

WSX-C03 – Overall approach to costing

Response to
Ofwat's PR24 draft
determination



Wessex Water
YTL GROUP

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Representation title: Overall approach to costing

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1. Cost Estimating Methodology

1.1. Purpose of this document

This document has been provided as a reference to explain our standard approach to cost estimating and the methods applied. Specific programmes and the costs that we propose in our Draft Determination response submission are covered in the specific individual Cost Assessment representation documents.

This document should be used as a background reference and includes an explanation of our business-as-usual approach and our business planning pricing methodology.

We provided evidence of our efficiency in capital delivery in the Annex to WSX38 of our PR24 business plan. We have not repeated this information here.

1.2. An overview of business-as-usual approach

Accurate estimation of the final project costs, risks and project duration is essential, for Wessex Water in particular, because we need to:

- Constantly assess that our internal delivery approach is getting the best value for money.
- Ensure we maximise the utilisation of our internal resources.
- Accurately compare a range of no-build, low-build and construction options on a whole life totex basis to ensure the best value is delivered.
- Use the information to combine projects into programmes of work to deliver maximum efficiencies.
- Test the effectiveness of our framework contract prices to ensure they remain competitive.

Each solution option is then reviewed technically and financially as part of our financial governance processes and the lowest whole life cost option is selected, unless there are specific circumstances where this is not feasible or appropriate. This option then proceeds to contract award and delivery as a project. Projects greater than £10m in value are approved by the Board. The financial and programme progress of each project is reviewed on a monthly basis and reported to the Board, with appropriate corrective action taken if risks materialise or third-party delays require an escalation to the executive team.

This standard process, applied to each project as business as usual, allows appropriate data to be fed into the estimation of the projects subsequently assessed for each business plan. However, further assessments of efficiency are carried out for the business plan estimates, due to the fact that solutions are normally developed for business plan purposes prior to the completion of appraisal and outline design. This design work will then commence during the price control in which the work is planned to be delivered.

1.3. Our business plan pricing methodology

For the business plan we have used 4 different pricing models:

1.3.1. Bottom-Up Estimates (BUEs)

- This is the preferred approach for cost estimation where applicable and allows the internal estimating team to provide an accountable, consistent and transparent estimating and review process with the following advantages:
 - Proven track record for technical, buildability, programme, and accurate estimating

- Considerable experience of:
 - Price Reviews
 - Wessex Water standards
 - Enabling Works
 - Operational and H&S requirements
 - Civil Works
 - Mechanical and Electrical (M&E) Works
 - Mature relationships with:
 - Design teams
 - Supply chain
 - Access to current market rates and supply chain

The production of BUEs follow our standard business as usual process, using an industry-wide approach. The guidance provided by the Association for the Advancement of Cost Engineering (AACE) requires estimates to be a P50 position with more downside risk than upside risk (i.e overspend is more likely than underspend).

The BUEs prepared for PR24 business planning provide project cost estimates aligned with semi-mature design information. A set of unit rates was utilised that were suitable for the PR24 base date, our region, and intended delivery contract approach. Estimators with experience in bottom-up estimating for water sector projects interpreted design information to quantify labour, plant and material requirements and derived bespoke project costs from aggregated unit rates. The costs of the main construction activities, ancillary, temporary and unique works identified from the design were estimated using the unit rates with estimated costs for delays due to site abnormalities and construction difficulties.

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1.3.2. Unit Rates Built from historical project building blocks

- Building blocks were generated from historical projects and used to price less mature and defined programmes of work with internal subject matter experts (SMEs). This method has been applied, for instance, to Continuous Water Quality Monitoring whereby similar historical monitoring programme cost information from our EDM programme of works was used alongside other relevant information (e.g. Environment Agency indicative costs) to build up the programme costs. This method was also used in less defined programmes of work such as IT projects.

1.3.3. Historical delivery costs

- Analysis of historical totex costs to generate future costs; this was also the method used to calculate the non-construction percentages. This method was applied, typically, to mature and repeat programmes or types of work where AMP8 looks similar e.g. lead pipe replacement, mains replacement.

1.3.4. Cost Curves

- Top-down estimating for PR24 business planning provides pragmatic cost estimates for project design solutions where there is limited detailed project design information.
- Our Unit Cost Database (UCD) system, consisting of project data captured from multiple AMPs, was utilised for the top-down estimating. Cost curves that represent construction activities at various levels of granularity,

aligning with our Work Breakdown Structure (WBS), were derived from our UCD projects. Cost curves were normalised to the PR24 base date (and our region) for use in the PR24 business plan.

- Experienced estimators with detailed knowledge of work activities included in our cost curves, interpreted the design to identify asset information that could be utilised in our cost curves to derive costs.
- Top-down estimating assumes costs for construction activities will be the same as normalised costs for similar activities delivered previously. The costs of the main construction activities were estimated using our UCD cost curves. The cost curves included for the ancillary, temporary and unique works typically found in previous projects with similar assets. Therefore, detailed design information was not required for top-down estimating.
- Costs for known or anticipated site abnormalities and construction difficulties were estimated using adjustment factors based on examples from UCD projects or identified as risks.
- The top-down estimating methodology enables costs to be estimated from early design information. This was beneficial at optioneering stage where design details had not yet been prepared to identify the preferred solution design to progress. Top-down estimating benefited from subject matter experts to ensure the estimate coverage of the design was robust.
- Where the scope of works did not allow use of the UCD e.g. elements of our wastewater treatment programme, the methodology and process used to generate cost models have been assured by the cost consultant, CKBS who concluded that our models used a consistent, well-considered approach. The processes and methodologies used to derive these cost models were evidently robust and considered to be appropriate for producing efficient costs for the PR24 Business Plan. See our separate representation WSX-C09 for further details of our costing approach for wastewater treatment.
- Similarly, for the storm overflows, we used a cost curve with mobilised storage volume as the sole variable and then accounted for additional variability at a programme level through the application of the risk and optimism bias framework. This cost curve was derived by undertaking a bottom-up assessment of the costs of underground storage schemes of various sizes (6 different sizes ranging between 100m³ and 1000m³). We then used this information to plot a cost curve for the construction element of all grey solution schemes under standard conditions, based on information about storage volumes at each location. See our separate representation WSX-C11 for further details of our costing approach for storm overflows.

1.4. Scope definition

The pricing model chosen depends on the design information available. The scoping information for the BUE estimates was provided by internal design teams in the form of bottom-up cost estimating schedules. The estimating schedules include:

- New assets
- Asset modifications, including demolition and disposal.
- Asset sizing information
- Indirect scope i.e. pipelines, cable ducting and access roads etc

For some programme areas, scoping information was not available to the level of detail highlighted above. This largely aligns to the other three pricing methods where basic yardstick information was limited to, for example, overflow storage volumes, continuous water quality monitoring locations. In some cases, further guidance from regulators has been required to confirm the scope definition. Further investigation work is included within the business plan to develop the detailed information to finalise solution option costs.

1.5. Accounting for optimism bias

We also make adjustments to cost estimates to account for optimism bias. This follows best practice as set out in the Government's [Green Book](#), the HM Treasury guidance on how to appraise policies, programmes and projects. The Green Book provides a framework for how to appropriately account for optimism bias in cost estimation. To develop our approach, we have combined this guidance with the recommendations and templates produced from

the water industrywide Cost Consistency Methodology report February 2022 (CCM), produced by Mott MacDonald as part of the SRO strategy.

The CCM recommendations predominantly follow the Green Book which recommends that optimism bias is accounted for in investment appraisal:

“Optimism bias is the demonstrated systematic tendency for appraisers to be over optimistic about key project parameters, including capital costs, operating costs, project duration and benefits delivery. Over optimistic estimates can lock in undeliverable targets. To reduce this tendency appraisals should make explicit adjustment for optimism bias. The Green book recommends applying overall percentage adjustments at the outset of an appraisal. The initial optimism bias estimate should not be locked in but can be reduced as an appraisal develops and the cost of specific risks are identified.”

As we do not have our own evidence for historical levels of optimism bias, we have used the generic levels provided in the Green Book. For PR24 we have used the templates recommended in the CCM and, dependent on the complexity of any given project, we have, in conjunction with the independent cost consultant ChandlerKBS, produced an average and complex set of scores based around the Green Book and CCM descriptions. We have then looked at each individual project and identified the mix of standard and non-standard assets then applied this mix to the scores to generate the optimism bias % which is then added to the central estimate.

1.6. Certainty / Uncertainty Analysis

For each business plan, the approach to assessing uncertainties and optimism bias is built into our solution definition process, which involves:

- assessment and risk-based prioritisation of maintenance works using our risk management process as well as benefit valuation for all projects as appropriate to ensure we optimise the programme to best value our customers, the environment and asset health.
- assessment of options for delivering the outcome. For example: catchment-based solutions, innovative technologies, procurement and BIM initiatives with the lowest totex whole life cost.
- site visits, where appropriate, to confirm the exact scope of works and to determine any specific environmental, third-party, land or planning constraints that could impact a project cost or more likely the programme. These are then factored into the estimate if they are definite issues or included in the risk register with an appropriate likelihood applied.
- an independent assessment by a cost consultant of the non-work rates applied to projects, such as project management and design fees.
- market testing of work item costs using our independent cost consultant, covering mechanical and electrical items of work from quotations, and civil works based on quantities of materials.
- review of the opex impacts of the delivery of new capital works, assessed using latest framework rates.

All this information is prepared using a standard cost estimate sheet for each project which generates the breakdown of the works by asset lives. A central record is then compiled, with the appropriate taxonomy applied to allow the population of the totex business plan data tables.

A final series of scenarios is then run to test the optimisation of the plan and the totex profile to ensure it provides the best opportunity to deliver the outcomes that customers require, and/or within the regulatory dates defined.

To further reinforce our optimism bias calculations, we analysed historical costs for a typical costing lifecycle i.e. from a Price Review to completed outturn costs on our AMP7 Quality programme and our AMP7 FSO programme. The reason we restricted our analyses to these programmes were two-fold, one, large spend programmes in AMP7 and looking forward into AMP8 and, two, these were the programmes with the largest number of named schemes and this allowed us to better ensure that we were able to compare like for like.

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1.7. Assurance

ChandlerKBS, has provided assurance on each of the pricing methodologies. Their reports are detailed in Annex A4 of WSX45 (Annexes – Assurance reports) within our business plan submission.

In producing the construction benchmark estimates, ChandlerKBS have used their Cost Intelligence Database (CID). The CID is a system of integrated cost databases and costing tools that was specifically designed to provide costing support for regulatory Price Reviews, allowing users to review and compare multiple cost curves, project data and indices to normalise and derive industry average costs for a range of asset drivers.

The CID comprises data obtained from ChandlerKBS clients over the past 20 years, including tens of thousands of cost curves and capital projects. Due to our involvement on several long-term cost management and capital allowances frameworks and commissions with water companies, contractors and regulators, we have captured the cost, design and specification data on all types of assets, processes, projects, programmes and technologies used within the industry.

ChandlerKBS has been involved with the design, creation and management of unit-cost-databases and Work Breakdown Structures (WBS) for several water companies. The CID system takes advantage of this knowledge and expertise to fully utilise captured cost data allowing a bottom-up or top-down estimating approach to suit the design maturity.

ChandlerKBS produced benchmark estimates for 18 sites. The current business plan values included for these sites are 6% lower than the benchmark estimates provided by ChandlerKBS.

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All assurance work is carried out independently by the consultants based on the exact same scope of works as provided to the internal estimating teams hence guaranteeing a 'perfect' benchmark to be able to compare with. As the internal pricing process is BAU we are assured that even though the consultants are higher we have confidence that we can deliver the submitted business plan values.

It should be noted that we have asked the consultants to focus on the construction costs of a project and not include non-construction costs. The non construction costs (excluding optimism bias/risk) have been estimated using historical delivery actual costs and applied as a %. External benchmarking is less appropriate for non-construction costs as these can vary significantly between water companies depending on the contract delivery model, the delivery method, size and make-up of the programme, ownership of design and internal accounting treatment. It is therefore unlikely that any analysis across the water industry will be able to compare like for like because of these differences. Due to this higher level of uncertainty around the non-construction costs, it was deemed reasonable to use historical actual costs and hence why external assuredness is focused on the construction element.

For clarity, our non-construction costs included the following main work types:

- Outline design activities
- Detailed design activities
- Construction support activities
- Senior Leadership Team management
- Programme management
- Project management
- Commercial management
- Commissioning activities
- Automation activities
- 3rd party surveys, investigations and ground investigation
- Power upgrades
- Land purchase

- Biodiversity Net Gain
- Optimism Bias/Risk (for optimism bias please refer to relevant section above)