

Wessex Water Services Ltd Response to Ofwat's PR19 Draft Determination – August 2019

Representation reference: Cost Assessment C5

Representation title: WINEP: Flow to full treatment (FFT) increase

Summary of issue

We remain concerned that Ofwat's cost assessment enhancement feeder model for flow to full treatment (FFT) is not properly representative of the true scope and costs of this work for Wessex Water. Ofwat's modelled totex allowance of £54.173m contrasts with our business plan estimated cost of £81.706m. We consider that this is due to the exceptional impact of the costs of the extension works required at our largest treatment works at Bristol (Avonmouth) and our fourth largest treatment works at Bath (Saltford), which the model does not accommodate. Bristol (Avonmouth) treatment works is one of the top ten largest STWs in England and Wales, serving a population equivalent of 800,000, while Bath (Saltford) serves a population equivalent of 118,271.

We believe that Ofwat's flow to full treatment enhancement cost assessment model has deficiencies that make it unrepresentative of the true costs of the work to Wessex Water. This is due to the impact of one very large and one large scheme which have particular engineering challenges, and which, due to their size and particular characteristics, skew the results of the model against Wessex Water. We acknowledge the modification in the cost model since the IAP response but we still note that the predicted values from the two triangulated models are quite different for most companies, and that Wessex Water is one for which the difference between the two is greatest.

Change requested

On the basis of the evidence provided in this representation, we propose that due to the scale and complexity of the Bristol (Avonmouth) STW, the cost difference between Ofwat's cost model assessment implied allowance of £22.4m and our PR19 business plan cost estimate of £43.842m is considered as a new cost adjustment claim. We are submitting Representation C1 – Cost Adjustment claim for Bristol (Avonmouth) STW for FFT and STW growth, to substantiate this.

We consider that for the Bath (Saltford) STW scheme a similar situation exists, albeit at a smaller scale. The lower value of the difference, between Ofwat's allowance and our estimate of the required costs, is not sufficiently material for a cost adjustment claim. As requested in our response to the IAP, we ask that Ofwat undertakes a deep dive into the Bath (Saltford) scheme in order to fully understand its exceptional characteristics, and scale, compared to the remaining set of schemes from all WaSCs, included in the cost assessment model for flow to full treatment. We are therefore requesting that the Bath (Saltford) scheme

is removed from the cost assessment model, and that Ofwat assesses it separately and allow the full efficient costs required for this large scheme (£22.322m).

Rationale (including any new evidence)

Our representation includes three main areas:-

- i) Limitations of the Ofwat model with respect to FFT schemes
- ii) The scale and scope of the Bristol Avonmouth and Bath Schemes – including additional evidence
- iii) Costs

i) Limitations of the Ofwat model with respect to FFT schemes

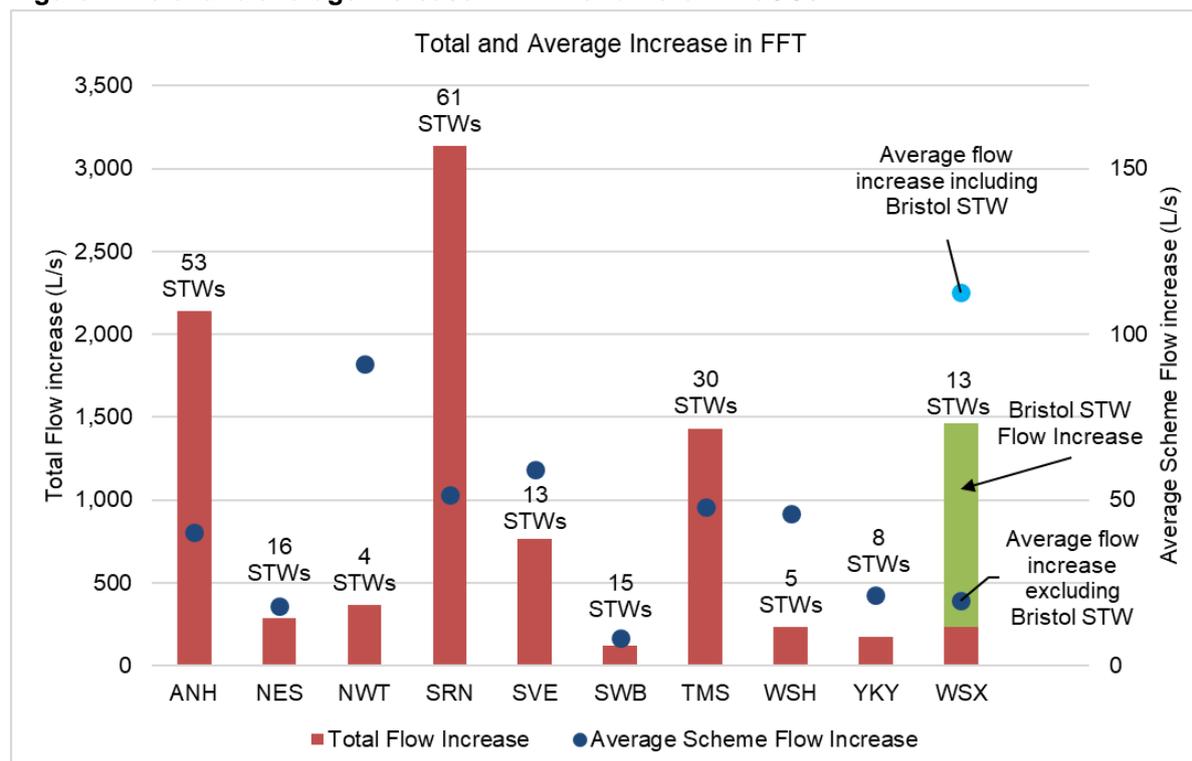
We consider that the flow to full treatment increase econometric model implies an implausibly high economies of scale at the scheme level and that this results in an unreasonably high negative impact on us, given the two large schemes described above. We note that a simple unit cost metric (based on the driver of FFT shortage in l/s) would give an average unit cost across the industry of about £97,000. However, Ofwat's econometric modelling implies that the cost per unit for Wessex Water, which has a higher than average number of units (l/s), should be around £37,000 per unit. The extent of economies of scale implied here does not seem plausible and seems more indicative of flaws in this modelling approach.

This is borne out further by applying the WRc's TR61 cost model¹ for capital cost estimating to a size of typical STWs reducing from 112.4l/s FFT (our average shortfall) to 37.6l/s (average shortfall of the other ten WaSCs). The TR61 model indicates an economies of scale factor in the range 65-70%. This contrasts with the 38% economy of scale factor implied by Ofwat's econometric modelling referred to above.

We therefore believe that Ofwat's flow to full treatment enhancement cost assessment model has deficiencies that make it unrepresentative of the true costs of the work to Wessex Water. This is due to the impact of one very large and one large scheme which have particular engineering challenges, and which, due to their size and particular characteristics, skew the results of the model against Wessex Water.

Ofwat's feeder model uses "Number of schemes in business plan" and "Shortfall in FFT (l/s)" as the two parameters driving the model. This is shown graphically in the figure below.

¹ Water Research Centre, Cost information for water supply and sewage disposal, TR61. TR61 contains cost estimating models for a wide range of works and works components which use historic information in conjunction with inflation indices to give high-level estimates.

Figure 1: Total and average increase in FFT for different WaSCs

Our review of the cost assessment model indicates that there are limitations within the model which are due to the amount of flow increase at Bristol and Bath STWs when compared to other STWs within the model. Using Ofwat's cost assessment enhancement feeder model results in a totex funding implied allowance of £22.402m for Bristol STW against our business plan totex cost of £43.842m, a reduction of some 49%, and an implied allowance of £10.362m for Bath STW against our business plan totex of £22.322m. We consider that these do not allow sufficient funding to deliver either scheme of this size and complexity, as demonstrated by evidence in our previous submissions and confirmed by independent assessments of both the technical scope and estimated costs.

We have carried out further sensitivity analysis, and note that, by removing both Bristol (Avonmouth) and Bath (Saltford) STWs, the cost assessment model calculates an implied allowance of £23.722m for the remaining Wessex FFT schemes. The PR19 business plan for these schemes is £15.542m. That is to say, if these two schemes were excluded from the set of FFT schemes used in the cost assessment model, then it would show Wessex Water to be above the industry average level of efficiency. This suggests the model lacks sufficient input variables to accurately represent the range and characteristics of the schemes which it is aiming to model.

The required improvements at Bristol (Avonmouth) STW for the increase in permit FFT from 3,472L/s to 4,700L/s cannot be delivered for the cost model implied allowance of £22.4m. We have therefore included a new Cost Adjustment Claim for Bristol STW for the additional funding which is required above the cost model assessment.

For our Bath (Saltford) treatment works the cost model implied allowance is £10.362m, which contrasts with our business plan estimate of £22.322m and represents a reduction of

some 53.5%. This is not sufficiently material for a cost adjustment claim and so we are therefore requesting Ofwat review this by carrying out a deep dive into our Bath STW FFT project to better understand the details of the scheme (including the complexity of work involved and site access difficulties) and the need to finance the full efficient costs for the scheme.

An alternative approach would be for Ofwat to revise its cost assessment model to adequately take into account our concerns, including a more appropriate approach to economies of scale.

ii) The scale and scope of the Bristol and Bath Schemes – including additional evidence

Subsequent to the challenges from Ofwat to our plans in their IAP in January 2019 and our response at that time in April 2019, we appointed Stantec to undertake a high-level independent review of a number of proposed STW schemes to confirm and/or challenge our selected business plan option and its technical scope. Stantec is an international engineering consultancy company.

The schemes were chosen for external review based on site-specific complexities and where we had particular concerns that their costs had not been adequately represented through Ofwat's IAP modelling approach. They also covered those schemes where, in our response to the IAP, we had invited Ofwat to review or take a deep dive into those programmes or schemes. The schemes reviewed by Stantec are shown in the table below.

Table: Schemes independently reviewed by Stantec

Main driver	Schemes/Sites	BP capex (£m)
Sanitary	Yeovil & Shepton Mallet	39.6
FFT Increase	Bristol (Avonmouth) & Bath (Saltford)	68.2
Growth	Burton, Compton Bassett, Great Wishford, Hurdcott & Salisbury	29.1
MCERTS	Poole, Dorchester, Milborne St Andrew, Palmersford & Weymouth	3.6

We selected Bristol and Bath from the set of FFT schemes as these are the two largest schemes, together representing over 80% of the combined totex value in this area. We have included Stantec's full report in Appendix C1.1. Stantec were asked to identify any immediate scope challenges as well as any opportunities for consideration in outline and detailed design. Their main conclusion is included below:

The finding of the report is that overall for all 14 sites reviewed, the solution described in the Business Plan is appropriate and a good fit to both Wessex Water design standards and wider industry benchmarks. For example, application of the "Pearce" model demonstrated that the process design approach applied for trickling filters is equal to or more aggressive than that of other UK water companies.

The challenge process applied by Stantec has developed many potential challenges some of which are recommended to be applied in delivery, these comprise optimisation opportunities as outputs of the Pearce model and drive reduced process risk, but not capital efficiency.

In no case was there any radical challenge as alternative unit processes or process trains promoted as a preferred solution after the risk analysis step.

The default approach by Wessex Water was to remain compliant with their in-house asset standards for wastewater process design. No significant positive deviations were identified through the gap analysis process i.e. examples of significant over provision of asset were not found. Conversely there were multiple examples of negative deviations i.e. examples of risk or potential under provision being proposed. These were driven by factors such as footprint constraint and the modular nature of process assets.

Wessex Water design standard sets out design horizons for new projects, dependant on the size of the STW as shown below: -

- Population >10000 10 year horizon*
- Population < 10000 20 year horizon*

In our view, this is a common and efficient approach with the longer design horizon for smaller STWs based on the very small marginal cost increase involved in constructing slightly larger process units for the longer term at these STWs.

There was evidence that Wessex Water were willing to take risks regarding the reuse of ageing assets either in their current or enhanced functionality or repurposed.

Where existing process assets are not embraced, modified or repurposed, a clear argument is given as to why an alternative is adopted. The theme in this case was the replacement or augmentation of trickling filter sites with the Activated Sludge process.

For many of the sites, the improvements required are manifold, for example at Hurdcott STW, Compton Bassett STW and Great Wishford STW. At these sites, simultaneous application of the load standstill principle regards sanitary determinants, and updating FTT for historic, and future growth to the design horizon is applied. This span of requirements across quality and flow mostly precludes the classical solution of solely adding tertiary or quaternary unit processes. Typically for the nine sites the whole process train from inlet to outfall requires quality and hydraulic upgrades and/or asset replacement.

Stantec's conclusion, specifically with regards to Bristol (Avonmouth) STW was:-

The results of the gap analysis identified that the capacity of the existing biological treatment would not be suitable to treat the future flows and loads, and that provision of additional Sequencing Batch Reactors (SBR) would be the lowest whole life cost solution. If land availability was an issue, then IFAS should be considered, but as there is available Wessex owned land it is not appropriate, based on the higher WLC costs.

The gap analysis conducted on Avonmouth assets concluded that from a process loading perspective (surface loading and retention) 4No. additional PSTs are not strictly speaking required as the existing PSTs are only marginally hydraulically overloaded. However, the capacity of the existing units to pass a 35% increase in flowrate is uncertain. For process robustness and site arrangement reasons and based on surface loading, at least 2 No. additional new PSTs dedicated to the new SBRs would be necessary. However, the process criticality of 2 new PSTs serving 4 new SBRs would be unacceptably high. A PST outage in this scenario would cause a process pinch point disabling full use of the new SBR assets. For this reason the minimum delivery in the initial phase would need to be three PSTs.

The 4No. new proposed SBRs however are process-critical to accommodate the increase in FFT. Based on the existing SBR design parameters, the proposed new SBRs are slightly undersized, however this should be able to be accommodated by optimising the MLSS levels, bottom water level within the cells and cycle times.

We have considered the comments from Stantec regarding the SBRs and PSTs. Whereas we consider the risk they have identified concerning the slight under-sizing of the SBRs can be managed and accommodated, we accept that the provision of 4No. PSTs is potentially over conservative. They have confirmed the need for at least 3 No. PSTs and we have accepted that the provision of 3No. rather than 4No. PSTs, represents a more cost efficient solution, with a reduction in costs of £2.0m totex.

Stantec's conclusion with regards to Bath (Saltford) STW was:-

The results of the gap analysis carried out on the proposed solution consisting of new PSTs and a new Activated Sludge stream are consistent with industry good practice and will ensure that the permit will be met with the new FFT and growth.

The construction of the ASP stream reduces the criticality of the filters stream and avoids the higher risk of extensive and complex filter media replacement as described in the challenge solution b.

Accordingly, it is not recommended that any of the challenge solutions are developed further at this time. Though the challenge relating to the site compound placement should be reviewed during detailed design.

The final and only residual challenge from Stantec, regarding the site compound placement at Bath STW is trivial in nature. It concerns the potential to avoid rental charges on an adjacent field, by locating a temporary site compound on land owned by Wessex Water.

iii) Costs

In Section 8 of our main business plan narrative we explained how we have ensured our proposals are efficient across all the price controls, as well as explaining how we estimated efficient costs for new projects (see also Section 3.5.5 of our Supporting document 5.1 – Protecting and enhancing the environment).

In Section 2.7.2 of Appendix 4 - Protecting and enhancing the environment: Response to IAP we explained the cost estimate breakdown and external benchmarking for Bath (Saltford) STW.

There are particular difficulties in constructing extensions at Bath STW. These are detailed within our IAP response and include access and site topography difficulties. Access to the site for large vehicles is very restricted, with public relations issues relating to the narrow access roads and residential housing in Salford village. We are planning to construct a new improved access to the STW, including a new bridge and access road over the river Avon to provide access for construction traffic in the short term and operational and maintenance traffic in the longer term. A proportion (~28%) of the total cost (£4m) of constructing the new access has been allocated to the FFT scheme, with the remaining 70% being funded from base capital maintenance. We believe this element of the works will be unique to our Bath (Salford) STW and hence not adequately represented in the cost assessment model.

A summary comparison of the costs for the options considered is shown in the table below.

Table: Treatment options at Bath (Salford) STW for the increased FFT WINEP driver (copy of Table D-3 from IAP Response, Appendix 4)

Option	New Activated Sludge treatment stream	New Secondary MBBR treatment stream	New Secondary biological filters treatment stream	New nitrifying MMBR tertiary treatment stage.
Provides treatment capacity	✓	✓	✓	✓
Meets new FFT permit	✓	✓	✓	✗
Fits on existing site	✓	✓	✗	✓
Utilises existing assets	✓	✓	✓	✓
Capex (£m)	22.20	23.51	Not feasible	Fails to provide hydraulic capacity
Opex (£k/yr)	600	668		
Lowest whole-life cost	✓	✗	✗	✗

As requested in our response to the IAP, we ask Ofwat to undertake a deep dive into the Bath (Salford) STW flow to full treatment scheme in order to fully understand its exceptional characteristics and scale compared to the remaining set of schemes included in their cost assessment model for FFT schemes.

An alternative approach would be for Ofwat to revise its cost assessment model to adequately take into account our concerns, including a more appropriate approach to economies of scale.

Why the change is in customers' interests

The increase in permit FFT will increase the amount of flow being fully treated rather than receiving settlement only, this will avoid the potential for flows to spill to storm tanks and the environment on dry days, this being an EA requirement listed in the WINEP and a regulatory output.

Specifically, this change will enable us to complete the FFT schemes listed in the WINEP, and to continue to target 100% compliance with environmental standards for sewage effluent. This level of performance is valued by customers and our other stakeholders.

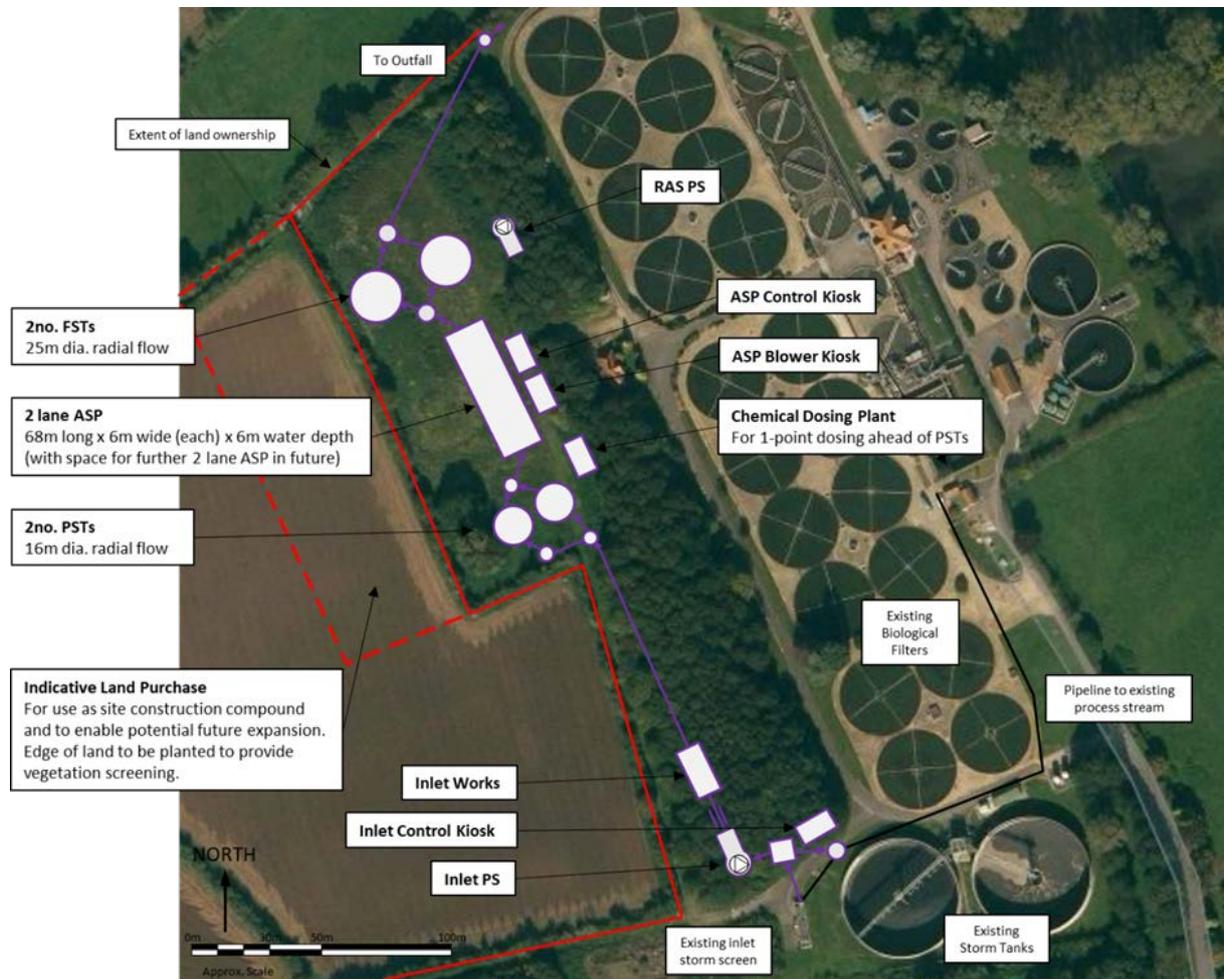
Should a funding allowance not be provided to enable us to complete the Bath (Saltford) STW scheme in full, then we would be in a position where a significant WINEP output is missed, and where one of our largest and most sensitive major sewage treatment works is failing its permit and with a high risk of causing a pollution. Our customer research has shown that our customers place a high value in avoiding any such deterioration in service.

The level of difference between our required, and Ofwat's proposed, allowed levels of financing for the efficient cost for these FFT schemes is such that we consider Ofwat would be in danger of breaching its duty to finance our necessary obligations if it does not accept this representation.

Links to relevant evidence already provided or elsewhere in the representation document

- PR19 business plan submission (September 2018)
 - Supporting document 5.1 – Protecting and enhancing the environment
 - Section 3.5
 - Annex B
- Response to Initial Assessment of Plans (April 2019)
 - Appendix 4 – Protecting and enhancing the environment: Response to IAP.
 - Section 2.7
 - Annexes B and D
- Response to Draft Determination (August 2019)
 - Representation C1 – Cost adjustment claim for Bristol STW
 - Representation Appendix C1.1: Third party report - Stantec

Annex A. Proposed layout at Salford (Bath) STW to meet WINEP requirements (Extract from Response to IAP, Appendix 4)



Annex B. Plan of appraised new access routes to Saltford STW

(Extract from Response to IAP, Appendix 4)

