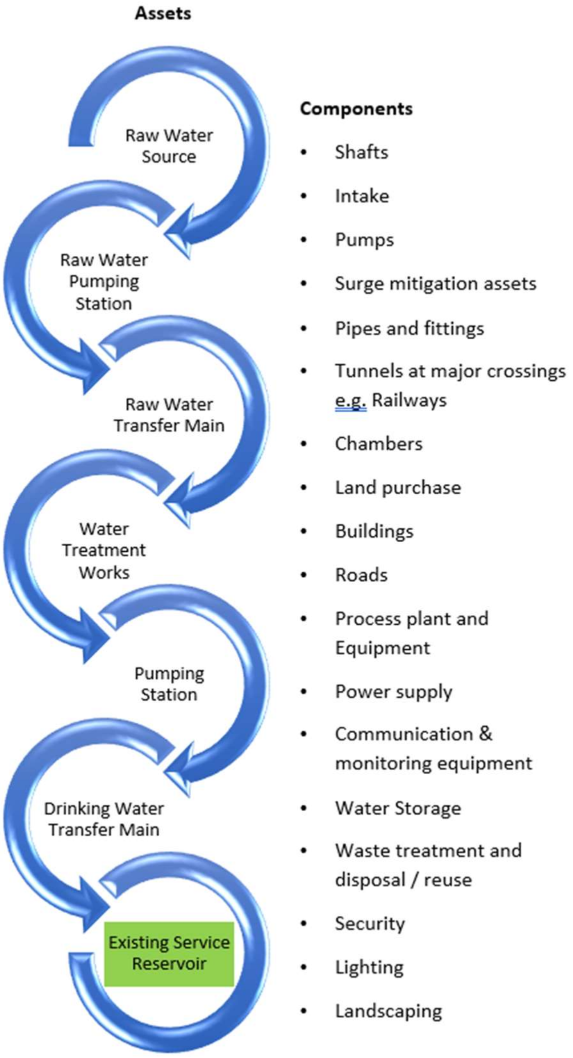
[1] ACWG (2021), Appendix A-1 - Optimism Bias and QCRA Template - Rev C.xlsx

2.1 Scheme overview

1.1 The source of water for the BRI scheme is the River Lee. However, the natural flow in the river is insufficient and so operation of the scheme will be dependent on recycled water being fed into the river from the Beckton Effluent Reuse option of the London Reuse SRO. Implementation of this option is therefore a pre-requisite for the BRI scheme, hence the name of this T2AT option.

Figure 2-1: Assets and example components



2.8 Raw water for the scheme will be abstracted from the River Lee. The concept design proposes a passive wedge wire screen located in the riverbed. The necessary equipment for backflushing or "airburst" will be housed away from the riverbank to ensure that there is a minimum of visible intrusion at the intake site. However, it is anticipated that at the minimum an access track and kiosk will be required on the riverbank.

2.9 Water will flow by gravity within buried pipes to a new raw water pumping station (BRI-RWPS) set back from the riverbank.

2.10 The raw water will be conveyed in a new buried transfer main (BRI-RWTM) to a new WTW (BRI-WTW).

2.11 Drinking water produced by the plant will pass through a storage tank before entering a high-lift pumping station (BRI-HLPS) from where it will be conveyed via a buried drinking water transfer main (BRI-DWTM) to an existing service reservoir (SR) in the vicinity of Brookmans Park.

2.12 A proportion of the water will then be able to flow under gravity to the existing booster pumping station in the vicinity of North Mymms.

2.13 There are several major crossings along the route of the treated water pipelines including the M25 motorway, four railway lines and four major watercourses within the Lee Valley.

2.14 The main delivery point for the BRI scheme is the existing SR which is a distribution hub within the Affinity Water network. Modifications to the network downstream from the reservoir, which will be required to distribute the additional water to customers, are currently being determined by Affinity Water and form part of their wider water resources planning and investment programme.

2.15 A full description of the option is provided in the A1b Concept Design Report – BRI Option.

2.2 Cost overview

2.16 The Total Capital Cost consists of 2 components, the capital cost estimates, and combined risk as shown in Figure 2-2 below.

2.17 Capital cost estimates are based on 2 sources.

- Cost curves derived by Affinity Water and incorporated in their Long-Range Marginal Cost (LRMC) tool.
- Bottom-up costs e.g. contractor and supplier quotes for items not captured via LRMC or out with the recommended range of use.

2.18 The cost base date in which the numbers have been reported is 2020/21 to align with WRMP24 requirements[2]. Option cost estimates presented in this report have not been factored to present day prices. The estimates presented at Gate 1 were to a 2017/18 cost base which is consistent with the cost estimate data provided to WRSE for regional modelling in February 2022.

2.19 To ensure approaches to quantifying risk and uncertainty associated with resource option cost estimates are consistent and to allow comparison of options at a regional level the ACWG has provided a guidance note and associated assessment template[3]. OB is based primarily on the Green Book approach. The template facilitates greater standardisation across the companies in: determining whether an option is considered standard or non-standard civil engineering; how optimism bias is estimated / scaled-back; and the recording and costing of risks. The outputs of the template consist of 2 components, scaled back OB and P50 costed risk which then form the combined costed risk as shown in Table 3-1.

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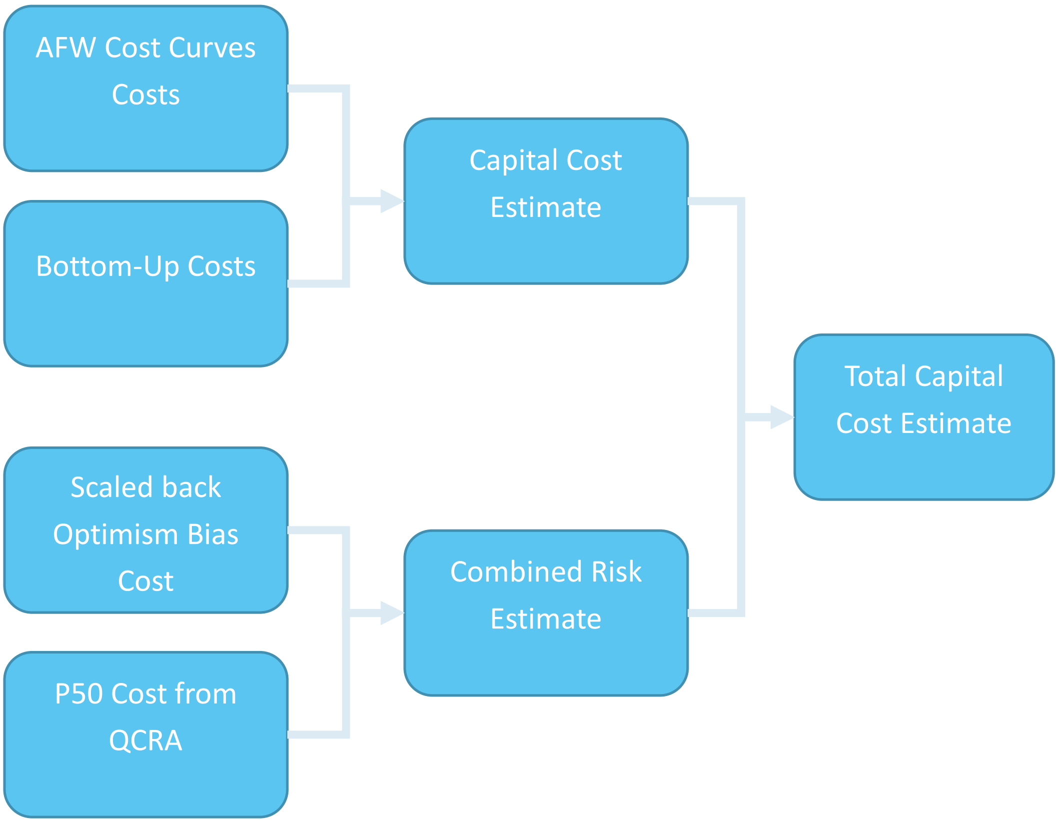
[2] 2022, Water Resources Planning Guidelines - Water Resources Planning Tables – Instructions, V5

[3] 2021, Cost Consistency Methodology, Technical Note and Methodology, Rev E

Figure 2-2: Total Capital Cost Estimate Process



2.20 The Opex estimates consist of fixed and variable components. Fixed Opex is the notional annual cost at zero throughput, hence at minimum throughput the estimated annual Opex would be the fixed Opex plus the variable Opex (expressed per unit of water produced) multiplied by the minimum flow rate.

3. Capital Cost

3.1 Capital cost estimate components

3.1 A single LRMC spreadsheet has been completed for each of the following option components for each flow alternative.

- Raw Water Pumping Station
- Water Treatment Works

3.2 Bottom-up Costs have been produced for each of the following option components for each flow alternative.

- Raw Water Transfer Main
- Drinking Water Transfer Main

3.2 LRMC cost

3.3 For each element of the components, the relevant cost curve was identified together with the appropriate input variables, derived from the concept design. This information was then entered into the LRMC spreadsheet tool to generate estimates of Capex and Opex.

3.4 The power consumption used to calculate Opex has been calculated separately to enable the application of incremental changes in energy.

3.5 The Capex cost base date for the LRMC sheets is 2017/2018. In order that all costs are reported against the same cost base (2020/21) a Capex inflation factor of 1.1 has been applied. The inflation factor provided by WRSE has been applied across all SROs.

3.3 Bottom-up cost

3.6 Where appropriate, bottom-up engineering cost estimates were made based on (a) Mott MacDonald’s experience of implementing similar projects and (b) supplier quotes. Principal items included but were not limited to:

- River intake
- The shaft and tunnel associated with the RWPS and intake
- Materials and works associated with the Raw Water Transfer Main and Drinking Water Transfer Main including any crossing requirements e.g., micro tunnelling under a railway
- Surge mitigation measures
- Land purchase and compensation
- Demolition and site clearance

- Sustainable drainage system (SuDS)
- Remediation of existing contaminated land.

3.7 As quotes have been received based on current day prices and in order that all costs are reported against the same cost base (2020/21) a Capex deflation factor of 0.94 has been applied to all bottom-up costs. The deflation factor provided by WRSE has been applied across all SROs.

3.4 On-cost

3.8 To ensure on-costs for LRMC and bottom-up items are applied consistently, bottom-up cost items had both client and contractor on-costs added to them whilst LRMC items remain unchanged. Affinity Water's LRMC cost curves are based on historic Affinity Water projects and incorporate 'all-in outturn' costs (construction costs, contractor and client on-costs, realised risk, plus project-related corporate overheads) for both whole new processes and periodic replacement of individual assets.

3.9 On costs include items such as:

- Contractor on-cost
    - Staff & supervision
    - Design
    - Welfare, offices, services & facilities
    - Temporary compounds & access roads
- Client on-costs
    - Project / programme management
    - Company overheads
    - Indirect costs

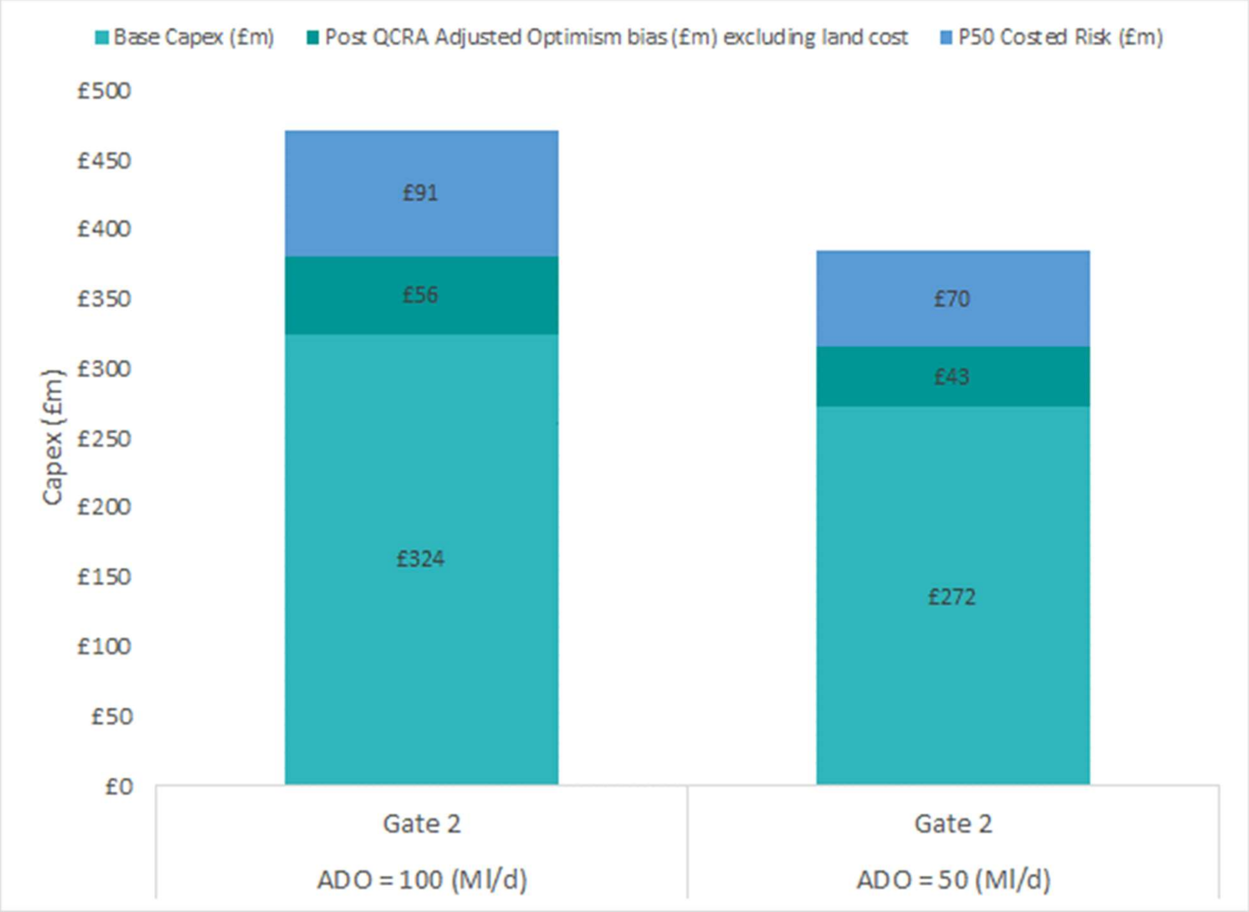
3.5 Summary of capital cost estimates

3.10 The estimated Capex for the 100Ml/d and the 50Ml/d ADO alternatives, including OB, are shown in Table 3-1 and Figure 3-1,. Note that all cost estimates are to a 2020/21 cost base. The Gate 2 Post QCRA adjusted OB value is calculated based on base Capex costs, excluding land costs.

Table 3-1: Estimated Capex (2020/21 cost base) for 100Ml/d and 50Ml/d ADO alternatives

ADO (Ml/d)	Base Capex (£m)	Post QCRA Adjusted OB (%)	Post QCRA Adjusted OB excluding land cost (£m)[4]	P50 Costed Risk (£m)	Total Capex (£m)
100	324	25%	56	91	471
50	272	25%	43	70	385

Figure 3-1: Estimated Capex (2020/21 cost base) for 100Ml/d and 50Ml/d ADO alternatives



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[4] Land costs have been excluded from the OB cost calculation.

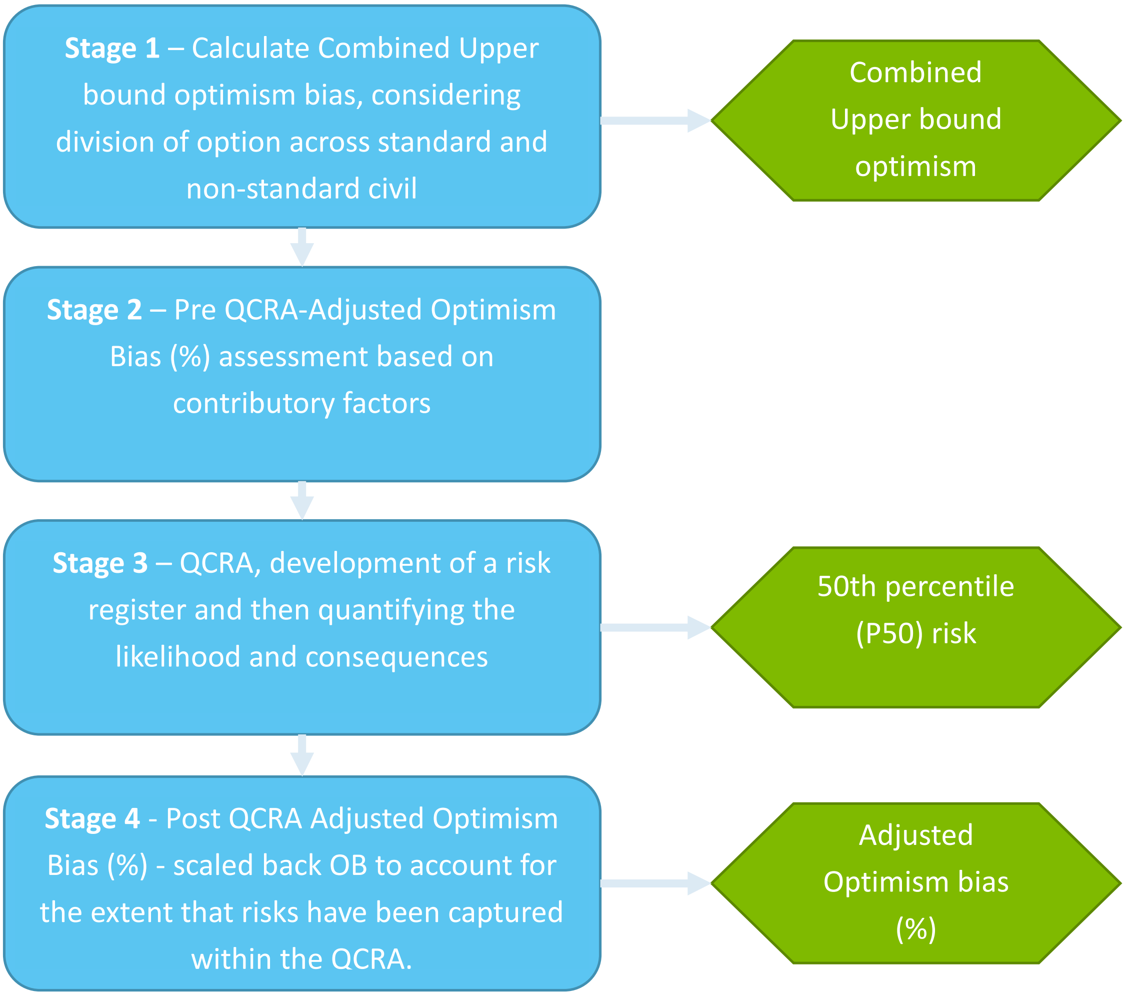
4. Quantitative Costed Risk Assessment and Optimism Bias Assessment

4.1 Approach to Quantitative Costed Risk Assessment and Optimism Bias

4.1 A consistent multistage approach (Figure 4-1) to risk and optimism bias has been applied based upon the approach recommended by the HM Treasury Green Book.

4.2 Both Optimism Bias (OB) as a percentage of Capex estimates and costed risk have been assessed to cover the risk of cost increases that may occur during the development and delivery of the selected option. To ensure a degree of consistency across the different SROs, the ACWG has provided guidance and a spreadsheet template for capturing the Quantitative Costed Risk Assessment (QCRA) and calculating OB[5].

Figure 4-1: Multistage approach to risk and optimism bias



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[5] ACWG (2021), Appendix A-1 - Optimism Bias and QCRA Template - Rev C.xlsx

4.3 Stage 1 - In most instances as shown in Figure 4-1, the OB calculation requires option components to be classified as standard or non-standard, depending on the complexity of implementing the scheme. The exception is where a component has a mixture of standard and non-standard elements, and the cost of both types of elements is greater than 35% of the total Capex. In this case the OB needs to be determined according to the proportion of standard and non-standard elements. Standard projects have a maximum OB allowance of 44% of Capex whilst for non-standard projects the maximum is 66%.

4.4 To provide consistency with Affinity Water's WRMP24 schemes each asset has been assigned to a particular type of infrastructure in accordance with the ACWG guidance. The infrastructure types for the T2AT assets are shown in Table 4-1.

Table 4-1: Optimism bias option asset classification

Component	Infrastructure type and rational	Standard or non-standard
Raw Water Pumping Station	Shaft digging on an operational WTW site with space constraints.	Non-standard
Raw Water Transfer Main	Bulk transfers of raw or treated water through an operational WTW site with space constraints.	Non-standard
Water Treatment Works and Drinking Water Pumping Station	Conventional water and wastewater treatment on a brownfield site with demolition, space constraints and potential ground contamination.	Non-standard
Drinking Water Transfer Main	Bulk transfers of raw or treated water with acceptable constraints.	Standard

4.5 Stage 2 – The 'Optimism Bias Tab' within the template is used to consider the proportion of the cost that falls within the different confidence bandings (high/medium/low) as described in the tab itself.

4.6 Stage 3 – The ACWG has prepared a uniform method for determining specific risk allowances in the form of a Quantified Costed Risk Assessment (QCRA) table[6]. Completion of the QCRA requires the identification and assessment of the likely

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[6] ACWG (2021), Appendix A-1 - Optimism Bias and QCRA Template - Rev C.xlsx

impact of each risk and its probability of occurrence. This allows a value (as a percentage of Capex) to be determined relating to each of the risks identified. As part of this stage, two workshops were held with representatives from the engineering, land and planning, terrestrial and aquatic environment work streams in attendance.

- Workshop 1: This focused on briefing other workstreams on the ACWG process, agreeing QCRA risks and opportunity inclusion. A review of description (nature of the risk, including cause and event), potential consequence, risk response strategy, risk owner (by workstreams). To facilitate this workshop the QCRA was initially populated by the engineering workstream.
- Workshop 2: This focused on agreement of any additional content identified by the workstreams, the verification of the work stream scoring and cost banding.

4.7 Subsequent to the workshops the @Risk tool is used to calculate the P50 costed risk output.

4.8 Stage 4 – Consideration is made to the extent that contributory factors for OB identified in Stage 2 can be scaled back to account for the extent that risks have been identified, understood and managed in Stage 3. During the development of the scheme, contributory factors which make up the OB allowance will be displaced by more specific calculated risk amounts in the QCRA. The scaling back of optimism bias to account for QCRA entries provides the post QCRA adjusted OB. The adjusted OB is then added to the base Capex and the P50 costed risk to give the total capital cost estimate.

4.9 At this early stage of working solution development opportunities are not captured within the costs, however they have been recorded, some of which are documented in the Technical Supporting Document (A1b) - Concept Design Report and Technical Supporting Document (A3b) – Carbon Strategy Report.

4.2 Summary of optimism bias

4.10 Application of the above process has resulted in the OB percentages shown in Table 4-2.

Table 4-2: Optimism bias for 100Ml/d and 50Ml/d ADO alternatives

ADO (Ml/d)	Pre QCRA Adjusted OB (%)	Post QCRA Adjusted OB (%)
100	36	25
50	35	25

4.11 Note that the contributory factors to OB have the same confidence level for both 50Ml/d and 100Ml/d capacities and hence the OB allowance is the same.

4.3 Summary of key costed risks

4.12 Table 4-3 summarises the top 10 risks in the QCRA from Stage 3 of the process, these and others shall be targeted for further investigation post Gate 2. The QCRA currently has 41 live items identified.

Table 4-3: Top 10 risks from the QCRA

No	Description	Consequence
1	Unexpected below ground clashes or constraints applied by 3rd parties - Works within close proximity to other significant infrastructure which that utility deems high risk. Proposed design does not comply with restrictions imposed by the utility company.	Results in re-design, additional approvals, construction can be delayed and additional costs incurred. May alter proposed plans for crossings e.g., route, structural designs (e.g. thrust blocks), hydraulics and / or changes to land noticing. There may be protracted legal negotiations to agree risk liabilities and insurances, requiring additional trenchless crossings and / or re-design of existing.
2	Land compensation: An unknown number of stakeholders and landowners to engage with for construction of WTW and pipeline.	Cost of stakeholder engagement and land acquisition / compensation is higher than anticipated. Local community challenges. Potential for delays in start of construction. Development may be obstructed leading to delays and extra costs or at worst, non-viability.
3	Failure to obtain power supply: planned power requirements prove to be inadequate to support the new development or the backup power provision. The estimate for the upgrade to the network is insufficient.	DNO needs to do upstream reinforcement work, on a site which may not have sufficient space to accommodate DNOs equipment and therefore may require more land. Results in re-design, programme delay and additional costs.

No	Description	Consequence
4	Requirement to change intake design e.g. weir within the River Lee or abstraction from King George reservoir.	Increased risk of WFD deterioration. Rejection of proposal by the EA. Conflict / non-compliance with established measures to remove/alter barriers to improve fish passage. Results in re-design and additional costs incurred.
5	Unexpected above ground point bottlenecks or constraints applied by 3rd parties. Current assumption is that all major crossings can be undertaken using no dig solutions, this may prove to be incorrect.	Results in re-design, programme delay and additional costs.
6	Unexpected Ground conditions: Currently limited GI available. The type of contaminated Land at WTW and along pipeline route is unknown. Assumption that most of the excavated material can be reused may not be overoptimistic.	Differential settlement due to heave may preclude the use of shallow foundations or require special measures. Current foundation design assumptions not valid. Additional remediation of ground contamination required. Contaminated material excavated from uncharted landfill sites requires suitable handling and disposal. Results in re-design, programme delay and additional costs.
7	Further resilience / DWI & AFW /DWQ risk assessment dictates requirement for additional raw water risk mitigation measures e.g. 3 days of raw water storage or additional treatment, shared use of raw water reservoir.	Additional land required together with associated environment and community impact assessment. Results in re-design, programme delay and additional costs.
8	Logistics - Proposed access to site is inadequate requiring transport network upgrades.	Results in re-design, programme delay and additional costs.

No	Description	Consequence
9	Delays to 3rd party granting permits / consents: Delays in obtaining (or failure to secure) discharge / abstraction consents.	Development may be obstructed leading to delays and extra costs or at worst, non-viability. Delays to processing crossing permissions or regulator consents could cause construction to be suspended at local points.
10	Unknown downstream demand or delayed delivery of downstream infrastructure. Increased emergency storage required upon network reconfiguration as part of connect 2050.	Inability to distribute the full capacity to customers. Inappropriately sized assets. Re-design, delays and additional costs.

4.4 Risk management

4.13 In order to further develop our risk understanding, a number of post Gate 2 activities have been identified, the proposed work breakdown is detailed in Supporting Document F: Project Delivery Plan. The Supporting Document F: Project Delivery Plan focuses on the key aspects of the risk registers, discussing the highest priority risks and what activity is being undertaken to mitigate the major cost and programme risks during future phases of the project.

4.14 Below are examples of post Gate 2 activities, which shall be used to inform future risk assessments;

- Environmental and engineering site surveys, including:
  - Walkover surveys
  - Ground investigations
  - Groundwater and surface water monitoring
  - Asset location and condition surveys
  - Geophysical survey and planning archaeological evaluation surveys
  - Ecological, biodiversity and arboriculture surveys
  - Further raw water quality sampling
- Topographical survey, especially of watercourses and river structures
- Initial non-statutory consultations and liaison with affected stakeholders
- Further early contractor engagement
- Further modelling of need and alternatives, as required, using WRSE regional system simulator and investment model, to reflect commentary from public consultations on WRSE and WRMP strategic plans

5. Operational Cost Estimate

5.1 Operational cost estimate components

5.1 In the Affinity Water LRMC cost model, fixed Opex consists of:

- Operational staff cost
- Maintenance staff cost and consumables
- Compliance and operational sampling and testing

5.2 Variable Opex consists of:

- Power cost
- Treatment chemicals
- Abstraction licencing
- Sludge disposal licencing
- Contracted maintenance

5.3 The LRMC spreadsheet tool was found to produce poor estimates of power cost because the cost curve driver is flow only, whereas power is a function of flow and pumping head. The power utilisation was therefore calculated separately and fed into the model as an external input.

5.4 The cost base date for the LRMC sheets is 2017/2018. In order that all Opex costs are reported against the same cost base (2020/21) an Opex inflation factor of 1.07 has been applied. The Opex inflation factor provided by WRSE has been applied across all SROs.

5.5 Apart from the substitution of the power cost mentioned above, no other additions or subtractions were made to the Opex estimates provided by the LRMC spreadsheet tool.

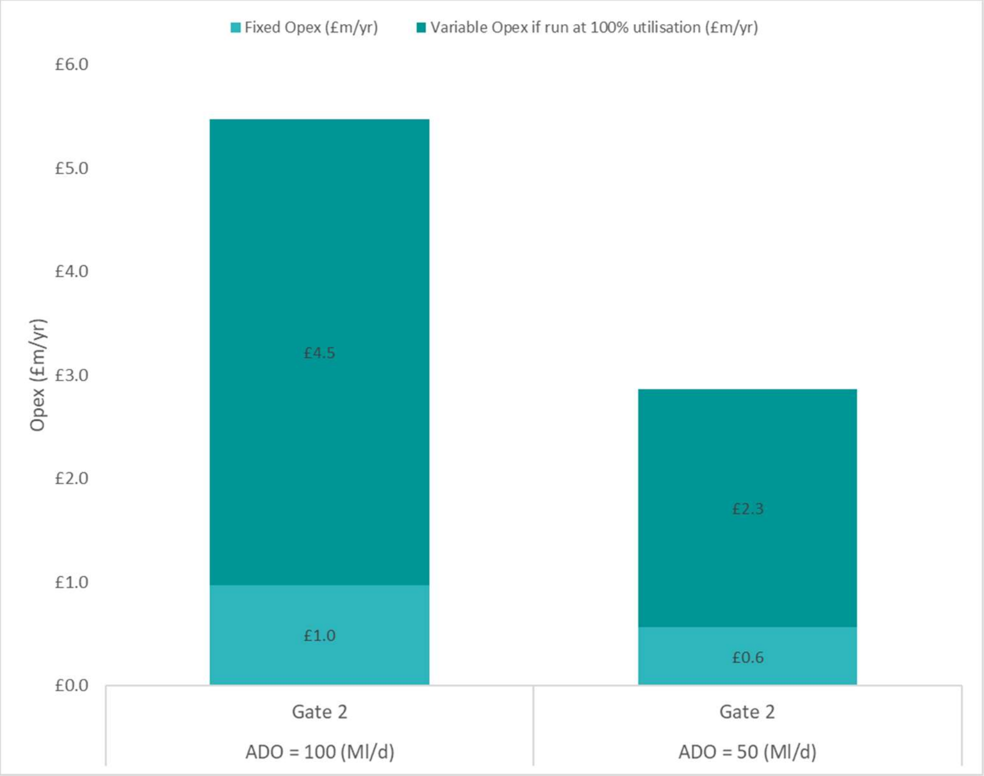
5.2 Summary of operational cost estimate

5.6 The Opex for each of the options for the 100Ml/d ADO and the 50Ml/d ADO alternatives are shown in Table 5-1 and Figure 5-1 below. Note that all estimates are to a 2020/21 cost base. The variable Opex is given for the options running at their full capacity.

Table 5-1: Opex (2020/21 cost base) for 100Ml/d and 50Ml/d ADO alternatives at 100% Utilisation

ADO (Ml/d)	Fixed Opex (£m/yr)	Variable Opex (p/m^3)	Variable Opex if run at 100% utilisation (£m/yr)	Total Opex if run at 100% utilisation (£m/yr)
100	1.0	10.7	4.5	5.5
50	0.6	10.8	2.3	2.9

Figure 5-1: Opex (2020/21 cost base) 100Ml/d and 50Ml/d ADO alternatives at 100% Utilisation



6. Net Present Value and Average Incremental Cost

6.1 NPV and AIC have been calculated for each component using the standard calculation template provided by the ACWG[7].

6.2 The base date for Capex and Opex cost estimates is 2020/21.

6.3 Capital costs are converted into a financing charge and depreciation charge as set out in Section 6.3 of the ACWG Cost Consistency Methodology[8] using asset life categories defined in Table 6-3[8].

6.4 Elements of the option have been mapped to Opex and Capex sub-metric categories defined for WRMP24 reporting.

6.5 Discount rates and associated discount factors used align with Table 7 of the HM Treasury Green Book (2020)[8].

6.6 The NPV and AIC costs have been calculated for (a) 100% utilisation and (b) the best estimate of operational utilisation.

6.7 Optimism bias is included in the calculation.

6.8 The PR19 final determination Weighted Average Cost of Capital (WACC) of 2.92% is used in the calculation of financing costs[8].

6.1 Appraisal period and Investment profile

6.9 The appraisal period is taken as 80 years from the start of the planning stage. The earliest completion date is expected to end in 2034[9]. The option is assumed to be operational after 11 years from the start of the planning stage.

6.10 AIC of an option includes the costs for all stages (Planning, Development and 'Construction & Operation') of an option.

6.11 The scheme is likely to be progressed as a Development Consent Order (DCO) rather than via a conventional planning application, therefore the LRMC investment profile has been adapted to account for this, the output of which is shown in Figure 6-1[10].

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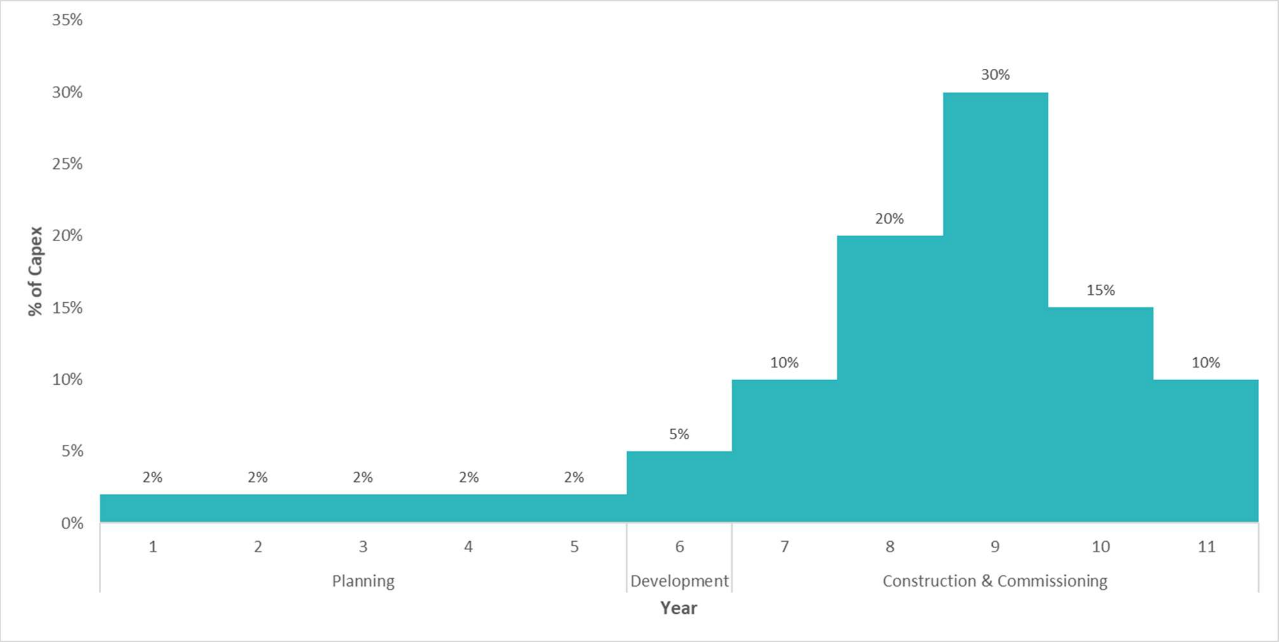
[7] ACWG (2021), One Scheme AIC RevC Template.xlsx

[8] ACWG (2021) - Cost Consistency Methodology - Rev E

[9] For illustrative purposes only

[10] Investment profile is indicative only to facilitate multi-solution decision making and will be refined at Gate 2

Figure 6-1: Option Investment Profile



6.2 100% utilisation scenario

6.12 For 100% utilisation, the option is assumed to operate at 100% of capacity every day from the date that the asset becomes operational. The 100% utilisation figures allow comparison with other SROs at Gate 2, which have been calculated on the same basis.

6.13 NPV and AIC costs for the option, if implemented and operated at 100Ml/d or 50Ml/d DO, are shown in Table 6-1. The NPV values are shown graphically in Figure 6-3.

Table 6-1: NPV & AIC (2020/21 cost base) for 100% utilisation scenario

ADO (Ml/d)	Option benefit (Ml at 100% capacity)	NPV Capex (£m)	NPV Opex (£m)	Total NPV (£m)	AIC (p/m3)
100	680,000	394	90	484	63
50	340,000	318	47	365	94

6.3 Estimated operational utilisation scenario

6.14 It is not expected that the scheme will be used at 100% capacity for 100% of the time. If the T2AT scheme is modelled as the last source to be utilised, then there are significant periods during which the scheme is not called on at all. However, the nature of conventional drinking water treatment plant is such that it requires a considerable amount of time and cost to recommission when starting from zero throughput. Therefore, the scheme will always be operated at a minimum throughput of 25% of its full capacity.

6.15 Pipelines and service reservoirs also need a minimum throughput to avoid over-aging of the water within them. In general, drinking water should not be allowed to remain in the pipeline or service reservoir for more than three days, with an absolute maximum of seven days in abnormal circumstances. Longer periods are allowable for raw water pipelines.

6.16 NPV and AIC calculations for current best estimate of operational utilisation consider both the minimum throughput requirements and the forecast utilisation profile derived from results of the PyWR water resources modelling. For the 100 Ml/d alternative this gives the utilisation profile shown by the blue line in Figure 6-2 below.

Figure 6-2: Operational utilisation profile for the 100Ml/d DO

6.17 For the purposes of calculating Opex for the T2AT scheme, the profile has been simplified as shown by the green line in Figure 6-2. The simplified utilisation profile for each alternative is shown in tabular form in Table 6-2.

Table 6-2: Simplified utilisation profile for 50Ml/d ADO and 100Ml/d ADO alternatives

Utilisation (% of Capacity)	Proportion of time spent at utilisation (% of time)
0%	0%
25%	60%
40%	15%
70%	20%

100%	5%

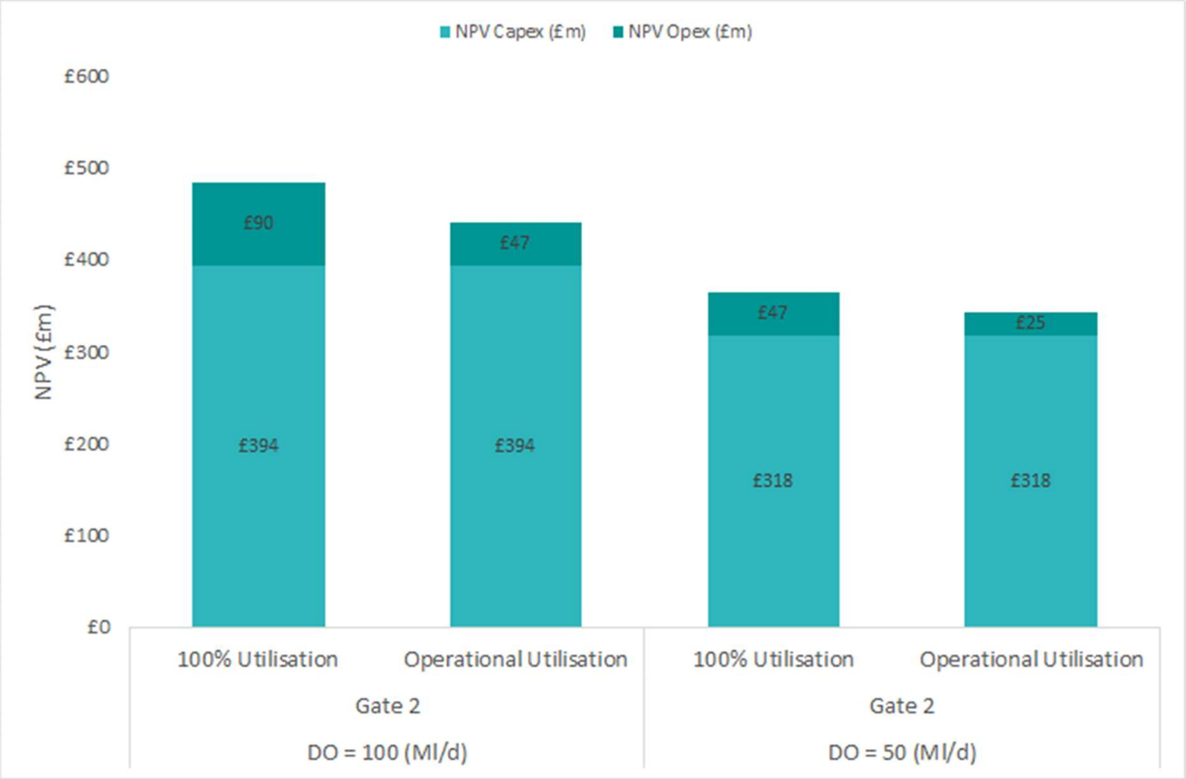
6.18 Note that the average utilisation is 40% for both alternatives. Further details of the modelling that supports this utilisation profile can be found in Section 4.4 of Technical Supporting Document (A1b) - Concept Design Report.

6.19 NPV and AIC costs for the options if implemented at 100Ml/d or 50Ml/d DO but operated at the estimated operational utilisation are shown in Table 6-3. The NPV values are also shown graphically in Figure 6-3.

Table 6-3: NPV and AIC (2020/21 cost base) at estimated operational utilisation

ADO (Ml/d)	Option benefit (Ml on full implementation)	NPV Capex (£m)	NPV Opex (£m)	Total NPV (£m)	AIC (p/m3)
100	680,000	394	47	441	57
50	340,000	318	25	343	87

Figure 6-3: Comparison of NPV (2020/21 cost base) for 100Ml/d and 50Ml/d alternatives, and 100% utilisation and estimated operational utilisation scenarios



6.20 For the estimated operational utilisation scenario, the Capex and fixed Opex NPV results are the same as for the 100% utilisation scenario, when comparing scenarios with the same ADO. The NPV of total planning period option benefit results are also the same because they relate to the water available for use rather than the amount of water actually delivered. The difference lies in the variable Opex results, which are ~50% of the full capacity values, leading to AIC values which are approximately ~90% of the AIC values for the options if operated at 100% utilisation.

6.21 As with all of the figures in this report, the results apply only to the treatment and transfer assets and do not take into account the upstream and downstream supporting infrastructure.

7. Change from Gate 1 and WRSE draft regional plan submission

7.1 Change from Gate 1 to Gate 2

7.1.1 Base Capital cost

7.1 The capex cost estimates at Gate 2 are based upon a much more granular concept design and a 'bottom-up' cost estimate of many of the main elements, compared to the approach used at Gate 1, which was based around more generic cost curves to ensure accurate comparison between options by WRSE. This has resulted in some cost increases since Gate 1, the most significant factors are summarised in *Table 7-1* **Error! Reference source not found.**below.

7.2 *Figure 7-1*, compares the Gate 2 Capex estimate with Gate 1 for the 50 and 100Ml/d alternatives. The Capex estimates have increased from Gate 1 to Gate 2 predominantly due to the movement of the WTWs from a greenfield site near Brookmans Park to brownfield site near Enfield and to a greater understanding of crossing complexity.

Table 7-1: Significant influencers to increased Capex

Description	% of overall CAPEX increase
The costs associated with land acquisition and compensation has increased significantly, now making up a significant proportion of the Capex. An allowance has been added for the rental of land for temporary works.	~60%
The pipeline length has increased by 30% between Gate 1 and 2 (20% increase between Gate 1 and Feb '22).	~22%
As a result of bottom-up estimating, the average cost of a crossing has increased by a factor of 3. The quantity of major crossings has increases by 55%	~14%
The relocation of the WTW from greenfield to a brownfield site to decrease environmental and planning risks has resulted in additional engineering complexity e.g., demolition and site clearance, along with contaminated ground processing.	~3%
An allowance has been added for a shaft and tunnel at the intake.	~1%

7.3 Other influencing factors include.

a) An addition ~4Km length of transfer main between Brookmans Park and North Mymms has been incorporated. The most significant factors are captured below.

b) The latest AFW Long-run marginal cost (LRMC) sheets have been used incorporating improved cost curves[11].

c) A ~15% increase in capacity for the treatment works and pipelines following additional DO modelling.

d) A 55% increase in the quantity of major crossings and a greater understanding of the engineering complexity, in addition to the new transfer main between Brookmans Park and North Mymms has resulted in a ~22% increase in pipeline length. The desire to avoid planning and environmental constraints has also influenced the refined pipeline corridor.

e) An allowance has been added for environmental mitigation measures and landscaping at the WTWs and intake.

f) Backup generator has been replaced by a dual power supply.

7.4 Further details of how the concept design was refined from Gate 1 to Gate 2 can be found in the Technical Supporting Document (A5) – Options Refinement Report.

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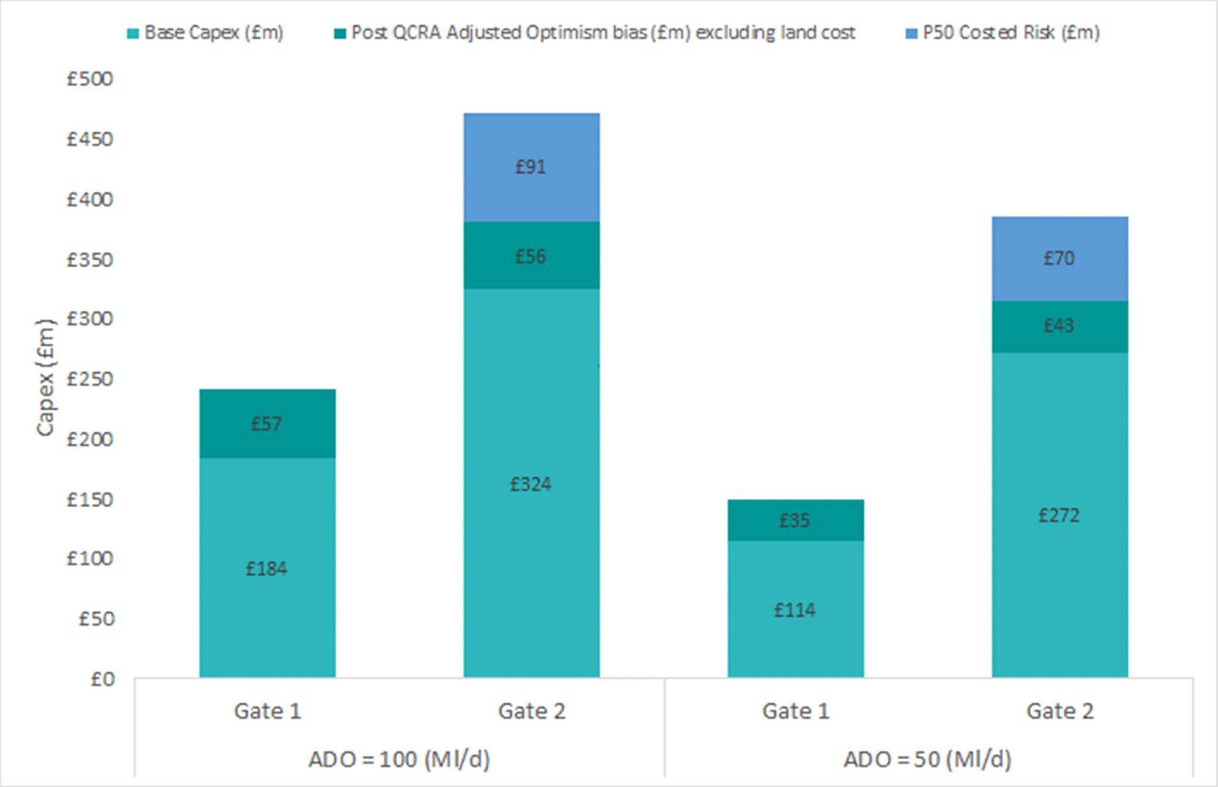
[11] Included in Feb '22 WRSE update.

Figure 7-1: Capex (2020/21 cost base) comparison with Gate 1



7.1.2 Costed risk and optimism bias

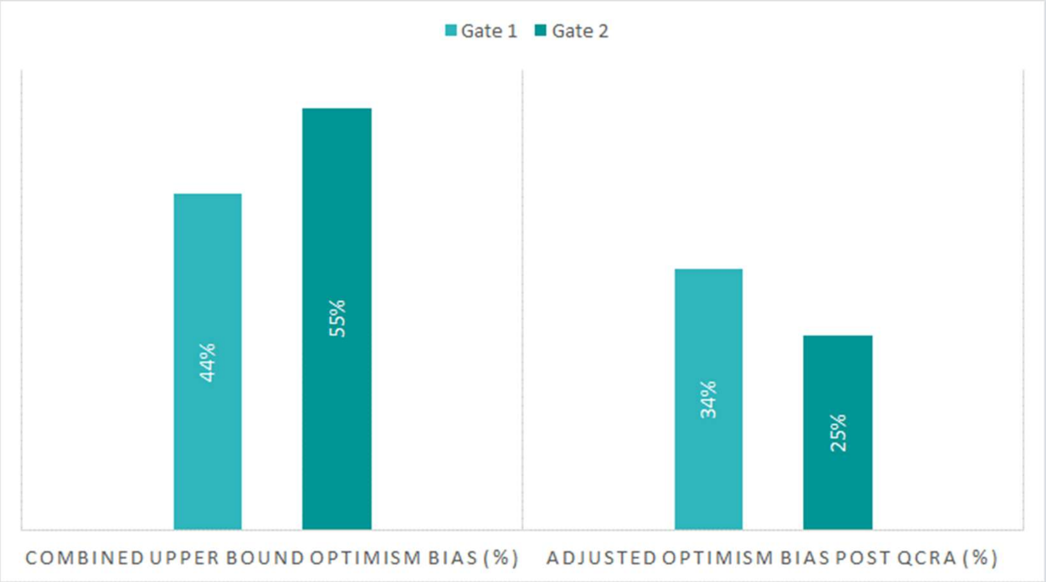
7.5 Figure 7-2, compares the Gate 2 Combined Upper Bound Optimism bias (CUBOB) with Gate 1 CUBOB for the 50 and 100Ml/d alternatives. The CUBOB estimates have increased from Gate 1 to Gate 2 predominantly due to the relocation of the WTW from a greenfield to a brownfield site. This has resulted in additional engineering complexity due to space constraints, piling of foundations, demolition works and site clearance including potential ground contamination.

7.6 The number of major crossings and a greater understanding of the engineering complexity has also influenced OB.

7.7 The cost related to OB is relative to base Capex (excluding land costs), therefore as base Capex has increased the cost related to OB has increased.

7.8 A QCRA has been produced for Gate 2, this was not available at Gate 1. The adjusted OB % at Gate 2 is slightly lower than that of Gate 1 as the QCRA now accounts for some elements of OB.

Figure 7-2: Optimism Bias comparison with Gate 1



7.1.3 Operational cost

7.9 Changes to operating costs since Gate 1 are less pronounced than capex, but are driven by factors such as a ~15% increase in capacity for the treatment works and pipelines following additional DO modelling.

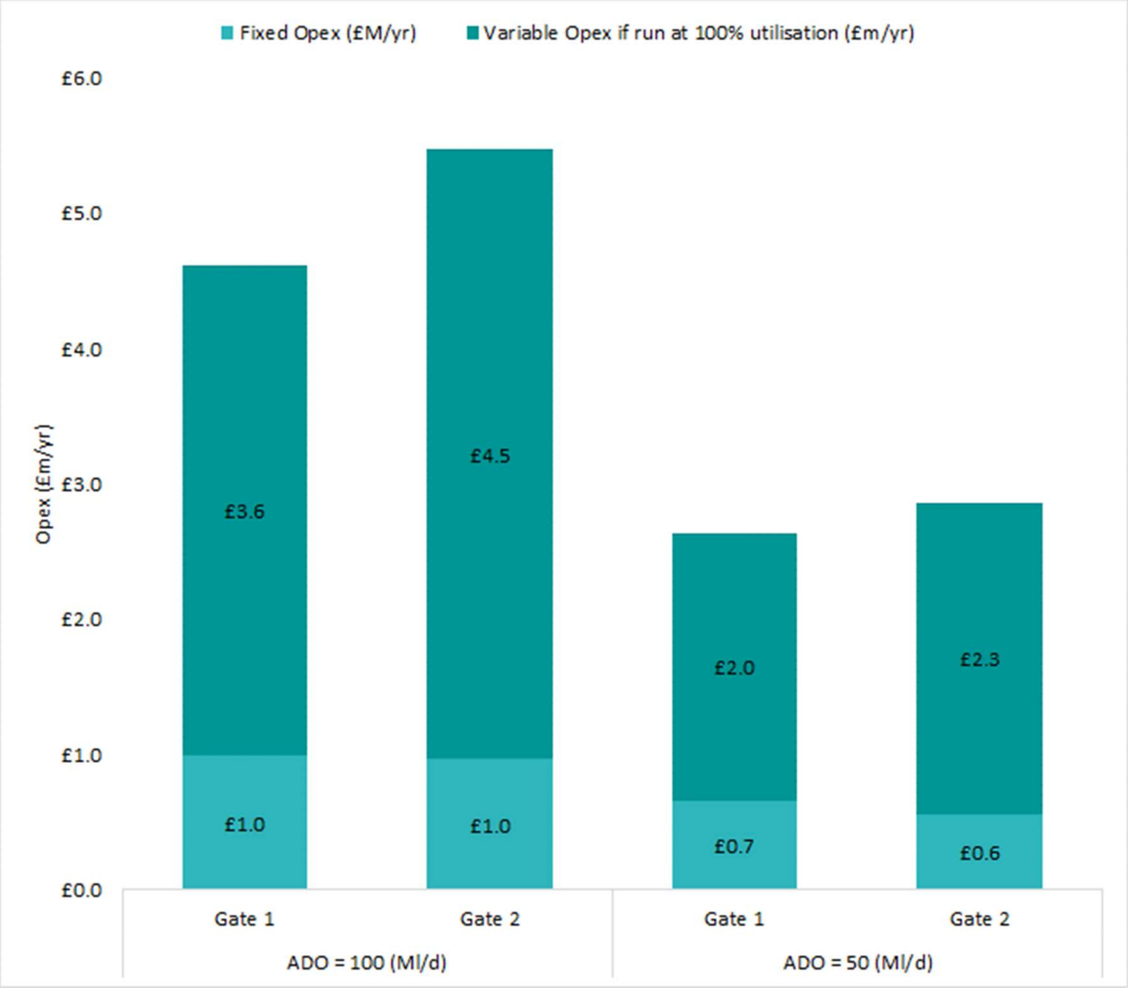
7.10 *Figure 7-3*, compares the Gate 2 Opex with Gate 1 for the 50 and 100Ml/d alternatives. Between Gate 1 and Gate 2 the total Opex estimates has increased for both the 100Ml/d and 50Ml/d alternatives. The most significant factors are captured below.

a) A ~15% increase in capacity for the treatment works and pipelines following additional DO modelling[12].

b) The latest AFW Long-run marginal cost (LRMC) sheets have been used incorporating improved cost curves[12].**Error! Bookmark not defined.**

c) Amendment to include an additional transfer of potable water from North Mymms to Brookmans Park[12].

Figure 7-3: Opex (2020/21 cost base) comparison with Gate 1



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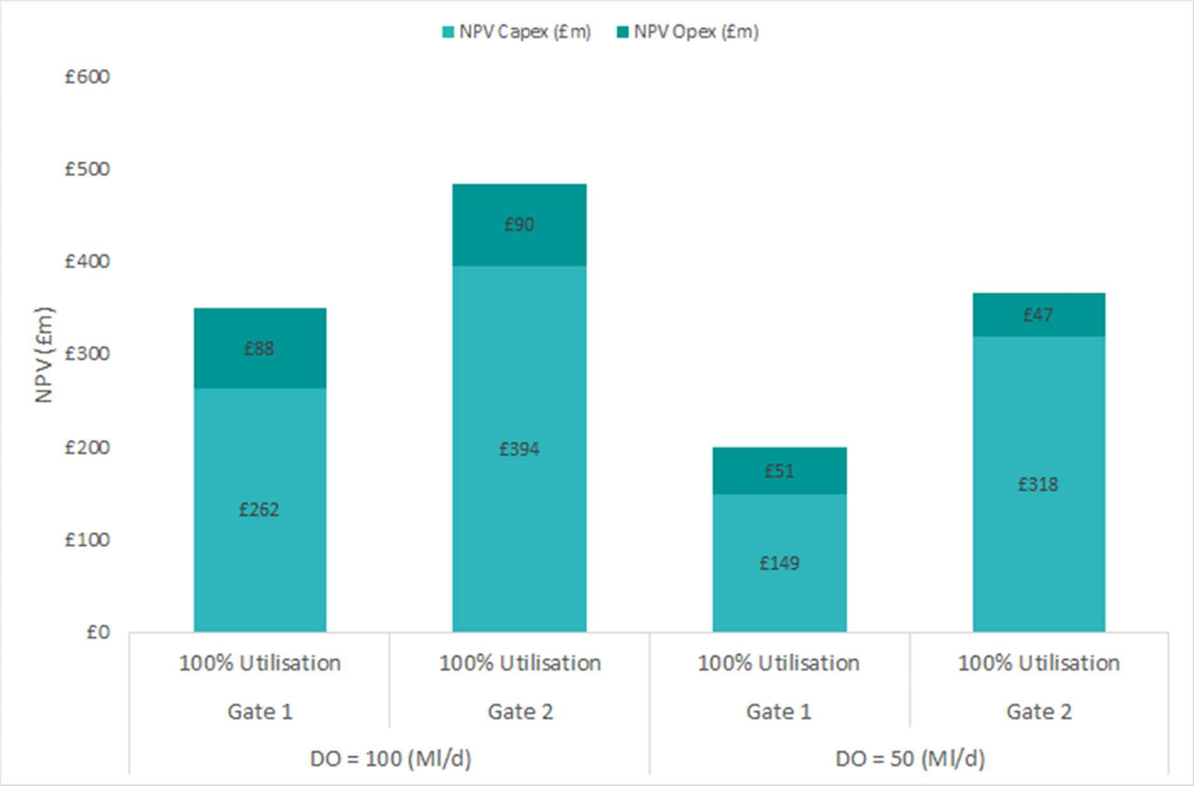
[12] Included in Feb '22 WRSE update.

7.1.4 Average Incremental Cost

Figure 7-4, shows the increases in NPV and AIC from Gate 1 to Gate 2 to for further details of these increases refer to section 7.1.1, 7.1.2 and 7.1.3 above.

Figure 7-4: NPV & AIC (2020/21 cost base) comparison with Gate 1 for 100% utilisation scenario



7.2 Change from WRSE draft regional plan submission to Gate 2

7.11 The primary increases in Capex cost are as a result of changes from WRSE draft regional plan to the Gate 2 submission, the most significant factors are summarised in *Table 7-1* above. The three exceptions are factors a, b and c in Section 7.1.1 above, that were also captured in the WRSE draft regional plan.

7.12 The primary decreases in Opex cost are as a result of changes from WRSE draft regional plan to the Gate 2 submission, the most significant factors are summarised in Section 7.1.3 above. The three exceptions are factors a, b and c in Section 7.1.3 that were also captured in the WRSE draft regional plan.

7.13 The CUBOB estimates have increased from WRSE draft regional plan submission to Gate 2 predominantly due to the relocation of the WTW from a greenfield to a brownfield site. This has resulted in additional engineering complexity due to space constraints, piling of foundations, demolition works and site clearance including potential ground contamination. The cost related to OB is relative to base Capex (excluding land costs), therefore as the most significant increase in base Capex has occurred since the WRSE draft regional plan submission the cost related to OB has also increased.

7.14 A QCRA has been produced for Gate 2, this was not available for the WRSE draft regional plan submission. The adjusted OB % at Gate 2 is slightly higher than that of WRSE draft regional plan submission as the QCRA now accounts for some elements of OB.

Appendix A WRMP 24 Tables 5a and 5b

Cost Profile WRMP24 Table

Water Company	Thames & Affinity Water	Version	V2.0

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Table 5a: WC Level - Option Level Cost Profile Table

Table Instruction	Option ID	Option Name	Cost Metric (£m)	Cost Sub-metric (£m)	Asset Life: Estimated average number of years an asset is considered useable before its value is fully depreciated.	Total/Fixed/ Variable	2019-20	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45	2045-46	2046-47	2047-48	2048-49	2049-50	2050-51	2051-52	2052-53	2053-54	2054-55	2055-56	2056-57	2057-58	2058-59	2059-60	2060-61	2061-62	2062-63	2063-64	2064-65	2065-66	2066-67	2067-68	2068-69	2069-70	2070-71	2071-72	2072-73	2073-74	2074-75	2075-76	2076-77	2077-78	2078-79	2079-80	2080-81	2081-82	2082-83	2083-84	2084-85	2085-86	2086-87	2087-88	2088-89	2089-90	2090-91	2091-92	2092-93	2093-94	2094-95	2095-96	2096-97	2097-98	2098-99	2099-00	2100-01	2101-02	2102-03
Complete for all options (Feasible and preferred)	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Capex			Total		3.4061	3.4061	3.4061	3.4061	84.942	8.5154	17.031	34.061	51.092	25.546	17.031	0	0	0	0.6954	0	0	0	0.6954	0	0.8501	0	0.6954	0	0	0	0.6954	0	0	0	8.2399	0	0	0	0.6954	2.8762	0	0	0.6954	0	1.4562	0	0.6954	0	0	0	0.6954	0	0	0	8.2399	0	0	0	0.6954	0	0	0	0.6954	0	5.2006	0	0.6954	0	0	0	0.6954	0	0	0	45.868	0	0	0	0.6954	0	0	0	0.6954	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Opex			Total		0	0	0	0	0	0	0	0	0	0	0	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.53496486
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Financing Cost			Total		0.0827	0.2481	0.4134	0.5788	2.2348	4.0149	4.635	5.8753	7.9424	9.8029	10.836	14.04	13.957	13.874	13.804	13.735	13.652	13.569	13.499	13.429	13.362	13.295	13.225	13.155	13.072	12.99	12.92	12.85	12.767	12.684	12.752	12.82	12.738	12.655	12.585	12.568	12.538	12.455	12.385	12.315	12.259	12.203	12.133	12.063	11.98	11.898	11.828	11.758	11.675	11.592	11.66	11.728	11.646	11.563	11.493	11.423	11.34	11.258	11.188	11.118	11.13	11.143	11.073	11.003	10.92	10.837	10.767	10.697	10.615	10.532	11.288	12.044	11.961	11.879	11.809	11.739	11.656	11.573	11.503	11.4333399
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Discount Rate			Total		0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.025	0.025	0.025	0.025	0.025
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Discount Factor			Total		0.9662	0.9335	0.9019	0.8714	0.842	0.8135	0.786	0.7594	0.7337	0.7089	0.6849	0.6618	0.6394	0.6178	0.5969	0.5767	0.5572	0.5384	0.5202	0.5026	0.4856	0.4692	0.4533	0.438	0.4231	0.4088	0.395	0.3817	0.3687	0.3563	0.3459	0.3358	0.326	0.3165	0.3073	0.2984	0.2897	0.2812	0.2731	0.2651	0.2574	0.2499	0.2426	0.2355	0.2287	0.222	0.2156	0.2093	0.2032	0.1973	0.1915	0.1859	0.1805	0.1753	0.1702	0.1652	0.1604	0.1557	0.1512	0.1468	0.1425	0.1384	0.1343	0.1304	0.1266	0.1229	0.1193	0.1159	0.1125	0.1092	0.106	0.1029	0.1	0.097	0.0942	0.0919	0.0897	0.0875	0.0854	0.08327125
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Capex	Costed Risk		Total		1.3982	1.3982	1.3982	1.3982	1.3982	3.4955	6.9911	13.982	20.973	10.487	6.9911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Capex	Optimism Bias		Total		0.859	0.859	0.859	0.859	21.422	2.1476	4.2951	8.5903	12.885	6.4427	4.2951	0	0	0	0.1754	0	0	0	0.1754	0	0.2144	0	0.1754	0	0	0	0.1754	0	0	0	2.0781	0	0	0	0.1754	0.7254	0	0	0.1754	0	0.3673	0	0.1754	0	0	0	0.1754	0	0	0	2.0781	0	0	0	0.1754	0	0	0	0.1754	0	1.3116	0	0.1754	0	0	0	0.1754	0	0	0	11.568	0	0	0	0.1754	0	0	0	0.1754	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Net Present Cost (NPC)			Total		0.0799	0.2316	0.3729	0.5044	1.8817	3.2661	3.6431	4.4618	5.8276	6.9494	7.4224	10.969	10.545	10.137	9.7529	9.3827	9.0194	8.6699	8.3403	8.0231	7.7192	7.4266	7.1438	6.8716	6.6042	6.3471	6.1048	5.8717	5.6426	5.4224	5.2879	5.1567	4.9796	4.8084	4.6468	4.5063	4.3663	4.2159	4.074	3.9368	3.8077	3.6828	3.5586	3.4384	3.3194	3.2043	3.0959	2.9911	2.8872	2.7868	2.7187	2.6521	2.5599	2.4709	2.387	2.3059	2.2255	2.1478	2.0747	2.004	1.9474	1.8924	1.8279	1.7655	1.7036	1.6438	1.5876	1.5333	1.4793	1.4272	1.4658	1.5009	1.4489	1.3987	1.3514	1.312	1.2726	1.2343	1.1982	1.16315815
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Total NPC			Total	317.08562																																																																																

Table 5b: WC Level - Option Level Unit Cost Profile Table

Table Instruction	Option ID	Option Name	Cost Metric (£m)	Cost Sub-metric (£m)	Asset Life: Estimated average number of years an asset is considered useable before its value is fully depreciated.		2019-20	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45	2045-46	2046-47	2047-48	2048-49	2049-50	2050-51	2051-52	2052-53	2053-54	2054-55	2055-56	2056-57	2057-58	2058-59	2059-60	2060-61	2061-62	2062-63	2063-64	2064-65	2065-66	2066-67	2067-68	2068-69	2069-70	2070-71	2071-72	2072-73	2073-74	2074-75	2075-76	2076-77	2077-78	2078-79	2079-80	2080-81	2081-82	2082-83	2083-84	2084-85	2085-86	2086-87	2087-88	2088-89	2089-90	2090-91	2091-92	2092-93	2093-94	2094-95	2095-96	2096-97	2097-98	2098-99	2099-00	2100-01	2101-02	2102-03
Complete for all options >£100m (Feasible and preferred)	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Opex	Cost		Fixed		0	0	0	0	0	0	0	0	0	0	0	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.562	0.56195811
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Opex	Cost		Variable		0	0	0	0	0	0	0	0	0	0	0	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.973	1.97300674
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Land (Non depreciating)			Fixed		0	0	0	0	102.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Planning and Development (Non depreciating)			Fixed		4.2652	4.2652	4.2652	4.2652	4.2652	10.663	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Other Non-Depreciating Assets (Non depreciating)			Fixed		0	0	0	0	0	0	1.2166	2.4331	3.6497	1.8248	1.2166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Process-Related Carbon Media Including GAC (4)		4	Fixed		0	0	0	0	0	0	0.1025	0.2049	0.3074	0.1537	0.1025	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0	0	0	0.8708	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Vehicles (4)		4	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Computers and Data Logging (4)		4	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Fencing (10)		10	Fixed		0	0	0	0	0	0	0.066	0.1321	0.1981	0.099	0.066	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0	0.5612	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Domestic Meters (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Building Services (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Membranes (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	ICA (Instrumentation, Control & Automation) (10)		10	Fixed		0	0	0	0	0	0	0.0592	0.1184	0.1776	0.0888	0.0592	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0	0.5032	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Plant and Machinery (15)		15	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	M&E (Mechanical and Electrical) Works on Pumping Stations and Treatment Works (20)		20	Fixed		0	0	0	0	0	0	0.9862	1.9724	2.9586	1.4793	0.9862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.3827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.3827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.3827	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Raw Water and District Meters (20)		20	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Power Supply (25)		25	Fixed		0	0	0	0	0	0	0.4237	0.8474	1.2712	0.6356	0.4237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.6016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.6016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Steel/Timber/GRP Structures (30)		30	Fixed		0	0	0	0	0	0	0.0151	0.0301	0.0452	0.0226	0.0151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1281	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Landscaping/Environmental Works (30)		30	Fixed		0	0	0	0	0	0	0.0742	0.1485	0.2227	0.1113	0.0742	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.631	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Borehole Screening and Casing (30)		30	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Bridges (40)		40	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Brick/Concrete Office Structures (50)		50	Fixed		0	0	0	0	0	0	0.2172	0.4344	0.6516	0.3258	0.2172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Treatment and Pumping Station Civils (incl. Intakes) (60)		60	Fixed		0	0	0	0	0	0	4.232	8.4639	12.696	6.348	4.232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35.972	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Roads and Car Parks (60)		60	Fixed		0	0	0	0	0	0	1.1922	2.3844	3.5766	1.7883	1.1922	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.134	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Water Towers (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Borehole Installation (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Headworks/Valves (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Underwater Assets (60)		60	Fixed		0	0	0	0	0	0	0.0298	0.0596	0.0895	0.0447	0.0298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2535	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Reinforced Concrete Tanks / Service Reservoirs (80)		80	Fixed		0	0	0	0	0	0	1.3465	2.693	4.0396	2.0198	1.3465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Weirs (100)		100	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Pipelines (100)		100	Fixed		0	0	0	0	0	0	7.9495	15.899	23.848	11.924	7.9495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Tunnels (100)		100	Fixed		0	0	0	0	0	0	3.4152	6.8304	10.246	5.1228	3.4152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Aqueducts (100)		100	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Embankment Works (250)		250	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_50	Costed Risk			Fixed		1.3982	1.3982	1.3982	1.3982	1.3982	3.4955	6.9911	13.982	20.973	10.487	6.9911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Cost Profile WRMP24 Table

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Table 5a: WC Level - Option Level Cost Profile Table

Table Instruction	Option ID	Option Name	Cost Metric (£m)	Cost Sub-metric (£m)	**Asset Life:** Estimated average number of years an asset is considered useable before its value is fully depreciated.	Total/Fixed/Variable	2019-20	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45	2045-46	2046-47	2047-48	2048-49	2049-50	2050-51	2051-52	2052-53	2053-54	2054-55	2055-56	2056-57	2057-58	2058-59	2059-60	2060-61	2061-62	2062-63	2063-64	2064-65	2065-66	2066-67	2067-68	2068-69	2069-70	2070-71	2071-72	2072-73	2073-74	2074-75	2075-76	2076-77	2077-78	2078-79	2079-80	2080-81	2081-82	2082-83	2083-84	2084-85	2085-86	2086-87	2087-88	2088-89	2089-90	2090-91	2091-92	2092-93	2093-94	2094-95	2095-96	2096-97	2097-98	2098-99	2099-00	2100-01	2101-02	2102-03
Complete for all options (Feasible and preferred)	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Capex			Total		4.4456	4.4456	4.4456	4.4456	85.891	11.114	22.228	44.456	66.684	33.342	22.228	0	0	0	1.2263	0	0	0	1.2263	0	0.9386	0	1.2263	0	0	0	1.2263	0	0	0	16.278	0	0	0	1.2263	3.4226	0	0	1.2263	0	1.5448	0	1.2263	0	0	0	1.2263	0	0	0	16.278	0	0	0	1.2263	0	0	0	1.2263	0	5.8356	0	1.2263	0	0	0	1.2263	0	0	0	65.048	0	0	0	1.2263	0	0	0	1.2263	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Opex			Total		0	0	0	0	0	0	0	0	0	0	0	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553	4.8553
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Financing Cost			Total		0.1079	0.3237	0.5395	0.7553	2.4618	4.3301	5.1394	6.7579	9.4555	11.883	13.232	17.774	17.655	17.537	17.44	17.344	17.226	17.107	17.011	16.915	16.813	16.712	16.616	16.52	16.401	16.282	16.186	16.09	15.972	15.853	16.032	16.212	16.093	15.974	15.878	15.845	15.789	15.67	15.574	15.478	15.388	15.297	15.201	15.105	14.986	14.868	14.772	14.676	14.557	14.438	14.618	14.797	14.678	14.56	14.464	14.367	14.249	14.13	14.034	13.938	13.926	13.914	13.818	13.722	13.604	13.485	13.389	13.293	13.174	13.055	14.127	15.199	15.081	14.962	14.866	14.77	14.651	14.533	14.436	14.34
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Discount Rate			Total		0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.025	0.025	0.025	0.025	0.025
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Discount Factor			Total		0.9662	0.9335	0.9019	0.8714	0.842	0.8135	0.786	0.7594	0.7337	0.7089	0.6849	0.6618	0.6394	0.6178	0.5969	0.5767	0.5572	0.5384	0.5202	0.5026	0.4856	0.4692	0.4533	0.438	0.4231	0.4088	0.395	0.3817	0.3687	0.3563	0.3459	0.3358	0.326	0.3165	0.3073	0.2984	0.2897	0.2812	0.2731	0.2651	0.2574	0.2499	0.2426	0.2355	0.2287	0.222	0.2156	0.2093	0.2032	0.1973	0.1915	0.1859	0.1805	0.1753	0.1702	0.1652	0.1604	0.1557	0.1512	0.1468	0.1425	0.1384	0.1343	0.1304	0.1266	0.1229	0.1193	0.1159	0.1125	0.1092	0.106	0.1029	0.1	0.097	0.0942	0.0919	0.0897	0.0875	0.0854	0.0833
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Capex	Costed Risk		Total		1.8176	1.8176	1.8176	1.8176	1.8176	4.5439	9.0878	18.176	27.263	13.632	9.0878	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Capex	Optimism Bias		Total		1.1274	1.1274	1.1274	1.1274	21.782	2.8185	5.6371	11.274	16.911	8.4556	5.6371	0	0	0	0.311	0	0	0	0.311	0	0.238	0	0.311	0	0	0	0.311	0	0	0	4.1281	0	0	0	0.311	0.868	0	0	0.311	0	0.3918	0	0.311	0	0	0	0.311	0	0	0	4.1281	0	0	0	0.311	0	0	0	0.311	0	1.4799	0	0.311	0	0	0	0.311	0	0	0	16.496	0	0	0	0.311	0	0	0	0.311	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Net Present Cost (NPC)			Total		0.1043	0.3022	0.4866	0.6582	2.0728	3.5225	4.0395	5.132	6.9378	8.4243	9.0633	14.976	14.393	13.833	13.308	12.803	12.304	11.824	11.374	10.941	10.522	10.118	9.7325	9.3613	8.9946	8.6419	8.3117	7.9939	7.6799	7.3779	7.2251	7.0748	6.8301	6.5936	6.372	6.1764	5.9803	5.7728	5.5784	5.3904	5.2102	5.0359	4.8659	4.7015	4.5374	4.3789	4.2307	4.0873	3.9442	3.8059	3.7294	3.6541	3.5263	3.4028	3.2873	3.1757	3.0642	2.9565	2.8558	2.7585	2.6765	2.5969	2.5084	2.4228	2.3372	2.2545	2.1774	2.1028	2.0282	1.9562	2.0129	2.0646	1.9926	1.9231	1.858	1.8039	1.7492	1.6962	1.6466	1.5984
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Total NPC			Total	426.8412																																																																																		

Table 5b: WC Level - Option Level Unit Cost Profile Table

Table Instruction	Option ID	Option Name	Cost Metric (£m)	Cost Sub-metric (£m)	**Asset Life:** Estimated average number of years an asset is considered useable before its value is fully depreciated.		2019-20	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45	2045-46	2046-47	2047-48	2048-49	2049-50	2050-51	2051-52	2052-53	2053-54	2054-55	2055-56	2056-57	2057-58	2058-59	2059-60	2060-61	2061-62	2062-63	2063-64	2064-65	2065-66	2066-67	2067-68	2068-69	2069-70	2070-71	2071-72	2072-73	2073-74	2074-75	2075-76	2076-77	2077-78	2078-79	2079-80	2080-81	2081-82	2082-83	2083-84	2084-85	2085-86	2086-87	2087-88	2088-89	2089-90	2090-91	2091-92	2092-93	2093-94	2094-95	2095-96	2096-97	2097-98	2098-99	2099-00	2100-01	2101-02	2102-03
Complete for all options >£100m (Feasible and preferred)	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Opex	Cost		Fixed		0	0	0	0	0	0	0	0	0	0	0	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Opex	Cost		Variable		0	0	0	0	0	0	0	0	0	0	0	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866	3.8866
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Land (Non depreciating)			Fixed		0	0	0	0	102.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Planning and Development (Non depreciating)			Fixed		5.573	5.573	5.573	5.573	5.573	13.933	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Other Non-Depreciating Assets (Non depreciating)			Fixed		0	0	0	0	0	0	1.1329	2.2658	3.3987	1.6994	1.1329	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Process-Related Carbon Media Including GAC (4)		4	Fixed		0	0	0	0	0	0	0.1809	0.3617	0.5426	0.2713	0.1809	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0	0	0	1.5373	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Vehicles (4)		4	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Computers and Data Logging (4)		4	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Fencing (10)		10	Fixed		0	0	0	0	0	0	0.0661	0.1322	0.1983	0.0992	0.0661	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0	0.5619	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Domestic Meters (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Building Services (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Membranes (10)		10	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	ICA (Instrumentation, Control & Automation) (10)		10	Fixed		0	0	0	0	0	0	0.0723	0.1447	0.217	0.1085	0.0723	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0	0.6148	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Plant and Machinery (15)		15	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	M&E (Mechanical and Electrical) Works on Pumping Stations and Treatment Works (20)		20	Fixed		0	0	0	0	0	0	2.0815	4.1629	6.2444	3.1222	2.0815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.692	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.692	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.692	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Raw Water and District Meters (20)		20	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Power Supply (25)		25	Fixed		0	0	0	0	0	0	0.5048	1.0096	1.5143	0.7572	0.5048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.2906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.2906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Steel/Timber/GRP Structures (30)		30	Fixed		0	0	0	0	0	0	0.0151	0.0302	0.0452	0.0226	0.0151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1282	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1282	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Landscaping/Environmental Works (30)		30	Fixed		0	0	0	0	0	0	0.0743	0.1486	0.2229	0.1115	0.0743	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6317	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6317	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Borehole Screening and Casing (30)		30	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Bridges (40)		40	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Brick/Concrete Office Structures (50)		50	Fixed		0	0	0	0	0	0	0.2174	0.4349	0.6523	0.3261	0.2174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8482	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Treatment and Pumping Station Civils (incl. Intakes) (60)		60	Fixed		0	0	0	0	0	0	5.8799	11.76	17.64	8.8199	5.8799	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49.979	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Roads and Car Parks (60)		60	Fixed		0	0	0	0	0	0	1.1935	2.3871	3.5806	1.7903	1.1935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.145	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Water Towers (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Borehole Installation (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Headworks/Valves (60)		60	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Underwater Assets (60)		60	Fixed		0	0	0	0	0	0	0.0299	0.0597	0.0896	0.0448	0.0299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2538	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Reinforced Concrete Tanks / Service Reservoirs (80)		80	Fixed		0	0	0	0	0	0	1.8473	3.6946	5.5419	2.7709	1.8473	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Weirs (100)		100	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Pipelines (100)		100	Fixed		0	0	0	0	0	0	10.409	20.817	31.226	15.613	10.409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Tunnels (100)		100	Fixed		0	0	0	0	0	0	4.1607	8.3214	12.482	6.2411	4.1607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Aqueducts (100)		100	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Embankment Works (250)		250	Fixed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AFW_AZ4_HI-ROC_WT1_CNO_BRI	BRI_100	Costed Risk			Fixed		1.8176	1.8176	1.8176	1.8176	1.8176	4.5439	9.0878	18.176	27.263	13.632	9.0878	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Affinity Water

Taking care of your water

Thames Water