

SRN-DDR-048: Wastewater Treatment Growth Enhancement Cost Evidence Case

28th August 2024
Version 1.0



from
**Southern
Water** 

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1. Introduction

This document provides additional evidence and other updated information from the October 2023 submission of our Enhancement Case for Growth at Wastewater Treatment Works (SRN44).

We understand Ofwat's rationale for assessing costs. We argued in our BP that headroom capacity should be considered in the model, and we think Ofwat has captured that through the consideration of added process capacity driver. However, we note that there are two major omissions from Ofwat's assessment of our business plan, Ford WwTW and Whitfield WwTW.

This document provides our response and reasoning and provides evidence for Ofwat to review their assessment of funding allowance for enhancement schemes driven by population increase.

2. Issue

2.1 Omission of the upgrades required at Ford WwTW from the model.

In the Draft Determination (DD) document 'Expenditure allowances – Enhancement cost modelling Appendix' Ofwat confirm that flow to full treatment permit increases without an associated increase in permitted dry weather flow (DWF) do not form part of the model and will not be funded.¹

We submitted costs of £43.96m for a scheme at Ford WwTW under our Enhancement Case for 'Growth at Wastewater Treatment Works' (SRN44), which identified the need to increase treatment process capacity to accommodate the additional flows and loads received by the WwTW due to an increase in connected population equivalent of approximately 25,000² between 2022 and 2030, because of population growth and planned sewer network upgrades. This is consistent with other schemes that are included in the model and have been funded where a process capacity shortfall has been identified as being introduced due to population growth, but a new DWF permit is not needed³. It is confirmed in Table 17 (Scenario 1) of 'Expenditure allowances – Enhancement cost modelling Appendix' that process capacity upgrades required to treat an increase in population under the existing permit should be funded from Enhancement.

Ford WwTW does not have a storm overflow and therefore does not have a permitted FFT, it is a 'treat all flows' WwTW. As part of our submission, we provided information that indicated an increase in permitted

¹ [PR24-draft-determinations-Expenditure-allowances-Enhancement-cost-modelling-appendix.pdf](#) (ofwat.gov.uk)

² In our latest forecast as submitted in data tables CWW20 and ADD19 this has reduced to approximately 10,500, however the need for investment has not changed as the WwTW is currently at capacity hydraulically and a ~20,000 PE capacity increase is required by 2040. For clarity, the design PE of the scheme of 155,757 has not changed, only the 2030 PE stated in the original business case.

³ Examples include Dymchurch WwTW, Hawkhurst North WwTW, Horsmonden WwTW, Staplehurst WwTW, Tonbridge WwTW.

FFT was required under the preferred solution. This is not the case as the site would continue to treat all flows, albeit at a higher flow rate due to an increase in population served. This means an increase in process capacity is required to accommodate the higher flow rate, which we determine to increase from the current 98%ile 5 yearly annual average of total flow of around 730 l/s to an estimated 1,036 l/s. However, this increase would not form part of the permit and therefore the information provided in the data table for Query OFW-OBQ-SRN-081 was incorrect.

An increase in permitted DWF is not required as there is sufficient headroom in the existing permit until beyond 2035. However, an increase in process capacity is required to accommodate growth flows and there is currently no funding allowed for this in Ofwat's DD allowance.

2.2 Omission of the upgrades required at Whitfield WwTW from the model.

We submitted a proposal to fund and deliver a new WwTW to provide wastewater treatment for the Whitfield Urban Expansion (WUE) development as part of our 'DPC lite' alternative delivery programme, at a cost of £55.17m (including DPC development costs). In 'Major projects development and delivery' DPC-lite was acknowledged as a proposal but was rejected, with a statement that 'DPC-lite schemes put forward by Southern Water have been 'assessed...as part of our usual approach to cost assessment...set out in the 'PR24 draft determinations: Expenditure allowances' document'⁴. However, no allowance was made for Whitfield in the cost model. To address this, we have further developed the options available to accommodate the population growth due to the WUE development, including external assurance of costs and benchmarking, and propose an assessment is undertaken to provide a funding allowance using the large capital works gated process. We have also reconsidered the viable alternative option of treating flows at the Broomfield Bank WwTW, as detailed below.

3. Our proposed response

3.1 Ford WwTW

As part of our response to post submission Query OFW-OBQ-SRN-081 we provided a data table with information for 19 separate cost drivers for schemes submitted under the 'Growth at STWs'. Cost driver 3 and 4 show Ford WwTW does not currently have a permitted FFT limit, but the expected limit is 1,036 l/s.

Ford WwTW has been omitted from the cost model and no funding has been provided, because of the increase in FFT without a permitted DWF increase. We do not require an increase in permitted FFT as the WwTW will continue to treat all flows (an FFT permit would only be required if a new storm overflow was created) and therefore this exclusion should not apply, as explained in Section 2.1.

⁴ [PR24-draft-determinations-Major-projects-development-and-delivery-1.pdf \(ofwat.gov.uk\), p13](#)

We therefore request a funding allowance is made for Ford WwTW using the deep dive approach applied to other outlier schemes. See Section 4 for evidence to support this assessment.

3.2 Whitfield WwTW

As identified in our business plan⁵ there are two feasible options for treating the flows generated by the new WUE development; construction of a new WwTW close to the new development, or to convey and treat the flows at the existing Broomfield Bank WwTW which would require an upgrade. At the time of submission, solutions and costs for these options were taken from our proposals at PR19 and re-costed for PR24, summarised in Table 1.

Option	October submission capex cost estimate (£m)
New WwTW (Whitfield)	55.02 ⁶
Broomfield Bank WwTW Upgrade	53.41

Table 1 - Original PR24 submission cost estimates

As identified in our Cost Adjustment Claim submission 'SRN22 Network and WTW Growth'⁷ and detailed further below, we anticipate significant challenges conveying flows from the WUE development to Broomfield Bank WwTW and in obtaining the necessary planning permission for the upgrades required. Therefore, there are significant concerns on the viability of this solution.

This resulted in the preference for a new WwTW at Whitfield due to the small difference in cost between the two options, lower construction risk, and suitability for delivering through the 'DPC-lite' mechanism proposed in Technical Annex 'Direct Procurement for Customers and Alternative Delivery Model (SRN17)'⁸. We believed the benefit of this delivery route would be:

- The diversity of treatment technologies provides scope for innovation that can drive down the price of solutions.
- The project is relatively discrete and using a competitively appointed third-party provider may enable capital and operational efficiencies in the delivery of the project.
- Once the project design is sufficiently developed (site selected, interfaces identified, required capacity known, key construction challenges identified), we believe it could attract multiple bidders and ensure competitive pressure during the procurement process.
- The detailed design for the project will be undertaken by those with skill and experience in delivering similar assets, allowing both us and customers to benefit from efficiency and innovation in the construction and operation of the assets.

⁵ https://www.southernwater.co.uk/media/dgbkg4ww/srn44-wastewater-growth_redacted.pdf

⁶ Does not include DPC related costs.

⁷ [srn22-network-and-wtw-growth.pdf \(southernwater.co.uk\)](#)

⁸ [srn17-direct-procurement-for-customers-and-alternative-delivery-model_redacted.pdf \(southernwater.co.uk\)](#)

- Competitive pressure in the procurement process will drive down the cost of delivering the works. This will also help to ensure that project risks are priced efficiently.

In the Draft Determination (DD), Ofwat accepted the need for additional capacity to treat flows for WUE and acknowledged the proposal for building a new WwTW through a ‘DPC-lite’ delivery mechanism. However, in the determination for Growth at STWs no allowance was made for Southern Water pre-construction development costs as part of this mechanism. The costs requested (£5.4m) can be found in data table SUP12.8 and SUP12.14.

Since submission of our original business plan in October 2023 we have further developed the options to better understand cost and deliverability and undertaken benchmarking of direct costs. This has resulted in a substantial increase in the expected cost for the new WwTW option, with the cost to serve the development at the existing Broomfield Bank WwTW remaining the same although at much higher risk. Due to the complexities of both options and the uncertainty around viability of the Broomfield Bank WwTW option, there is still significant uncertainty in scope, complexity, and therefore cost.

Option	Original capex cost (£m)	Revised capex cost (£m)	Scope certainty	Complexity	Cost certainty
New WwTW (Whitfield)	55.02	103.2	High	Medium	Medium
Broomfield Bank WwTW Upgrade	53.41	53.41	Medium	High	Low

Table 2 - Cost and certainty assessment

Evidence to support Ofwat’s assessment of this proposal is provided in Section 4. We propose to deliver the new (Whitfield) WwTW solution using the large scheme gated process⁹ to ensure engineering and planning complexities are known and refine cost estimates in a controlled way to avoid committing to project development until all risks and therefore costs are understood. As part of this gated process, we will also confirm viability of any alternative options including the upgrade of Broomfield Bank WwTW. We therefore propose an initial allowance of 6% of the re-costed new WwTW option is made for development costs to achieve completion of the 2nd stage of the gated process. As detailed in Section 4, the cost estimate for delivering a new WwTW has increased to £103.2m which is above the threshold of the gated process of £100m. This would equate to an allowance of £6.2m for development costs.

⁹ [PR24-draft-determinations-Expenditure-allowances-to-upload.pdf \(ofwat.gov.uk\)](#), p177

3.3 Ofwat consultation questions

As part of the DD Ofwat asked the following questions, our response is below.

Question 5.1) Do you agree with our approach to identifying overlap with base costs so that customers do not pay for non-compliance with existing permits?

Yes. We agree with the rationale set out in Table 17 of 'Expenditure allowances – Enhancement cost modelling Appendix', except for the exclusion of Ford WwTW from the funding allowance under Scenario 3 of the table. This is because of the error in stating an increase in permitted FFT is required by the individual scheme as explained in Section 2.1, rather than the principle of not funding an FFT increase without an associated increase in DWF.

Question 5.2) Do you agree with the models we have selected to explain differences in efficient growth at STWs enhancement costs?

We understand Ofwat's modelled approach and welcome the use of additional cost drivers of additional capacity provided, expected change in DWF permit, and ammonia permit level. Disproportionate costs are incurred for sites which require an increase in hydraulic capacity which is not captured at site level in the models, however we recognise this would be difficult to implement in a model and a deep dive approach would need to be considered at every individual scheme level to capture this.

Question 5.3) Do you agree with our approach to adjusting modelled allowances to account for costs incurred outside of the 2025-30 period?

Yes. We welcome clarification on how costs after 2030 will be funded at PR29, will they be automatically granted with associated adjustment for the period or should companies re-submit their costs for PR29? If the latter, it leaves companies at risk of starting a scheme which cannot be funded.

Question 5.4) Do you agree with our approach to adjusting allowance to account for past under-delivery?

We recognise the need to protect customers from underspending allowance given for growth. The approach taken does not appear to be based on capacity provided, rather the overall cost vs allowance only.

We welcome the PCD based on actual capacity provided rather than totex spent as a mechanism to prevent under delivery in AMP8, to avoid the challenges identified in Section 5.6.2 of 'Expenditure allowances - Enhancement cost modelling appendix'. We detail our Conditions for PCD design in SRN-DDR-052 Price Control Deliverables

4. Supporting evidence

4.1 Ford WwTW

The solution identified for Ford WwTW was the third highest cost submitted in our 'Growth at Wastewater Treatment Works' (SRN44) Enhancement Case, at £43.96m over AMP8 and AMP9. The main reason for the high and atypical cost is the need to provide a new inlet works to serve the increase in flow, due to there being no storm overflow in the permit.

Table 3 shows the cost per PE using the 2040 design capacity provided minus forecast PE in 2025, based on our bottom-up cost estimate.

PE ₂₀₂₅	Design PE (PE ₂₀₄₀)	PE capacity provided	Cost (£k) ¹⁰	£/PE provided
140,671	155,757	15,086	43,955	2,913

Table 3 - Estimate of cost per PE at Ford WTW

Using the triangulated allowance from the totex models described in Table 18 of 'Expenditure allowances – Enhancement cost modelling Appendix', we estimate a funding allowance of £7.3m would be made under the modelled allowance approach. The model underestimates the cost because no allowance is made for increased flows at the site as this cost is captured by the DWF increased cost driver, which doesn't apply to Ford WwTW.

Given the significant difference between our estimated bottom-up costs and the modelled allowance we propose a deep dive approach to allocate a funding allowance due to the atypical costs involved, as undertaken for other outlier schemes. Further detail on the cost drivers can be found in data table ADD19.

4.2 Whitfield WwTW

Development of the two primary options and costs have been undertaken, with external assurance and benchmarking of the new WwTW at Whitfield. This has led to a change in the expected costs, the evidence and justification for which is below.

New WwTW at Whitfield

In line with our cost and option methodology (SRN15), we have conducted further review and enabling investigations into the option to provide a new WwTW adjacent to the WUE. In accordance with our costing methodology, the costs submitted in our original growth enhancement business case were derived using the Southern Water Level 1 costing tools. However, we recognised the need for improved cost confidence in this project, which is particularly complex and includes a new long sea outfall. Based on our recent experience

¹⁰ Costs are in nominal terms, 2022/23 price base with cost data adjusted for inflation using CPIH.

delivering a similar scope for Swalecliffe (which incurred larger enabling costs than anticipated), we wanted to make sure our estimate reflected the true costs of the proposed solution.

Our Engineering team has conducted a more detailed scoping exercise considering the unique needs, opportunities, and constraints of this site. This has resulted in the following changes to the solution outlined at original business plan submission:

- Relocation of the proposed outfall, including additional infrastructure to convey final effluent from the WwTW.
- Better understanding of the cost of delivering a new long sea outfall (LSO) following progression of a project to provide a similar outfall at Swalecliffe WwTW.
- Removal of storm overflow, resulting in an increase in the treatment capacity required to ‘treat all flows’.
- Change to location of the WwTW, resulting in the need for additional pumping.

A Level 2 cost estimate has been derived for the updated scope by our Cost Intelligence Team (CIT). The result is a total cost estimate increase of £48.0m to £103.2m. The primary reason for the difference is the increase in LSO cost, as shown in Table 4.

Asset	October 2023 net direct cost (£m)		August 2024 net direct cost (£m)		Cost increase (£m)	Cost increase (%)	Comment
WwTW	Includes 3km Long Sea Outfall (LSO)	14.5	Larger treatment process	14.4	16.5	114%	Largely driven by significant increase in LSO cost, based on more recent cost data.
Outfall			3km LSO	16.6			
Discharge WPS	180l/s	9.5	150l/s	0.7	6.4	67%	Changed route to LSO from WTW following more detailed enabling works.
Sewers & Rising Main	9.2km		12.4km	15.2			
Feed WPS	N/A	0	New	1.1	1.1	100%	Not included in original cost, change to WTW location following more detailed enabling works.
Total net direct costs	24.0		48.0	24	100%		
Total cost including indirect costs ¹¹	55.0		103.2	48.2	87%		

Table 4 - Change in net direct cost of Whitfield WwTW October 2023 to August 2024

¹¹ Indirect costs include contractor and client project related costs, risk, overheads.

A benchmarking exercise was carried out for the net direct costs of the project by Mott MacDonald. Top-down cost models from the Mott MacDonald database were aligned to the asset and equipment level models and tested against comparable water company costs to generate the benchmarks. Overall, the data from 8 comparable water companies was used to generate the benchmarks.

Benchmarking tools were used to ensure alignment of benchmarking sources across individual scopes that share the same assets and models. Where the cost driver lay outside the range of the model it was omitted, ensuring consistency, and allowing for a better analysis of Southern water models.

Costs were normalised for both inflation using the CPIH inflation index, and construction location using BCIS location factors.

The results are shown in Table 5.

Scheme	Southern Water cost estimates		Benchmarking result		
	Total cost estimate of assets for benchmark	Total cost of assets able to be benchmarked	Coverage	Total cost of benchmarked assets	Variance
Whitfield	£47,282,608	£23,070,119	48.79%	£24,278,426	-4.98%

Table 5 - Whitfield WwTW net direct cost benchmark

Due to the unique nature of the scheme the coverage of benchmarked assets is relatively low at 49%, as benchmarking models cannot be aligned with custom assets. However, a significant proportion of the costs include a quote or previously assured costs, which infer a 0% variance to the estimated net direct cost. Factoring in these costs which account for £20.5m alongside the benchmark, means a total of £43.6m of the scope (92%) has some measure of cost confidence, as shown in Table 6.

Scheme	Southern Water cost estimates		Benchmarking result		
	Total cost estimate of assets for benchmark	Total cost of assets able to be benchmarked	Coverage	Total cost of benchmarked assets	Variance
Whitfield	£47,282,608	£43,559,979	92.13%	£44,768,286	-2.70%

Table 6 - Whitfield WwTW net direct cost benchmark including quotes

Given the high coverage of scope and low variance we consider the net direct costs to be appropriate and proportionate. Non-direct project related costs were applied, as explained in Technical Annex 'Cost and Option Methodology (SRN15)'¹², to give the total cost estimate of £103.2m.

¹² https://www.southernwater.co.uk/media/mjyp0of4/srn15-cost-and-option-methodology_redacted.pdf

Upgrade existing Broomfield Bank WwTW

A review of the solution identified at PR19 and a bottom-up re-costing of the alternative solution to the new Whitfield WwTW was undertaken, and we consider the scope and cost estimate given in our business plan to remain appropriate.

As discussed in our Cost Adjustment Claim submission 'SRN22 Network and WTW Growth'¹³ we anticipate significant challenges in obtaining the necessary planning permission to upgrade Broomfield Bank WwTW to accommodate the WUE flows. Significant constraints were imposed on the construction of the original treatment works and similar restrictions are likely to apply to any major expansion. As part of the upgrades required a new storm tank would need to be constructed outside of the current footprint of the underground site, and no suitable locations have yet been identified.

Additionally, we assess there to be much higher construction and therefore cost risk in conveying flows to Broomfield Bank WwTW than a new WwTW, due to its location and the route the pipeline would need to take. Whitfield is situated north of Dover bounded on both sides by the Kent Downs designated Area of Outstanding Natural Beauty. It is 6.5 km as the crow flies from the Broomfield Bank WTW and 10.5 km from the Broomfield Bank WwTW in terms of existing infrastructure routed via the port town of Dover. Providing new and/or upgraded infrastructure in and around the Port of Dover is a highly complicated area for construction and involves multiple stakeholders and agreements due to the national strategic importance of the location. This includes:

- The Port of Dover handles 13 million passengers, 2.5 million freight vehicles and £119 billion of UK (17% of all UK) trade a year; up to 160km of freight in a single day.
- Crossing main transport links – A2/A20.
- Large amount of other infrastructure underground; telecommunications, utilities, tunnels.
- Channel Tunnel Rail Link.

Under normal circumstances, the existing treatment works would be expanded but Broomfield Bank WwTW is constructed underground in a hillside; therefore, providing additional process capacity whilst maintaining current levels of service is highly complicated. At this stage we do not believe this is a viable option.

¹³ [srn22-network-and-wtw-growth.pdf \(southernwater.co.uk\)](https://www.southernwater.co.uk/srn22-network-and-wtw-growth.pdf)

5. Business plan dependencies

Chapters	–
Business cases	–
Technical annexes	SRN15 Cost and Option Methodology SRN17 Direct Procurement for Customers and Alternative Delivery
Enhancement cases	SRN44 Wastewater Growth
Cost adjustment claims	SRN22 Network and WTW Growth
Ofwat test areas	–
Assurance	–
Other – please specify	–

Data Tables impacted by the representation:

Table/s Impacted	Data Lines Impacted
CWW3	CWW3.153 to CWW3.155 ¹⁴
SUP12	SUP12 ¹⁵

All documents and tables referenced above can be found on our website here: [Business Plan 2025-30 - Southern Water](#)

¹⁴ CWW3.153 increased by £103.2m to account for full cost of Whitfield WwTW. Additional data table to be provided by Ofwat (reference Query Response OFW-IBQ-SRN-003) to detail breakdown of development costs to Stage 3 of the large scheme gated process and final delivery costs.

¹⁵ Whitfield WwTW costs removed from table SUP12 to reflect change in delivery mechanism from 'DPC-lite' to the large scheme gated process.