SRN-DDR-045: WINEP - Monitoring

Enhancement Cost Evidence Case

28th August 2024

Version 1.0

from Southern Water

Contents

1. Executive Summary

This document sets out our response to Ofwat's Draft Determination on the Monitoring requirements within the Water Industry National Environment Programme (WINEP) in relation to flows and spills in wastewater systems.

Since our draft Business Plan submission on 2 October 2023, the number of monitoring actions planned for AMP8 have been altered to reflect the regulatory requirements resulting from on-going conversations with Defra and the Environment Agency. This evidence case documents these changes in scope and the costs.

This document provides a detailed response to Ofwat's Draft Determination of our proposed costs for delivery of the WINEP Monitoring requirements for AMP8. We believe the proposed allowances for flow and spill monitoring fall significantly short of the investment needed to meet the statutory and regulatory monitoring and reporting requirements in this essential programme of work.

Specifically, we have responded to the following concerns raised by Ofwat:

1) **Flow Monitoring at Sewage Treatment Works (U_MON4):** Ofwat challenged us to explain and evidence the assumptions we have made in ensuring this investment is the best option for customers and is cost efficient. They also note discrepancies between our initial WINEP action numbers and our proposed AMP8 program.

   Our Response: We have addressed the discrepancy in action numbers, which stemmed from the inclusion of U_MON3 actions. We can also confirm that any costs for the actions have only been included in our plans once. More importantly, we demonstrate that our higher costs are directly related to the increased complexity of AMP8 projects, supported by detailed site surveys and a breakdown of required work. Our approach, tailored to individual site needs and size, ensures cost-effective solutions for customers. Benchmarking data further confirms that our unit costs are competitive with, and often lower than, other water companies.

2) **MCERTS Monitoring at Emergency Sewage Pumping Station Overflows (U_MON6):** Ofwat has challenged the efficiency of our proposed investment, citing concerns about high unit costs and a lack of detailed cost breakdowns.

   Our Response: We acknowledge that our AMP8 program for U_MON6 includes a higher proportion of larger, more complex sites, contributing to higher costs. However, we have undertaken a rigorous cost review process, involving detailed site assessments and benchmarking against industry standards. This process has strengthened our confidence in the accuracy of our estimates and confirmed that our costs are generally lower than industry benchmarks.

Considering this evidence, we request Ofwat to reconsider their proposed allowances for WINEP Monitoring. Our robust cost estimation process, coupled with our commitment to delivering tailored and efficient solutions, ensures that the requested funding will be used responsibly to meet regulatory requirements and deliver essential environmental improvements for our customers.

2. Introduction

This evidence case supplements our SRN41 WINEP Monitoring Enhancement Business Case submitted on 2 October 2023. It details significant developments in the programme's scope and provides compelling new evidence to justify our request for the full funding allowance.

Ofwat's Draft Determination proposes a substantial reduction in our allowance for two critical areas:

(a) Flow Monitoring of Flow Passed Forward (FPF) at Wastewater Treatment Works.
(b) MCERTS certified monitoring of emergency overflow operation on network sewage pumping stations.

These reductions total £33.35 million. This is a gap that significantly hinders our ability to meet the regulatory requirements in the WINEP for enhanced monitoring at our wastewater treatment works and pumping stations. This document will demonstrate why these reductions are unwarranted and why granting the full requested allowance is crucial for delivering a program that effectively serves our customers, enable us to operate our infrastructure to the permit requirements, and enables the Environment Agency to effectively carry out their regulatory duties.

3. Issues

3.1 Changes within planned Monitoring actions

The drivers in this evidence case are split into two for ease of discussion. The case for each WINEP driver is discussed separately. The WINEP drivers are briefly summarised below:

Flow and Spill Monitoring

a. U_MON4 – MCERTS certified FPF flow monitoring at WwTW or last in line sewage pumping station (SPS) overflows.
b. U_MON6 - MCERTS certified monitoring of emergency overflow operation on network sewage pumping stations.

There are WINEP drivers to support monitoring of compliance at storm overflows and wastewater treatment works. U_MON 4 drivers require these flow-limiting overflows to have certified monitoring of the Flow Passed Forward (FPF) for full treatment at the treatment works. U_MON6 drivers require the installation of EDM and flow monitoring at emergency overflows on the network.

Our initial business plan submission of 2nd October 2023 included the following provisions for drivers focused on storm overflow 'flow passed forward' monitoring:

- U_MON4b – monitoring on 168 sites to be installed in AMP8.
- U_MON4c – monitoring on 72 sites to be installed in AMP8.
- U_MON4d – monitoring on 2 sites to be installed in AMP8.
- U_MON4e – monitoring on 12 sites to be installed in AMP8.

Our initial business plan submission of 2nd October 2023 included the following provisions for drivers focused on emergency overflow monitoring:

U_MON6a - 23 sites to be installed in AMP8.
U_MON6b - 7 sites to be installed in AMP8.
U_MON6d - 98 sites to be installed in AMP8.

We have 510 sites in our WINEP which fall under the monitoring of emergency overflow operation on network sewage pumping stations driver. Of these 510 sites, 390 require the installation of Event Duration Monitoring (EDM) and MCERTS flow passed forward (FPF) monitors. Many of these schemes are likely to include civil engineering work of a complex nature.

We have prioritised our initial list of 510 sites, and we propose to complete 128 sites in AMP8 and 382 sites in AMP9, see **Error! Reference source not found.**. This is in accordance with the Environment Agency WINEP guidance, and the instruction issued on 18 August 2023 which advised us that Defra confirmed that all companies must phase 75% of U_MON6 actions beyond 2030 and that no more than 25% of actions should be delivered in AMP8. This applies to each of the U_MON6 subcategories: U_MON6a, U_MON6b, U_MON6c, U_MON6d. We have been working with the EA to compile a revised prioritised site list for the U_MON6 driver based on Defra's criteria, ensuring that monitors at the highest priority sites are installed first.

Driver	Total number of sites on WINEP	Number of WINEP sites to complete in AMP8 (25% of total)	Number of WINEP sites to rephase to AMP9 (75% of total)
U_MON6a	91	23	68
U_MON6b	29	7	22
U_MON6d	390	98	292
Total	**510**	**128**	**382**

Table 1: Summary of the impact of applying Defra's steer on U_MON6 monitoring driver

Defra sent an email to us on 7 August 2024 saying "we are likely to require monitors to be installed at 100% of emergency overflows by 2035. This would likely mean increasing requirements in PR24 for roll-out from 25% to 50%. A formal confirmation of this approach will follow, subject to some final internal decisions, but we would be grateful if you could start preparing your response to Ofwat's Draft Determinations accordingly". The email was received too late to change our response to the Draft Determination. However, we request that Ofwat utilises its Storm Overflow Uncertainty Mechanism to enable us to deliver any such changes in the regulatory requirements for AMP8. An alternative would perhaps be for Ofwat to adjust the U_MON6 allowances for AMP8 for any additional requirements from Defra.

Ofwat's Draft Determination and our response

We have sought to further challenge the robustness and quality of evidence in support of our costs since the October submission.

This explains the work we have done since October to challenge ourselves and to improve the confidence and evidence of the options and costs in our submission. We have:

- Assessed what cost drivers could be driving cost differences between water companies ahead of final submission
- Completed component benchmarking for the costs of installing flow monitors.
- Commissioned more detailed scoping and costing across a sample of projects to improve definition and evidence to support the estimates. We have also externally benchmarked these costs to challenge ourselves further.

The evidence generated by these exercises is presented in this document to support our submitted costs.

3.2 Flow Monitoring at Sewage Treatment Works (U_MON4)

Ofwat used a modelling approach to assess our submitted costs for flow monitoring at sewage treatment works (STWs). They concluded that the model was showing our costs as inefficient due to the higher unit costs associated with our complex installations, which underpins the majority of our AMP8 installation profile.

Thus, Ofwat opted for a deep dive approach for assessing our allowance against our total requested costs (see

Figure 1 below).

Our total requested Totex includes £10.33m of transition funding for 2024-25, covering actions at 61 U_MON4c sites.

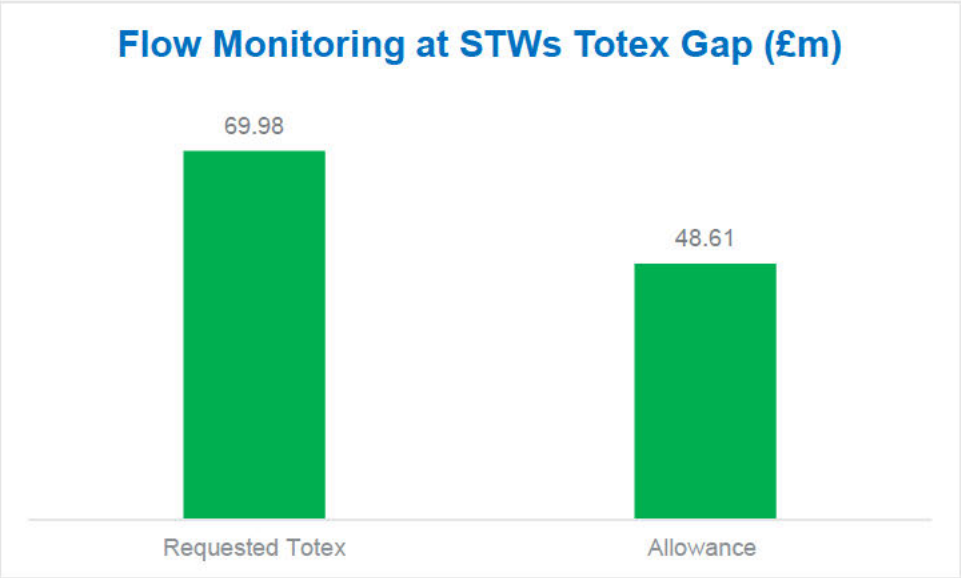

Figure 1: SW requested totex for Flow Monitoring at STWs vs Ofwat draft determination allowance.

As shown in Figure 1, Ofwat's model of our programme at draft determination results in a £21.37m (30%) challenge. Since the October submission, we have further interrogated our costs to ensure they are robust and accurate. This section provides a response to Ofwat's draft determination challenge for our Flow Monitoring at STW's programme. We have responded to each area of challenge (Need, Option and Cost Efficiency) below.

Note, there are no material changes to the requested Totex compared to our February 2024 submission. Please see **Error! Reference source not found.** for a breakdown of the U_MON4 costs.

		AMP8
Workstream	**Total Sites**	**Totex Cost (£m)**
Move AMP7 U_INV2 driver output to 2-minute flow monitoring (U_MON4b)	168	30.38
Installation and MCERTS certification of front-end flow monitor (U MON4c)	72	37.39
Improve accuracy of flow monitoring to better demonstrate flow compliance (U_MON4e)	13	2.21
Total	252	69.98

Table 2 - AMP8 U_MON4 Costs Breakdown*

*In our compilation of data for our Draft Determination Response submission, we missed the inclusion of two sites for MCERTS certified Flow passed forward flow monitor (U_MON4d) in our financial data tables. This increases our request by an additional £108k.

Need for Enhancement Investment

Ofwat's Draft Determination

Ofwat has noted concerns that the proposed investment is not fully consistent with the company's WINEP schemes. A lack of correlation between action numbers submitted in our September 2023 WINEP and supplementary information provided by Southern Water on the breakdown of the 2025-2030 programme was noted, suggesting a much larger programme. Sufficient and convincing evidence to explain the larger programme based on the supplementary information was requested.

Our Response

The number of actions initially provided to Ofwat in the CWW20 data tables following the September 2023 submission included both U_MON3 and U_MON4 actions, as opposed to only U_MON4 actions. Removing the U_MON3 actions (which are accounted for in other areas of the data tables) brings the action numbers in the data tables back in line with those in the September 2023 WINEP. Updated data tables with associated commentaries and methodologies are submitted with our response to Ofwat's consultation on the Draft Determination.

Best option for customers

Ofwat's Draft Determination

Ofwat acknowledges our high-level assessment of flow monitoring options but raises some minor concerns regarding our categorisation of flow monitoring sites based on the complexity of installation work, requesting justification for our approach and detail as to how it is site-specific.

Our Response

The difference between our AMP8 and AMP7 programmes is the complexity profile of our investment, with our AMP7 programme focusing on delivering a simpler and lower cost set of installations and certifications. We recognise our investment requirements for AMP8 are, per site, far higher. This is due to the complexity of the programme we are required to deliver, please see below for a comparison of the work to be delivered across AMP7 and AMP8 for our installations and MCERTS certification of front-end flow monitor (U_MON4c).

	AMP7		AMP8	
Workstream	**Total Sites**	**Proportion of AMP7 programme**	**Total Sites**	**Proportion of AMP8 programme**
Low Complexity – replacement of MCERTS flow meter only	50	88%	2	3%
Medium/High Complexity – require civils work	7	12%	70	97%

Total	**57**	**100%**	**72**	**100%**

Table 3 - Flow Monitoring AMP7 and AMP8 complexity breakdown (U_MON4c)

At AMP8, 32% of the sites that we will be delivering U_MON4 actions at will be serving a population equivalent of 10,000 or more people (see **Error! Reference source not found.** below). As shown in **Error! Reference source not found.** above, the majority of sites at AMP8 will require actions with an element of civil works. To address this, we have taken a site-specific approach to ensure the best option for customers. This involves:

- Evaluating the work required at each site through surveys and investigations.
- Using our historical understanding of cost drivers to integrate the size of the sites into the cost model developed by our Cost Intelligence Team (see Cost Efficiency subsection below).

Population Equivalent	% of Total 72 UMON_4c Sites
0 – 5,000	48%
5,000 – 10,000	20%
10,000 – 100,000	28%
100,000 – 400,000	4%
Total	**100%**

Table 4 - Population Equivalent Served at AMP8 Flow Monitoring Sites

The options were developed from survey outputs and investigations carried out by [redacted], a specialist in Wastewater Network Monitoring Systems, which outlined the required works for compliance with U_MON4 and which AMP the works are to be delivered at each site. From this site-specific approach, the works to be delivered were then categorised in terms of engineering design and construction complexity based on the identified work required at each site.

Specifically, our assumption that certain sites require more complex interventions stems directly from the findings of our site surveys and investigations. These surveys revealed that all of our sites required civils, pipework, and other construction costs (e.g., purchase and installation of new isolation valves, bypass pipework, construction of new chambers, over pumping etc.)

To provide further detail, our site surveys across the 72 UMON 4c sites identified the following scope of work. It's important to note that some sites require multiple actions, so the numbers below reflect the total instances of each work type.

Equipment Upgrades

- 55 sites require replacement of obsolete flowmeters with MCERTS-compliant models
- 21 sites require additional monitoring equipment on storm return lines

Civil Works

- 55 sites require bypass installations to facilitate maintenance
- 39 sites require chamber extensions or modifications to accommodate new equipment

A full breakdown of the scope of the work identified at each of the 72 sites is provided in Appendix 1.

The works were categorised into the following complexity buckets:

- Low – replacement of MCERTS flow meter only

- Medium – adaptation of pipework to accommodate bypass pipework or alteration of pipework to incorporate meter and bypass pipework. Above ground only.

- High – adaptation of pipework to accommodate bypass pipework including the adaptation of any civils element of works that included the introduction or enlargement of below ground chambers.

Based on the outputs from our site surveys and investigations, each site has been categorised according to the size of the site and the complexity of the work required to bring it up to the required standard. This site-specific approach ensures that the best option for customers is chosen by allowing us to:

- Tailor solutions based on a survey of each location. By taking a site-specific approach, we can avoid a one-size-fits-all solution that could lead to overspending at some sites and underspending at others.

- Consider both the scope of work, and the unique size factors of each site (measured by population equivalent served). Our approach ensures that investment is prioritised based on the actual needs of each site, maximizing the impact of every pound spent.

Ultimately, this approach ensures we deliver the most efficient solutions for our customers, optimise our investment, and benefit customers through responsible and targeted spending.

Cost Efficiency

Ofwat's Draft Determination

Ofwat has noted concerns regarding the efficiency of our proposed Flow Monitor investment and suggests we are an outlier on Totex requested and the cost of complex civil installations when compared with the indicative industry unit cost benchmark.

Our Response

We understand via our actual delivery during AMP7 that the cost of installing monitors with a civil works requirement is correlated with the size of the site and the complexity of the work to be undertaken (i.e. whether there is a civils element involved). This is shown in below where the notional direct costs of projects requiring civil works (i.e. medium / high complexity sites) increase significantly for sites servicing a population equivalent of 10,000 people or more.

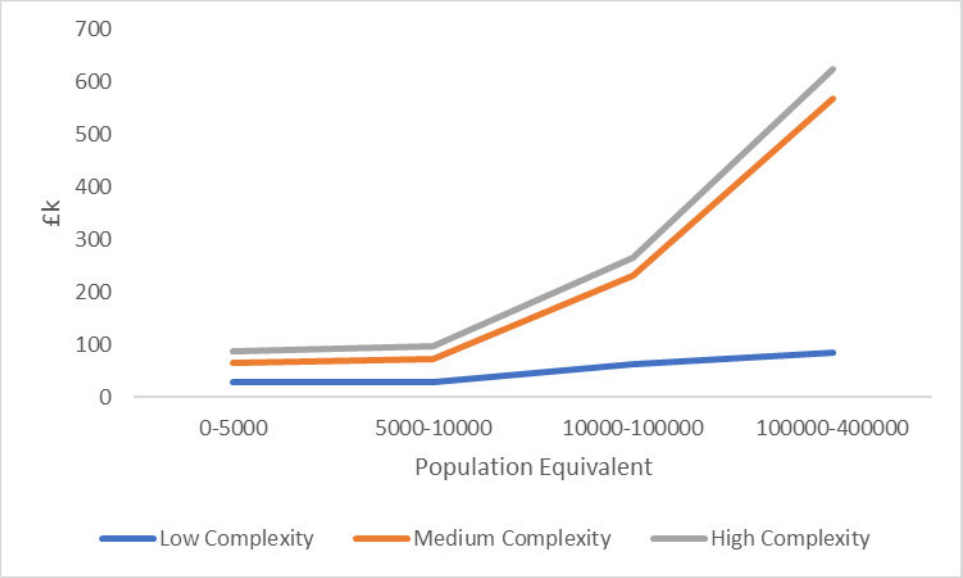

Figure 2: Change in Direct Cost of U_MON4 actions across cost drivers (Population Equivalent and Complexity)

We considered the type of work identified in our site surveys (i.e., the complexity) and the population equivalent served to determine a notional cost bucket for each of these categories. We then applied our pricing curves, which have been developed by our Cost Intelligence Team based on our historical delivery experience.

We have underpinned our assessment of the work required at each site with our robust costing data to ensure that we have accurately estimated our costs of delivering the required U_MON4 programme efficiently for customers.

Component Benchmarking of Flow Monitor installations

We have provided evidence in the Best Option for Customers section above pertaining to why our overall Totex is an outlier relative to other water companies. We commissioned Mott MacDonald to check our unit costs in comparison to similar water companies. They completed a benchmarking exercise on flow meters to provide further confidence of our PR24 costs. The benchmark focused on meters in four different capacities used within our Enhancement Business Case. These costs were benchmarked against Mott MacDonald industry cost curves and data from five other water companies. Bottom-up estimation was carried out to supplement the industry data to increase the benchmarking confidence, coverage, and accuracy. The results of the benchmarking exercise are shown in **Error! Reference source not found.**.

As demonstrated via the benchmarking exercise, our cost estimates have consistently been estimated cheaper than elsewhere across the industry, providing additional confidence we have challenged ourselves from an efficiency perspective.

Diameter (mm)	Population Equivalent	Total Direct Cost within cost estimate (£k)	Benchmarking Direct Cost (£k)	Variation (Benchmark) (£k)	Variation %
200	0 – 5,000	86.4	115.5	-29.1	-25%
250	5,000 – 10,000	96.9	126.9	-29.9	-24%
850	10,000 – 100,000	266.0	456.0	-190.0	-42%
2x850	100,000 – 400,000	625.1	1016.3	-391.2	-38%

Table 5: Summary of component benchmarking for installation of flow meters

Please refer to Appendix 2 for the benchmarking report.

3.3 MCERTS monitoring at emergency sewage pumping station overflows (U_MON6)

Ofwat's Draft Determination

As our MCERTS Monitoring programme has been determined to be material in cost and our indicative unit cost benchmarks higher than industry average, Ofwat have opted for a deep dive approach for assessing our allowance against our total requested costs for the programme (see **Error! Reference source not found.** below).

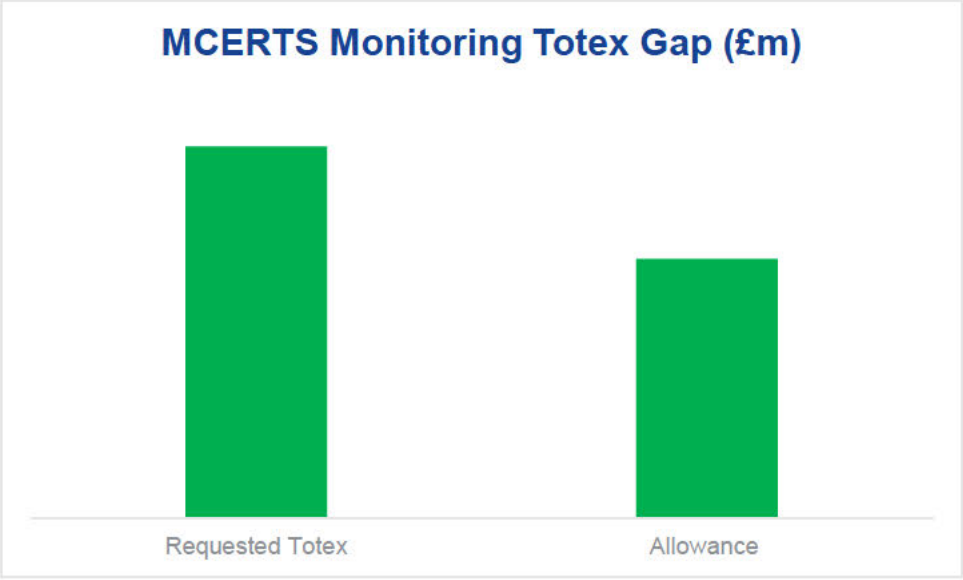

Figure 3: SW Requested Totex for MCERTS monitoring at emergency sewage pumping station overflows vs draft determination allowance.

As shown in **Error! Reference source not found.**, Ofwat's model of our programme at draft determination results in a £11.98m (30%) gap. This section provides a response to these challenges, presenting evidence which enables Ofwat to make the full requested allowance for our MCERTS monitoring programme.

Ofwat has raised concerns as to whether our MCERTS monitoring investment proposal is efficient. Ofwat states that we have not provided evidence of the assumptions we have made or supporting evidence of how costs have been developed and have not obtained third party cost assurance or benchmarking for these monitoring costs.

Our Response

A key consideration is the split of our total emergency overflow programme which we intend to deliver in AMP8. Summarised below is a breakdown of our AMP8 programme by site size, compared to proportion of the full WINEP programme (AMP8 and AMP9). Sites required for AMP8 have been determined by agreement of prioritisation with the Environment Agency, which does not consider the size or complexity of the site requiring installations.

Our Emergency Overflow installation (U_MON6) activity will include a higher proportion of our medium and large sites in AMP8 than in later AMPs, as shown in **Error! Reference source not found.**. While we are no longer deploying our largest sites in AMP8, this does not offset the increase in large and medium sites. Note that some sites require multiple actions.

Site Size	Population Equivalent	Number of sites receiving installation (AMP8 only)	Number of sites receiving installation (AMP9)	Number of sites receiving installation (AMP8 and AMP9)	% of U_MON6 activity (AMP8 only)	% of U_MON6 activity (AMP8 and AMP9 WINEP)
Small	0 – 5,000	11	96	**107**	11.2%	27.4%
Medium	5,000 – 10,000	49	130	**179**	50.0%	45.9%
Large	10,000 – 100,000	38	51	**89**	38.8%	22.8%
Very Large	100,000 – 400,000	0	15	**15**	0.0%	3.9%
Total		**98**	**292**	**390**	**100.0%**	**100.0%**

Table 6: Summary of U_MON6d actions by site size

This highlights a key consideration; that the method of setting allowances should account for site size as a proxy for the complexity of installation. Other water companies' priority sites could be weighted towards their smaller (and less costly) sites, whereas in our case, AMP8 represents a more complex portion of the whole programme.

The initial cost estimate for this activity was £39m. Since Business Plan submission, our engineering teams have conducted a rigorous review and refinement process of bottom-up costs, challenging site categorisation, complexity evaluation and costing rationale. This process involved a detailed analysis of site characteristics and installation requirements. Our engineering teams categorised sites based on flow rate and developed standardised layout sketches for flowmeter chambers. They then conducted a comprehensive review of existing flowmeter installations, utilising system data and site visits to gather information on site specifics such as land ownership, discharge consents and existence of onsite storm tank storage.

A representative sample of 11 sites (5 notional and 6 actual) across different flow rate categories were methodically assessed to develop accurate cost estimates. This involved detailed cost breakdowns for the actual and notional sites, factoring in variables such as pipe diameter, site complexity, and the potential need for temporary flow management solutions. The resulting cost data was then analysed to establish a clear correlation between flow rate and installation cost, enabling us to extrapolate costs for all sites in a robust and transparent manner.

The outcome of this re-costing exercise was that we found our costs to be 7.6% higher than our Business Plan estimate. We have concluded that this is within an acceptable tolerance threshold and thus have decided to maintain the costs we submitted in the Business Plan, with increased confidence of their accuracy because of this thorough challenge of the costings.

We also commissioned Mott MacDonald to complete a comprehensive benchmarking exercise to further confirm the accuracy and efficiency of our submitted costs. This involved comparing our costing of Emergency Overflow installation activity against industry standards using a representative sample of MCERTS monitor installation sites. 11 schemes amounting to £2.45m scope were sampled, and £1.9m of the costs within this scope were benchmarked, using the latest available comparable data to provide a robust basis for comparison. As summarised in Table 7 below, our estimated costs for the sampled sites are generally lower than industry benchmarks, Specifically, 10 out of 11 schemes demonstrated lower costs than the benchmark, with an average cost reduction of 12% across all sampled schemes. Please refer to Appendix 3 for the full results of the benchmarking exercise.

Total Cost of Projects Sampled (£k)	Scope Benchmarked – SW Cost (£k)	Sample Coverage (of total project cost)	Benchmarked equivalent costs (£k)	Variance (£k)	Variance (%)
£2,450	£1,930	79%	£2,194	-£265	-12%

Table 7: U_MON6 Benchmarking

Companies were selected as the closest peers to Southern Water and data normalised for location and date to ensure comparisons are appropriate. To account for regional variations in the base cost of the resources needed for water projects, the location factors published by the Building Cost Information Service (BCIS) were used to adjust comparator data to a Southern Water cost base. This adjustment seeks to remove any 'skewing' of the comparison due to data being sourced from companies across the UK, which experience local differences in resource cost due to factors including availability; the general local economy and average rates of pay; logistical or access constraints caused by the preponderance of urban or rural communities within their catchment areas; and variances in productivity. Occasionally, costed items were factored to adjust costs to reflect market changes, replacement costs and additional assumptions. Where applicable, these factors have been used in the benchmark costs as well to ensure a like-for-like benchmark comparison.

These adjustments have been made to ensure that we have a robust and accurate benchmark, and the results show that our costs and options selected are efficient compared to comparable water companies.

Response to Ofwat query (OFW-IBQ-SRN-017)

Defra have indicated that they may ask water companies to increase the number of Emergency Overflows with a MCERT Monitor from 25% to 50% by 2030 in order to meet a 100% completion target of 2035. It is too late in the Price Review process to make any adjustments to our final data tables. We have not included these potential extra costs for AMP8. We propose that the storm overflow uncertainty mechanism is utilised such that any additional government requirement under the U_MON6 driver can be appropriately considered and delivered during AMP8. This change of obligations directly relates to storm overflow activity, so this seems an appropriate use of this mechanism.

This is a new requirement and would be in addition to our planned 25% coverage by 2030, and as such we would expect to overspend on the proposed Ofwat allowances for AMP8. The uncertainty mechanism would be able to provide the additional funding for companies through the PR24 reconciliation at PR29 for the overspend associated with these additional 25% of monitor installations delivered. An alternative would be for Ofwat to make an adjustment to the allowance for this activity in AMP8.

3.4 Continuous Water Quality Monitoring (CWQM)

Our latest cost estimates for Continuous Water Quality Monitoring have been updated to reflect our query response OFW-OBQ-SRN-251, increasing estimated costs to £43m.

Our October proposal reflected our intent to buy-in the service from a national provider such as the EA, with our costs reflecting purchase of the data on an annual basis from year 3 onwards.

Subsequent conversations with national providers such as the EA have confirmed this will not be a feasible approach. As such, our latest cost estimates are inclusive of full installation and maintenance of 304 continuous water quality monitors in AMP8. For further details, please refer to response OFW-OBQ-SRN-251.

Ofwat has proposed that £28.5m of our draft determination allowance is allocated within the Delivery Mechanism. This provides us with an allowance of £8m to confirm the site locations, type of installation required and to secure legal and estates access to the locations to install and maintain the monitoring equipment. We have assumed our year 1 costs of £8.6m remain outside the Delivery Mechanism which equates to core element allowed at draft determination. All other costs will remain within the Delivery Mechanism.

4. Our WINEP price control deliverable (PCD)

Ofwat proposes a specific PCD for our WINEP monitoring programme. We are requesting that Ofwat reconsiders its approach to customer protection and uses instead our wastewater WINEP PCD, which we set out below. The principles we applied to our PCD proposals are set out in SRN-DDR-052 Price Control Deliverables.

The details of the PCD are subject to our AMP8 WINEP being finalised.

Component	Output based on WINEP action completion
Description	Completion of AMP8 WINEP actions as submitted in our business plan (including Delivery Mechanism and DPC), and are within the scope of the WINEP drivers listed in **Error! Reference source not found.**9 below. We will return funding to customers on a unit cost basis for non-delivery of AMP8 WINEP actions within the scope of the drivers listed in **Error! Reference source not found.** below that are not completed by 31st March 2030 because the WINEP need has changed.
Output - WINEP actions	Output: The total number of actions in scope of PCD is 1,419
Total Cost	£2,187 million
Unit cost	£1.464 million per action (total cost / number of actions)
Penalty rate	£1.464 million per action not completed (no cost sharing assumed)
Materiality of future scope alterations	£21.867 million
Output delivery date with current scope	31 March 2030
Gated dates	Assurance of the WINEP being forecast for completion by 31 March 2030 will be provided by 31st of March 2028 to support draft reconciliation for performance during PR29.
Conditions on allowance	Should we receive confirmation from a regulator of a necessary change to the timing or scope of a scheme, or in fact the change of scheme to address the core issue, which either changes the benefit delivered or the solution being more expensive, the implication of this change would be reflected in the PCD. Where this change leads to a material variance greater than 1% of the original enhancement investment, then the PCD would symmetrically account for this change in a reconciliation at the end of the AMP.
Assessment of PCD	In the event of not delivering the output by the end of AMP8 (i.e., by 31 March 2030), but the need is still required, this PCD remains in place until the end of AMP9 (i.e., 31 March 2035). Ofwat will assess the completion of this PCD by 31 March 2035 as part of the PR34 process.
Late penalty	Not required as being late would mean non-compliance with WINEP statutory requirements.
Measurement	Progress and performance will be reported in our annual performance report (APR) We will report progress on number of in scope WINEP actions completed by 31 March each year.

Component	Output based on WINEP action completion
ODIs to be netted off in the event of non-delivery	Storm Overflows Discharge Permit Compliance (part) Operational Greenhouse gases (part)
Assurance	Third party APR assurer will assure that the output and conditions have been met.

Table 8: Wastewater WINEP PCD

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
U_IMP1	8	6.309
U_IMP2	2	0.100
U_IMP3	0	0
25YEP_IMP	0	0
25YEP_INV	1	0.370
WFD_INV_WRHMWB	0	0
WFD_NDINV_WRHMWB	0	0
WFD_ND_WRHMWB	0	0
WFD_IMP_WRHMWB	0	0
BW_IMP1	0	0
BW_IMP2	3	0
BW_IMP3	0	0
BW_IMP4	0	0
BW_INV1	0	0
BW_INV2	4	0.464
BW_INV3	0	0
BW_INV5	0	0.284
BW_ND	4	120.478
BW_NDINV	7	0.545
NERC_INV	0	0
NERC_IMP	0	0
WFD_NDLS_CHEM1	11	0.006
WFD_NDLS_CHEM2	23	3.827
WFD_ND_CHEM3	6	11.213
WFD_ND_CHEM4	5	0
WFD_IMP_CHEM	8	3.920
WFD_INV_CHEM	24	2.442
EnvAct_INV1	2	0.150
EnvAct_MON1	0	0
EnvAct_INV2	0	0
EnvAct_MON2	0	0

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
EnvAct_INV3	0	0
EnvAct_MON3	0	0
EnvAct_MON4	1	43.000
EnvAct_MON5	1	0
DrWPA_INV	0	0
DrWPA_ND	0	0
DrWPA_IMP	0	0
EE_INV	1	0.031
EE_IMP	1	1.836
U_MON6	3	39.707
HD_IMP	11	119.309
HD_ND	0	0
HD_INV	14	3.321
HD_IMP_NN	37	223.355
WFDGW_INV	7	1.910
WFDGW_NDINV	0	0
WFDGW_ND	0	0
WFDGW_IMP	0	0
U_IMP5	0	0
U_IMP6	0	0
INNS_INV	0	0
INNS_ND	0	0
INNS_IMP	0	0
INNS_MON	0	0
MCZ_ND	0	0
MCZ_IMP	0	0
MCZ_INV	14	2.536
WFD_INV_MP	3	0.589
U_MON3	260	8.323
U_MON4	255	69.976
EPR_MON1	0	0
WFD_INV_N-Tal	4	3.052
WFD_INV	37	8.212
WFD_IMP	59	227.869
EnvAct_IMP1	5	24.585
WFD_ND	29	73.973
SAFFA_IMP	0	0
SAFFA_INV	0	0
U_IMP7	0	0

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
SUiAR_IMP	2	51.069
SUiAR_ND	0	0
SW_IMP	6	63.529
SW_ND	56	419.421
SW_INV	3	0.323
SSSI_IMP	18	58.708
SSSI_ND	0	0
SSSI_INV	32	8.588
EnvAct_INV4	210	13.256
EnvAct_IMP2	212	417.122
EnvAct_IMP3	20	83.267
EnvAct_IMP4	6	67.257
EnvAct_IMP5	2	2.086
WFD_INV_MOD	0	0
WFD_IMP_MOD	2	0.548
Totals	**1,419**	**2,186.686**

Table 9: Drivers and number of wastewater WINEP actions and business plan costs within scope of the PCD as reported in table ADD15

5. Business Plan Dependencies

This document links to the original business plan submission as set out in

Chapters	SRN06 Wholesale Wastewater
Business cases	
Technical annexes	SRN38 Water Industry National Environment Programme.
Enhancement cases	SRN42 Wider Environmental Enhancement
Cost adjustment claims	n/a
Ofwat test areas	n/a
Assurance	
Other – please specify	

Data Tables impacted by the representation:

Table/s Impacted	Data Lines Impacted
CWW3	CWW3.1 – 3.9 and 3.10-3.12
CWW20	CWW20.32 - 35 and CWW20.50 - 55

Appendix 1: U_MON4 sites scope of work

Site	Option Description	Complexity
Appledore Road Woodchurch WPS	New flowmeter and associated bypass pipework to enable inspection and cleaning	Medium
Barcombe WTW	New flow meter chamber, New flowmeter and associated bypass pipework to enable inspection and cleaning	High
Beckley WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Benenden WTW	Storm return requires diverting to the process upstream of the FFT flume OR Alterations to the storm return pipework maybe required to install a magmeter/ clamp on flow meter. Upgrade of Warren Jones 460 Monitor	Medium
Bishops Waltham WTW	Capital works required: Installation of monitoring on the Storm Return required to produce accurate FFT. Civil works required to excavate Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter	High
Bognor Main WPS	Capital works required: Bypass required on the PFF MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber	Medium
Boldre WTW	FFT requires storm return flows OR Flow from storm tank to environment Upgrade of monitoring equipment: Warren Jones 460 flowmeters require replacing for MCERTS approved flowmeters Upgrade of monitoring equipment: Warren Jones 460 flowmeters require replacing for MCERTS approved flowmeters	Medium
Bosham WTW	Bypass required on FFT Magmeter, no chamber required	Medium

Budds Farm WTW	Capital works required: Bypass required on the FFT (FE280) flowmeter for means of cleaning and maintenance. Civil works required due to the position of the flowmeter Upgrade of monitoring equipment: FFT (FE280) ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter Upgrade of monitoring equipment: FFT (USF5), FFT (USF6) & FFT (USF8) Siemens HydroRanger Plus with Milltronics ultrasonic sensor is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Burwash Village WTW	Capital works required: Bypass required on the FFT Magmeter for means of cleaning and maintenance. Civil works required for New/extension of chamber Upgrade of monitoring equipment: FFT ABB Magmaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Castle Road Allington WPS	Replacement magmeter new chamber and pipework	High
Catsfield WTW	Bypass required on Works Return Magmeter, Civil works required for extension/new chamber Upgrade of equipment: FFT Warren Jones 460 sensor is now obsolete	High
Chale WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Capital works required: Bypass required on the Works Return MagMeter for means of cleaning and maintenance. No civil works requires as the flowmeter is above ground We recommend completion of installing bypass' on FFT & Works Return flowmeters in AMP8 Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter Upgrade of monitoring equipment: Works Return ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	Medium

Chickenhall Eastleigh WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Chiddingfold WTW	Bypass required for FFT flow meter	Low
Chilbolton WTW	The WJ460 obsolete and not supported, replace flow meter New flow meter chamber and associated bypass pipework to enable inspection and cleaning	High
Churchfield Way Wye WPS	Certify magmeter bypass required- new chamber and pipework	Medium
Coldwaltham WTW	Capital works required: Bypass required on the FFT flowmeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter We recommend completion of installing bypass and upgrading FFT flowmeter in AMP8 Capital works required: Monitoring required on the Works Return as this returns upstream of the FFT flowmeter. Civil works required as the pipe is located underground We recommend completion of installing monitoring on Works Return or diverting flows in AMP8 U_MON3 / Flow to Storm: The U_MON3 Flow to Storm Warren Jones 460 with ultrasonic sensor (C) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High
Dambridge WTW	Excavation required on the Storm Return to install a flowmeter for accurate FFT Upgrade of monitoring equipment: FFT Warren Jones 460 flowmeter is obsolete	High
Ditchling WTW	Storm Return requires a Magmeter to monitor flows which return downstream of the FFT Weir Ultrasonic OR divertReturn flows to return upstream of the FFT Weir Ultrasonic which would not require flow to be summated.	Medium

Ditton WTW	WJ460 is obsolete this will require replacing with a suitable MCERTS flow meter. New flow meter chamber,New flowmeter and associated bypass pipework to enable inspection and cleaning	High
East Dean WTW	Capital works required: Bypass required on the FFT Magmeter for means of cleaning and maintenance. Civil works required for new/extension of chamber	High
East Hoathly WTW	Bypass required for FFT flow meter	Low
Eden Vale East Grinstead WTW	New storm return MCERTS flowmeter with civil works required (FFT)	Medium
Ferry Hill WTW	Bypass required on the FFT Magmeter , new/extension of chamber required Upgrade of monitoring equipment: FFT ABB Magmaster is not MCERTS accredited Monitoring required on Storm Return as it re-joins the process downstream of the FFT Magmeter	High
Fittleworth WTW	Considerations are required for maintaining the FFT Magflow equipment achieved by installing a bypass for calibration and Break out/expand existing flow meter chamber	High
Foads Lane Ramsgate WPS	New flowmeter and associated bypass pipework to enable inspection and cleaning	Medium
Fordcombe WTW	Bypass required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required	High
Golf Road Deal WPS	Break out/expand existing flow meter chamber,New flowmeter and associated bypass pipework to enable inspection and cleaning	High
Hamstreet WTW	Civil works required to install a bypass on the FFT Magmeter for means of cleaning and maintenance (enlarge Chamber) Upgrade of monitoring equipment: FFT ABB Magmaster is not MCERTS accredited	High
Lavant WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. No excavation works required as the flowmeter is above ground Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	Medium
Lenham WTW	Capital works will be required to install new flow meters on a new flume. Options in report.	High
Lingfield WTW	Bypass required on FFT 1, FFT2 and FFT3 MagMeter for means of cleaning and maintenance. Civil works required due to the	High

	location of the flowmeter (FFT) 3 x New MCERTS flowmeters (FFT)	
Liss WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and mainetanance. No civil works required as the flowmeter is located above ground Capital works required: Installation of monitoring on the Storm Return required to produce accurate FFT. Civil works required to excavate	Medium
Lydd Road Camber WPS	large diameter bypass required	Medium
Military Road Ramsgate WPS	New flowmeter and associated bypass pipework to enable inspection and cleaning	Medium
Minster WTW	Excavation required on the Storm Return to install a flowmeter for accurate FFT. New Chamber Required Upgrade of monitoring equipment: FFT ABB Magmaster is not MCERTS accredited and requires replacement	High
Moat Road Headcorn New WPS	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber We recommend completion of installing bypass on FFT flowmeter in AMP8 Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP8	High
Monks Gate WTW	Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber (FFT) New MCERTS flowmeter (FFT)	High
Morestead Road WTW	Bypass required on FFT Magmeter, extension/new chamber required	High
Northchapel WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter Upgrade of monitoring equipment: Storm Return Altometer is not MCERTS accredited	High

	and requires replacement with MCERTS approved flowmeter	
Peel Common WTW	Bypass required on the FFT Magmeter for means of cleaning and maintenance, new/extension of chamber required Upgrade of monitoring equipment: Upgrade of ABB Kent-Taylor to approved MCERTS approved Magmeter- ABB Watermaster	High
Pembury WTW	Capital works required: Storm Return requires monitoring to be installed to produce accurate FFT as this returns downstream of the flume We recommend completion of installing monitoring on Storm Return in AMP8 Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP7 U_MON3 / Flow to Storm: The U_MON3 Flow to Storm Warren Jones 460 with ultrasonic sensor (C) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High
Penshurst WTW	Bypass required on the FFT ABB Magmeter for means of cleans and maintenance. New/extension of chamber required (FFT) New MCERTS flowmeter (FFT)	High
Portswood WTW	Capital works required: Bypass required on the Works Return 1 MagMeter for means of cleaning and maintenance. No civil works required as the flowmeter is above ground Upgrade of monitoring equipment: Works Return 1 ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter Upgrade of monitoring equipment: FFT 2 & 4 ABB MagMaster's are not MCERTS accredited and require replacement with MCERTS approved flowmeters Capital works required: Monitoring required on the Works Return 2 to produce accurate	Medium

	FFT. Civil works required to the position of the pipe Upgrade of monitoring equipment: SAS Return 1 & 2 Warren Jones 460 flowmeters are now obsolete and require replacement with MCERTS approved flowmeter	
Pulborough WTW	Installation of bypass' on FFT 1, FFT 2, FTA & Works Return Magmeters. Civils work required for new/extension of chamber (3/4) (FFT) 4 x New MCERTS flowmeters (FFT)	High
Robertsbridge WTW	Capital works required: Bypass required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required Upgrade of equipment: FFT ABB Magmaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Rolvenden Layne WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Rye WTW	Considerations are required for maintaining the FFT Magflow equipment achieved by installing a bypass for calibration and Break out/expand existing flow meter chamber	High

Scaynes Hill WTW	Capital works required: Storm Return requires monitoring to be installed to produce accurate FFT as this returns downstream of the FFT flume We recommend completion of installing monitoring on Storm Return pipe in AMP8 Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP7 U_MON3 / Flow to Storm: The U_MON3 Flow to Storm Warren Jones 460 with ultrasonic sensor (C) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor The U_MON3 Formula A Overflow Warren Jones 460 with ultrasonic sensor (D) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High
Sea Road Littlehampton WPS	New flowmeter and associated bypass pipework to enable inspection and cleaning	Medium
Sidlesham WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for extension/new chamber	High
South Ambersham WTW	Capital works required: Bypass' required on the FFT 1 & FFT 2 MagMeter for means of cleaning and maintenance. Civil works required for extension/new chamber Capital works required: Installation of monitoring on the Works Return required to produce accurate FFT. Civil works required to excavate	High

St Helens WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber We recommend completion of installing bypass on FFT flowmeter in AMP8 Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP8 U_MON3 / Flow to Storm: The U_MON3 Flow to Storm Warren Jones 460 with ultrasonic sensor (B) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor The U_MON3 Formula A Overflow Siemens MultiRanger Plus with Milltronics ultrasonic sensor (C) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High
Staplecross WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB PartiMag is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Staplefield WTW	Considerations for maintaining the FFT Magflow equipment achieved by installing a bypass so that the ABB magmeter can be removed.	High
Staplehurst WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High

Steyning WTW	U_MON4 FFT: Capital works required: Civil works required to prevent flume from drowning and the flume requires redesign and reconstruction which will require civil engineering works for delivery in early AMP8 Monitoring of the storm return could also be undertaken so we can use the inlet for TDV in the future, installation of an offline construction of a parallel measurement system such as a MagMeter or Flume We recommend completion of re-design of the FFT flume and installing monitoring on the Storm Return in AMP8 Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter U_MON3 / Flow to Storm: The U_MON3 Flow to Storm (C) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High
Swalecliffe WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
The Bulwark Sandwich WPS	Break out/expand existing flow meter chamber,New flowmeter and associated bypass pipework to enable inspection and cleaning	High
Thornham WTW	Capital works required: Bypass' required on the FFT 'A' & FFT 'B' MagMeter's for means of cleaning and maintenance Upgrade of monitoring equipment: FFT 'A' & FFT 'B' ABB MagMaster's are not MCERTS accredited and require replacement with MCERTS approved flowmeters	High
Tinkers Lane Ticehurst WPS	Considerations are required for maintaining the FFT Magflow equipment achieved by installing a bypass for calibration and Break out/expand existing flow meter chamber	High
Tonbridge WTW	Capital works required: Due to the difficulties of capital works required to excavate for improvements on access to the	High

	flume, we recommend installation of flow meters from the DWF Well pumps which is downstream of the Storm Return. (See schematic diagram)	
Tunbridge Wells North WTW	Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter Upgrade of monitoring equipment: Storm Return ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Tunbridge Wells South WTW	Capital works required: Inlet flume is inaccurate as it regularly surcharges. There is also an issue with the distance between the flume and the penstock. Civil works required to make this MCERTS compliant. Upgrade of monitoring equipment: FFT Warren Jones 460 with ultrasonic sensor is now obsolete and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP8 Upgrade of monitoring equipment: Storm Return ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading Storm Return flowmeter in AMP8	Medium
Warnham WPS	Unsurveyed	Unsurveyed
Weatherlees Hill B WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for new/extension of chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
West Park Bognor Regis WPS	New flowmeter and associated bypass pipework to enable inspection and cleaning	Medium

Westbere WTW	FFT: Due to downstream drowning of the flume, it would be recommended that the entire inlet FFT channel is redesigned with the screens and storm overflow to be located upstream of the FFT monitor. This would require MCERTS flowmeters installing on the FTW, storm separation and storm overflow. This will require the following engineering works: • 3 x New flow meter chambers • New flowmeters and associated bypass pipework to enable inspection and cleaning • Overpumping/tankering enabling works to allow bypass installation This engineering works will need to be planned, designed and delivered in AMP8. We recommend that work commences in Year 1 of AMP8.	High
Whiteparish WTW	Capital works required: Bypass required on the FFT MagMeter for means of cleaning and maintenance. Civil works required for extension/new chamber Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter	High
Wivelsfield WTW	replacement flowmeter and redesign flume	High
Wroxall WTW	Capital works required: FFT MagMeter is buried under tarmac, and we are unable to get access to determine whether a bypass is required. Civil works required to excavate the flowmeter We recommend completion of excavating and potential installation of bypass on FFT flowmeter in AMP8 Upgrade of monitoring equipment: FFT ABB MagMaster is not MCERTS accredited and requires replacement with MCERTS approved flowmeter We recommend completion of upgrading FFT flowmeter in AMP8 U_MON3 / Flow to Storm: The U_MON3 Formula A Overflow Siemens HydroRanger Plus with Milltronics ultrasonic sensor (B) is not supported by the MCERTS certification scheme. It Is recommended that this monitor is replaced with a MCERTS compliant EDM monitor	High

Appendix 2: U_MON4 Benchmarking Report

MOTT MACDONALD

PR24 Enhancement Case Review
Monitoring - Flowmeter

Project:	Monitoring – Flow meters		
Our reference:	NA	**Your reference:**	NA
Prepared by:	[redacted]	**Date:**	30/11/2023
Approved by:	[redacted]	**Checked by:**	[redacted]
Subject:	CIT Review and Benchmarking		

Executive Summary

For PR24 Southern Water considered the flowmeters to provide bypass work around all new Magflow meters to allow them to be removed for cleaning and maintenance in the future. Considering this in the costs resulted in an increase in costs based on benchmarks from PR19 information.

Mott MacDonald were engaged to undertake a benchmarking exercise on flow meters to give confidence in the PR24 costs. The benchmark focused on flowmeters in four different capacities (sizes) from the WINEP Monitoring Enhancement Case. The costs were benchmarked against MM industry cost curves, and data from five other water companies. Bottom-up estimation was carried out to supplement industry data to increase the benchmarking coverage, confidence and accuracy.

Southern Water's (SWS) estimated the costs for four solution types as £1.07m. The average benchmark for this was £1.71m which results in a variation of £0.64m (37%). The main variations resulted from the two largest capacity solution types, namely the "large" (850 mm dia), and "very large" (1700 mm dia) solution. The main contributors to the variations include valves, flowmeter, and overpumping. Which were underestimated and have a variation of between 66% to 86% with the benchmark. Large scale value and meter installation have extensive temporary works for handling and installation, this combined with that manufacture and supply costs increase exponentially with the larger sizes account for the variance.

It should also be noted that cabling and ducting items had variation across all four solution types at 62% under estimated. Although a significant increase it has less of a materialistic impact, only 5% of the total cost on the very large solution type.

Based on the outcomes of this benchmarking exercise, it is recommended to review the estimated costs for large size valves, flowmeters, and overpumping, As well as cabling and ducting item for all cases. It is recommended that SWS review the impact of the potential 37% increase on its position in OFWAT's models and tables and the impact to delivery in AMP8.

Introduction

This report presents the methodology and results of an external cost benchmarking exercise for FFT Flowmeter for 4 different population equivalents (PE) shown in Table 1. MM industry cost curve database forms the basis of the benchmark, with coverage of up to five other water companies.

Methodology

To benchmark Southern Water's (SWS) estimated costs against the industry, data from five peer companies was used. This data is anonymised to protect the commercial interests of these organisations. This data has been obtained by Mott MacDonald from client organisations who are all UK Water and Wastewater companies, who will be employing comparable solutions to that estimated by Southern Water. To produce the benchmark, with reference to descriptions, drivers, inclusions, and exclusions stated for each item, similar cost models were sought from the comparator external sources, and the comparator costs were normalised for date, when required, to 2022 Q4. The Mean value of the comparator costs was used for benchmarking against the estimated costs when more than one external source was used for benchmarking.

Also, a bottom-up estimation was carried where enough industry data was not available to increase the benchmarking coverage, confidence and accuracy.

Findings

A sense-check was made of the comparative costs, and the benchmark was cleansed of any outliers for which a satisfactory explanation could not be deduced. The results are shown in Table 2 and Table 3.

- The overall difference between SWS estimated costs and the benchmarking results ranges between 24% to 42%. The highest difference is related to case 3 and case 4 which are 850 mm size pipes. Whereas SWS estimated costs in case 1 and case 2 differs with the benchmark by 25% and 24%, respectively.

- The main large variations are observed in 850 mm diameter systems. These are caused by underestimation of the valve. The SWS price is between 77% to 79% underestimated for isolation valves.

- Also, ducting in cabling items costs of SWS estimates is underestimated by about 62% in all cases. In addition, two draw pits were added to this item in each case did not seem to be included in SWS estimations.

- Finally, SWS overpumping estimated costs for case 3 and case 4 are another major difference with the benchmark by 66% and 86%, respectively. This is partly due to consideration of a 12" wire armoured flanged hose in the bottom up estimating, instead of the 6" hose considered in SWS estimations. Also, four weeks of Overpumping was assumed to be sufficient, as the process can be partly performed offline.

Next steps / Recommendations

Based on the outcomes of this benchmarking exercise, it is recommended to review the estimated costs for large size valves, flowmeters, and overpumping, As well as cabling and ducting item for all cases.

Table 1

Flowmeters capacities

	PE	Flow rate (l/s)	Pipe diameter
Case 1	0-5,000	28	200
Case 2	5,000 - 10,000	55	250
Case 3	10,000 - 100,000	555	850
Case 4	100,000 - 400,000	2222	1700

Table 2 Benchmarking summary for Flowmeter.

Diameter (mm)	PE	Total Cost (SWS) (k£)	Total Cost (Benchmark) (k£)	Variation (k£)	Variation %
200	0 - 5,000 PE	**86.4**	**115.5**	**29.1**	**25%**
250	5,000 - 10,000 PE	**96.9**	**126.9**	**29.9**	**24%**
850	10,000 - 100,000 PE	**266.0**	**456.0**	**190.0**	**42%**
2X850	100,000 - 400,000 PE	**625.1**	**1016.3**	**391.2**	**38%**

Table 3 Benchmarking itemised results.

	Pipe diameter (mm)	200	250	850	2 X 850
	PE (Population Equivalent)	0 - 5,000 PE	5,000 - 10,000 PE	10,000 - 100,000 PE	100,000 - 400,000 PE
Valves	SWS Cost (£)	£ 7,048.00	£ 7,359.56	£ 32,635.00	£ 44,258.75
	Benchmark (£)	£ 4,692.55	£ 6,185.49	£ 139,815.07	£ 209,722.60
	Variance (%)	-50%	-19%	77%	79%
Flowmeter	SWS Cost (£)	£ 5,020.40	£ 5,145.00	£ 7,398.00	£ 13,644.00
	Benchmark (£)	£ 7,749.71	£ 9,687.14	£ 32,936.27	£ 65,872.54
	Variance (%)	35%	47%	78%	79%
Kiosk	SWS Cost (£)	£ 12,358.75	£ 12,358.75	£ 12,358.75	£ 12,358.75
	Benchmark (£)	£ 14,672.45	£ 14,672.45	£ 14,672.45	£ 14,672.45
	Variance (%)	16%	16%	16%	16%
Cabling & ducting	SWS Cost (£)	£ 11,074.80	£ 11,074.80	£ 11,074.80	£ 22,149.60
	Benchmark (£)	£ 28,971.43	£ 28,971.43	£ 28,971.43	£ 57,942.86
	Variance (%)	62%	62%	62%	62%
Chamber	SWS Cost (£)	£ 6,774.57	£ 9,749.62	£ 17,432.05	£ 24,839.78
	Benchmark (£)	£ 7,897.15	£ 9,972.33	£ 21,392.56	£ 45,037.44
	Variance (%)	14%	2%	19%	45%
Bypass Pipework	SWS Cost (£)	£ 22,505.00	£ 26,803.00	£ 128,162.00	£ 384,786.00
	Benchmark (£)	£ 23,995.49	£ 26,808.26	£ 105,344.70	£ 316,034.09
	Variance (%)	6%	0%	-22%	-22%
Overpumping	SWS Cost (£)	£ 7,213.29	£ 8,291.83	£ 12,605.99	£ 18,898.69
	Benchmark (£)	£ 8,258.79	£ 9,442.47	£ 36,857.37	£ 137,612.35
	Variance (%)	13%	12%	66%	86%

Appendix 3: U_MON6 Benchmarking Report

MOTT MACDONALD

Southern Water PR24 Enhancement Review

U_MON L2 Benchmark

Project:	PR24 Enhancement Review		
Prepared by:	[redacted]	**Date:**	03/07/2024
Approved by:	[redacted]	**Checked by:**	[redacted]
Subject:	U_MON L2 Benchmark		

1.1 Introduction

Mott MacDonald have been engaged to increase cost confidence in the PR24 U_MON solutions. The initial stage of the PR24 Enhancement Review included a benchmark of four flowmeter size bandings. To gain a more comprehensive understanding of the overall costs associated with the U_MON programmes, a full L2 benchmark has been undertaken on 11 solutions.

1.2 Methodology

The individual costed items of the 11 U_MON projects were identified and benchmarked against Mott Macdonald's industry database where comparable data was available. The MM database includes data from 8 UK Water and Wastewater companies (WaSCs), of comparable scale and operating model to Southern Water (SWS). Companies have been selected as the closest peers to SWS and data normalised for location and date to ensure comparisons are appropriate.

To make like-for-like comparisons, the comparator data has been adjusted for inflation (and deflation) to 1Q2023 using the published CPIH figures.

To account for regional variations in the base cost of the resources needed for water projects, the location factors published by the BCIS were used to adjust comparator data to a SWS base. This adjustment seeks to remove any 'skewing' of the comparison due to data being sourced from companies across the UK, which experience local differences in resource cost due to factors including availability; the general local economy and average rates of pay; logistical or access constraints caused by the preponderance of urban or rural communities within their catchment areas; and variances in productivity.

Occasionally, costed items were factored to adjust costs to reflect market changes, replacement costs and additional assumptions. Where applicable, these factors have been used in the benchmark costs as well to ensure a like-for-like benchmark comparison.

1.3 Analysis and Results

This section of the report provides the results and analysis of the benchmarking process. Table 1 below presents the coverage which reflects the percentage of the project cost that has been benchmarked and the variance which represents in percentage terms the cost difference between SWS cost for the scope benchmarked and the industry benchmark. For example, 8% variance implies that scope benchmarked is 8% more expensive than the benchmark.

Table 1 Project Coverage and Benchmark results per project.

New Schemes					
Project Name	Project cost	Scope Benchmarked	Coverage	Benchmark	Variance
Chapel Wharf WPS	£342,828.05	£243,740.31	71%	£267,515.89	-9%
Fire Station Lane Beaulieu	£147,167.47	£84,383.11	57%	£115,224.89	-27%
High Street Cowes	£292,115.63	£231,473.63	79%	£200,134.43	16%
Ladies Walk Binstead	£237,111.74	£152,241.74	64%	£189,672.44	-20%
Large U_MON6 Scheme	£262,638.19	£227,850.07	87%	£281,346.20	-19%
Medium U_MON6 Scheme	£218,901.73	£170,100.54	78%	£219,091.74	-22%
Ridham Ave Kemsley	£125,775.39	£106,029.23	84%	£135,134.82	-22%
Salterns Road Seaview	£173,899.14	£162,183.98	93%	£184,329.61	-12%
Small U_MON6 Scheme	£162,219.16	£116,504.40	72%	£129,385.74	-10%
Very Large U_MON6 Scheme	£365,385.24	£334,886.88	92%	£368,124.60	-9%
Very Small U_MON6 Scheme	£122,196.50	£100,819.04	83%	£104,883.46	-4%
Total	£2,450,238.25	£1,930,212.94	79%	£2,194,843.81	-12%

Of the £2.45m scope included in the estimates, £1.93m was benchmarked, providing a 79% coverage of the scope. Against this scope benchmarked, the benchmark was £2.19m, indicating that the scope costs are 12% lower than the benchmark.

The table above suggests that coverage is equal to or above 70% apart from Fire Station Lane and Ladies Walk projects in which coverage is 57% and 64% respectively. Notably, the Fire Station Lane Beaulieu, Medium U_MON6 and Ridham Ave Kemsley projects present the highest variances.

In order to give more insight into these variances the data was analysed per item within the group of projects. Table 2 highlights the top 5 items with the highest scope cost.

Table 2 Top 5 items with highest scope cost in the project group.

Item	Scope cost	Benchmark Cost	Variance	Percentage of total Scope Cost
Portable generator	£480,202.52	£389,155.26	23%	22%
Pipework (Civil)	£227,911.66	£199,892.54	14%	11%
Gate Valve	£194,776.69	£125,380.98	55%	9%
Chamber	£164,034.40	£561,475.53	-71%	8%
Removal of excavated material for new flow meter	£134,375.00	£73,683.08	82%	6%

The table above shows that the most expensive assets are the portable generators and civils pipework, which cumulatively make up 33% of the total scope cost. These fall within an acceptable tolerance against the benchmark, with variances of 22% and 11% respectively.

The largest cost delta lies within the chamber costs, which exhibit a £397,441 discrepancy and -71% variance. This is largest cost contributor to the negative variance cumulatively. The scope breakdown varies between using manholes or chambers, with the manhole costs much more in line with the benchmark. The chamber cost curve implemented in the scope appears low against the chamber benchmarks for larger chambers, causing a higher variance than seen in other schemes where the chambers are typically smaller and within the benchmark tolerance.

The highest variance item was the removal of excavated material at 82% but these items only made up around 6% of the total scope cost, with a resulting cost difference of £60,692. There is less confidence in this benchmark comparison, as the item is detailed as a custom asset and as such fewer sources have been aligned within the benchmark.

Within the Fire Station Lane project, it is notable that the item that accounts for the highest proportion of scope is the allowance for construction of a concrete chamber at 25%. However, this item was not benchmarked. The next notable item within this project is the portable generator which accounts for 16% of the scope cost with a variance of -48% from the benchmarked item. After this, the third item of note is a manhole which accounts for 12% of the scope cost and a variance of -17%.

For the Medium U_MON6 project, the item with the highest proportion of the scope cost is the portable generator (21% of scope) with a variance of 15%. This is followed by a chamber which accounts for 9% of the scope cost but has a significant variance of -75%. The gate valves also account for around 9% of the scope with a variance of 13%.

The item with the highest proportion of scope in the Ridham Avenue Kemsley project is a portable generator which makes up 17% of the scope and has a variance of -48%. Another item making up around 17% of scope is a manhole with a variance of -6%. The next largest scope item is a duct with a variance of -43% and accounting for just 9% of the total scope.

1.4 Conclusion

The primary purpose of this study is to bolster confidence in the U_MON project estimates by increasing benchmarked coverage and by using latest available comparable data. The study has achieved 70% or greater coverage for 9 of the 11 projects. The increased coverage increases the robustness of the study and provides greater confidence in the benchmark results.

The total variance is -12% which means the SWS total benchmarked scope is 12% lower than the total benchmark cost. As such, the scope costs appear in line with the benchmark for this level of design definition.

The projects with the highest variances are Fire Station Lane Beaulieu, Medium U_MON6 and Ridham Ave Kemsley. The items with a large scope cost that are likely to explain these variances are portable generators and chambers.