Portsmouth Water

PR24 DRAFT DETERMINATION RESPONSE

EXPENDITURE ALLOWANCES

CONTENTS

SECTION 1

OVERVIEW OF OUR REPRESENTATIONS ON EXPENDITURE ALLOWANCES

OVERVIEW OF OUR REPRESENTATIONS ON EXPENDITURE ALLOWANCES

This document contains all our Draft Determination representations that relate to Expenditure Allowances.

In total there are ten separate representations, with the most material being first. These cover:

1. Smart meter enhancement costs
2. UV enhancement scheme costs
3. Nitrates enhancement scheme costs
4. eCAF enhancement scheme costs
5. Service reservoir enhancement scheme costs
6. Lead strategy enhancement scheme costs
7. Retail cost modelling
8. Meter replacement base costs adjustment
9. Business rates cost allowance
10. Accelerated investment cost allowance profile

For each representation area, we provide an articulation of the Issue on which we are making representations and our Proposed Remedy for the Final Determination. This is followed by the detailed Supporting Evidence for the case and summary Conclusion. We highlight any Business Plan Tables Impacted by our representations and reference any Supporting Documents that should be read in conjunction with our representation.

Finally, we include our response to any actions in the Draft Determination. These consist of:

1. A summary of our cyber maturity assessment.
2. Proposed schemes to be delivered for the Climate Change resilience funding provided in the Draft Determination.

Included within our representations is an additional Business Case which was not included in our October Business Plan. This relates to the elevated PFAS risk at one of our water treatment works and additional monitoring costs, which are driven by changes in the DWI's approach to the risks associated with PFAS. In addition to this business case, we face elevated risks at a number of other treatment works and we support the conclusions of the joint industry work by Jacobs on identifying appropriate uncertainty mechanisms to manage these risks in AMP8 (PFAS Uncertainty at PR24, Jacobs, August 2024).

Below we provide an overview of the cost changes in our Draft Determination response.

A. Business Plan and Draft Determination

Business Plan Submission

Our Business Plan costs are summarised in Table 1 below.

Table 1: Our submitted Business Plan costs

Cost category	Water	Retail	AMP8 totex
Base costs	£206m	£31m	£237m
Enhancement totex (incl. HTWSR)	£218m	-	£218m
Total expenditure (pre-frontier shift)	£424m	£31m	£455m
Total expenditure (post-frontier shift)			£440m

Source: PR24 Draft Determination expenditure allowances summary table (Pre-frontier shift and RPE)

Base expenditure, or Botex, covers the day-to-day running costs of the business and the maintenance and renewal of our existing assets. Our plan included Wholesale Botex of £206m for 2025-2030, including third party services, developer services and network reinforcement.

Enhancement expenditure represents the costs of meeting new service standards or complying with new statutory obligations. Our AMP8 plan included £133m of enhancement expenditure (2022-23 prices, pre-RPE and frontier shift), excluding Havant Thicket, which was a significant step up from our forecast enhancement expenditure for the period 2020-25 of £26m. Expenditure associated with Havant Thicket was £85m.

Draft Determination

At Draft Determination Ofwat assessed our costs through a series of models and other mechanisms. The Draft Determination provided expenditure allowances of £413m as shown in Table 2 below.

Table 2: Draft Determination expenditure allowances

Cost category	Water	Retail	AMP8 totex
Base costs	£225m	£28m	£254m
Enhancement totex	£171m	-	£171m
Total expenditure (pre-frontier shift)	£396m	£28m	£425m
Total expenditure (post-frontier shift)			£413m

Source: PR24 Draft Determination expenditure allowances summary table (Pre-frontier shift and RPE)

Wholesale Base Costs

Ofwat's view of our wholesale base costs, before frontier shift and RPE, were built up on the following.

Table 3: Draft Determination Wholesale Base Costs

Cost category	Water
Modelled costs and cost adjustments	£188.7m
Energy Adjustments	£(0.9)m
Meter replacement adjustment	£3.6m
Net Zero adjustment	£0.2m
Additional £10km of mains renewals	£0.0m
Other costs[1]	£33.8m
TOTAL	**£225.3m**

Source: Portsmouth Water analysis of Ofwat Draft Determination

Ofwat's Wholesale Botex Draft Determination allowance was £19m higher than our equivalent Business Plan costs of £206m.

[1] Other costs include the unmodelled costs in the DD such as business rates, abstraction charges, TMA costs.

Wholesale Enhancement Costs

Ofwat's view of our enhancement costs were allocated as follows.

Table 4: Draft Determination Wholesale Enhancement Costs

Cost category	Water
WINEP	£3.9m
Supply-demand balance and metering	£51.6m
Resilience and security	£11.6m
Water quality improvements	£18.6m
Havant Thicket	£85.0m
TOTAL	**£170.8m**

Source: Portsmouth Water analysis of Ofwat Draft Determination

Ofwat's Wholesale Enhancement Draft Determination allowance was £47m (22%) less than our Business Plan. This reduction was across all our schemes excluding Havant Thicket. Ofwat also included additional enhancement work for:

- A sector wide uplift to prioritise the biggest climate-related risks. Ofwat calculated the uplift based on 0.7% of modelled base allowances, £1.3m.
- Leakage to reduce over the period by 2.95Ml/d, with additional £2.1m of enhancement expenditure.

Retail Costs

Ofwat's view of our Household Retail costs was as follows:

Table 5: Draft Determination allowed retail expenditure

Units	2025-26	2026-27	2027-28	2028-29	2029-30	2025-30
£m	5.5	5.6	5.7	5.8	5.8	**28.4**

Source: Ofwat Draft Determination

Ofwat's allowance was £2.2m lower than our Business Plan costs of £30.6m on a pre-Frontier Shift basis.

Frontier Shift

For the Draft Determination Ofwat applied the following factors for Base Costs and Enhancement Expenditure. Ofwat applied both from 2023-24 in the derivation of the cumulative net price change, as shown below.

Table 6: Draft Determination Frontier Shift and Real Price Effects, cumulative net

Cost category	2025-26	2026-27	2027-28	2028-29	2029-30
FS and RPE on Base allowances	-2.16%	-3.02%	-3.89%	-4.67%	-5.42%
FS and RPE on Enhancement allowances	-2.12%	-2.97%	-3.84%	-4.61%	-5.35%

Source: Draft Determination response business plan tables, SUP11

Ofwat's assumption for Frontier Shift of 1% per annum was in line with our Business Plan but was applied for an additional two years prior to AMP8.

B. Updates to our Business Plan

Wholesale Base Costs

We have considered Ofwat's Draft Determination adjustments and updated our Business Plan Base Costs to reflect the additional requirements that you have included in 'what base buys'. We have also reallocated some costs from our smart meter enhancement case and amended one other item on catchment management grants to farmers and landowners in our regional collaborative partnerships, which was omitted from our Business Plan in error.

Table 7: Updated Wholesale Base Costs

Cost category	Draft Determination	Updated Business Plan
Base costs including other costs	£222m	£206m
Additional mains renewals	-	£3m
Energy Adjustments	£(0.9)m	-
Net Zero additional work	£0.2m	£0.2m
Meter replacement (from enhancement)	£3.6m	£6.8m
ERP and GIS systems		£4.7m
Catchment management		£0.4m
Total expenditure (pre-frontier shift)	**£225m**	**£221m**

Source: Portsmouth Water

These adjustments still place us above the efficient company level as identified in the Draft Determination. Further detail on these adjustments is explained below.

Additional mains renewals

In our original Business Plan, we included 41km of mains renewals, equivalent to 0.24% renewal rate. Ofwat's Draft Determination[2] required us to increase our renewal rate to 0.3%, another 10.25km of mains renewals. We have included this in our Business Plan at Ofwat's rate of £292 per metre.

Energy adjustment

In the Draft Determination Ofwat has included an energy adjustment mechanism and an adjustment to base allowances due to the forecast drop in energy prices over the period. We have not included Ofwat's energy adjustment as we had already included a reduction in energy costs over the period from our starting position.

[2] PR24-draft-determinations-Expenditure-allowances

We support the work that has been undertaken by Baringa to consider the most appropriate treatment of energy costs in AMP8 ('Ofwat's PR24 Draft Determinations for the treatment of energy costs in AMP8', Baringa).

Net Zero adjustment

Ofwat's Draft Determination required us to reduce greenhouse gas emissions by an additional 2.5% with a Base Cost adjustment. This is a 198 tCO2e reduction with an allowance of £150k. We have added this to our base costs to reflect the additional requirement.

Meter replacement

In our smart meter program we plan to replace over 68,000 meters with new smart meters. We included the costs of these in our Smart Meter Enhancement case. Ofwat's Draft Determination included meter replacement as a base cost.

Ofwat calculated the costs of meter replacement as £8.8m in total but made a number of adjustments as shown below.

Cost of replacement of household and non-household meters	£8.8m
Less implicit allowance in modelled base expenditure	£(2.0)m
Less PR19 under delivered meter replacements	£(3.2)m
Total	**£3.6m**

We have included £6.8m of costs in base to reflect the first two elements. We do not agree with the rationale for the £3.2m adjustment for under-delivery. We set out our representations on this issue in section 2 of this document.

ERP and GIS upgrades

To support our smart meter program we need to upgrade our Enterprise Resource Planning (ERP) system and our Geographic Information System (GIS) to allow us to make full use of the smart meter data. We include these costs in our Enhancement case at £4.7m. We have reflected further on the allocation of these costs and given the headroom available within our base cost allowance, we have determined that these costs should be within our base allowances. We have increased our base expenditure to reflect this and removed the costs from our enhancement expenditure. (See our representation on smart metering cost allowance for more details.)

Catchment management

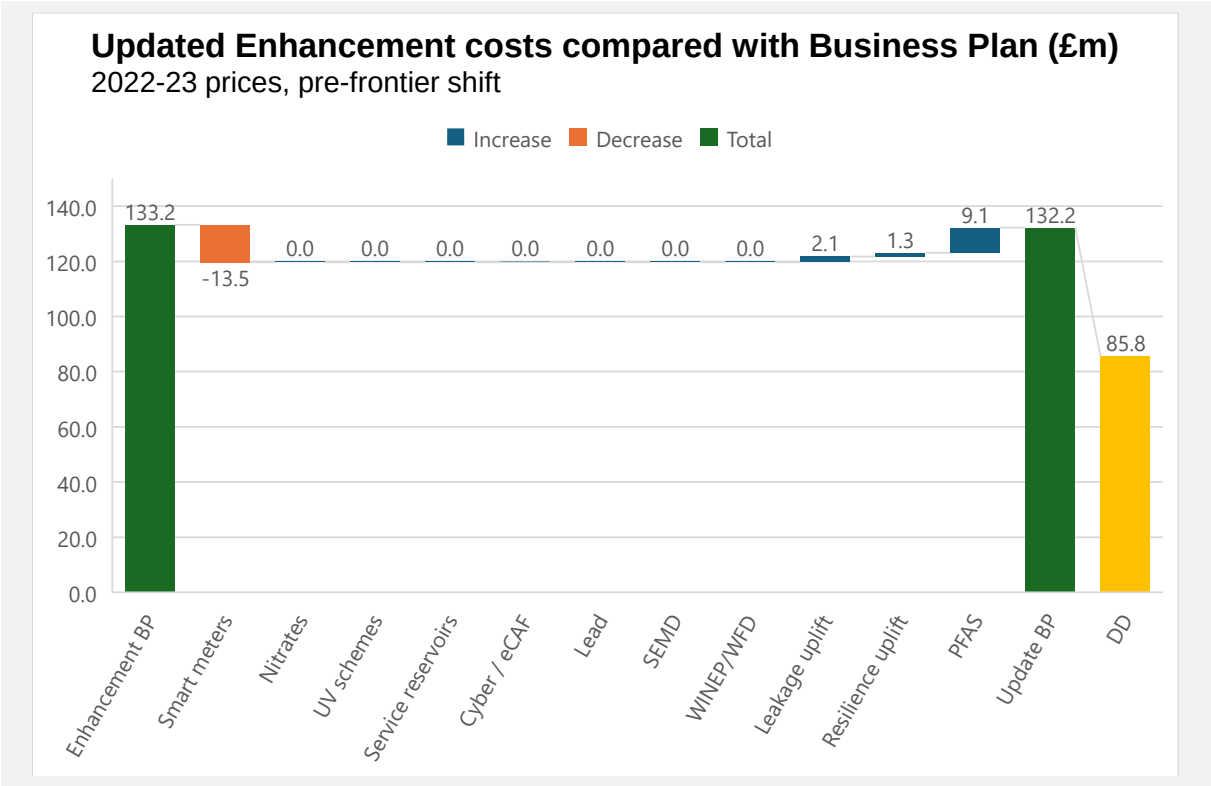
As part of our collaboration with The Downs and Harbours Clean Water Partnership we provide funding for grants to farmers and other landowners to reduce nutrient losses to groundwater and increase biodiversity. In our Business Plan submission, we only included £100k in total for these grants whereas historically we have targeted £100k per annum. This was an error. We have increased our base catchment management expenditure by £400k to continue at our current funding levels.

We have not updated other costs as part of our Draft Determination response. Our base program now reflects your assessment of 'what base buys' and is aligned with the delivery of the outcomes from base expenditure.

Enhancement Allowances

We have considered Ofwat's Draft Determination Enhancement Expenditure allowances and made a number of changes to our Business Plan tables as shown in Figure 1 below.

Figure 1: Enhancement costs in our updated Business Plan



Source: The final figures are in CW3, pre-frontier shift, and excluded Havant Thicket allowances.

A summary of our representations is outlined below.

Smart Meter programme

In our original Business Plan, we included all costs associated with our smart meter programme as Enhancement Expenditure. Ofwat has made allowance for meter replacements within base costs, and we have therefore removed £8.8m of associated costs from our Business Plan. As described above, we have also reallocated £4.7m of costs associated with the upgrades to our ERP system and GIS £4.7m from Enhancement to Base. In aggregate we have removed £13.5m from the Enhancement Expenditure and increased our Base Costs by £11.5m. The difference is related to the implicit allowance that Ofwat have calculated for meter replacement within our base costs.

Efficiency reductions to schemes

We have retained the enhancement costs that we submitted with our original Business Plan for the following schemes.

- Nitrates
- UV schemes
- Service reservoirs

- Security – SEMD and cyber/eCAF
- Lead
- WINEP/WFD

We provide further evidence in Section 2 of this document in relation to each of these schemes with the exception of WINEP/WFD and SEMD. We do not make specific representations in these areas on the grounds of materiality, but we have retained our original Business Plan costs which we believe are efficient and necessary.

Leakage Uplift

In the Draft Determination Ofwat allowed for an additional £2.1m to reduce leakage. This uplift comprised on

Leakage reduction enhancement at £1.1m per Ml/d	£3.3m
Less PR19 under delivered leakage reduction	£(1.2)m
Total	**£2.1m**

We have included the additional £2.1m in our updated enhancement plans but also consider that the additional £1.2m should be added back to our determination. Failure to meet leakage targets is already penalised within our PR19 ODIs together with a cost sharing for under spend in totex. We are proposing this mechanism is removed and the £1.2 added to the enhancement spend.

Climate Resilience Uplift

In the Draft Determination Ofwat provided an additional £1.3m to improve climate resilience. Our proposals to use this allowance are set out in the Draft Determination Actions section of this document. We have added this uplift to our enhancement expenditure.

PFAS Additional requirement

Water quality sampling indicates that our Fishbourne ground water sources rise consistently above the Tier 1 threshold for PFAS. Since our Business Plan submission, we are required to provide a mitigation to manage PFAS concentrations in drinking water. Our proposal is laid out in a new investment case PRT07.08 PFAS Resilience Enhancement. This proposal is estimated to cost £9.1m including catchment study costs of £0.5m, capex delivery costs of £8.1m and enhancement opex of £0.5m. We have added this to our enhancement expenditure plan.

In addition to this business case, we face elevated risks at a number of other treatment works and we support the conclusions of the joint industry work by Jacobs on identifying appropriate uncertainty mechanisms to manage these risks in AMP8.

Our overall position is £1m less in enhancement costs than our submitted Business Plan.

Wholesale Transition Expenditure

In our Business Plan we put forward an investment plan that was needed to meet out regulatory and statutory requirements. This investment plan was a step change in the level of capital delivery and digital technology. Some of our investment programmes have delivery dates that due for completion in 2028 and to ensure on time delivery we consider that an early start would support the achievement of these target dates. We are requesting the rephasing of some of the enhancement allowances that Ofwat have included in our AMP8 plan into 2024-25 so that we can start work early on key elements. The projects we are requesting transition expenditure are detailed below with the movements.

Table 8: Transition expenditure movements

Project	AMP7	AMP8			Net total
	2024-25	2025-26	2026-27	2027-28	
eCAF – Security Cyber enhancement	0.458			(0.458)	-
WINEP – WINEP enhancement	0.462			(0.462)	-
UV programs – Addressing raw water quality deterioration (grey solutions)	0.600			(0.600)	-
TOTAL	1.520			(1.520)	-

Source: Portsmouth Water

eCAF – Security Cyber enhancement

Our Business Plan included the programme of improvements in the digital security of OT systems to align with the new Enhanced Cyber Security Framework (eCAF). This new requirement was introduced by the Drinking Water Inspectorate and confirmed by Ofwat in their letter to Water Companies, during the PR24 process, on 5 July 2023, two months prior to submission of Business Plans.

The Cyber Assessment Framework (CAF), introduced during AMP7 and the Enhanced Cyber Assessment Framework (eCAF) now required to be achieved by 31 March 2028. This is a statutory requirement and takes our systems from a non-compliant position to meet the requirements.

Since Business Plan submission we have reviewed the cyber threat environment, which is still high after the invasion of Ukraine, together with evolving state-sponsored cyber actors and increasing use of AI. We believe that it is in the best interests of customers to accelerate this security programme to ensure we can meet the statutory deadline and protect customers from potential actions of external hostile agents to our operations and facilities.

WINEP – WINEP enhancement

As part of our WINEP programme we are required to carry out investigations of the majority of our source catchments to assess our abstraction activities and possible impact on the Water Framework Directive classification on waterbody status within those catchments currently and in the future. In our programme we have nine catchment investigations of which six are due to be completed by the end of 2026. These investigations are key in determining the priorities for the remainder of AMP8 and the development of the nitrate programme for end of AMP8 and start of AMP9.

We have reviewed the programme and consider starting the first investigations in AMP7 will be essential to ensure that we meet the required deadlines and have sufficient evidence in a timely manner to inform future decisions.

We strongly believe that starting these investigations early gives us an earlier view of our higher risk catchments and react swiftly to the findings.

UV programmes - Maindell

A cryptosporidium contravention occurred at Maindell WTW in March 2017 and as this was an emergent risk there are no controls for cryptosporidium at Maindell WTW. A DWI notice requires that this site remains out of service until appropriate cryptosporidium treatment is installed and operational. We have detailed the requirements to bring this back into service in our Business Plan and further detail is given in our PRT07.02 Raw Water Resilience Enhancements (Disinfection).

Bringing the site back into service is a critical enabler of our AMP8 investment programme, enabling us to take other sites out of service for construction activity. Our target date for this project is 2028 and our plan requires significant activity in 2025. We have identified that there is a high program risk if we do not start detailed design of the solution and procurement activities in 2024-25.

Retail Allowances

We have considered Ofwat's allowances for retail costs. We have not changed our business tables in light of the Draft Determination. However, we make representations on Ofwat's Retail modelling, which we believe understates our retail efficiency, in Section 2 below.

Our view of our wholesale base costs, before frontier shift and RPE, remains as set out in Table 9 below.

Table 9: Household Retail costs

Units	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025-30
£m	6.0	6.0	6.1	6.2	6.3	**30.6**

Source: Portsmouth Water

Frontier Shift

In our updated Business Plan, we have continued to apply our 1% frontier shift efficiency from 2025 onwards. We consider this appropriate for our updated Business Plan although we consider there is merit in a lower level of Frontier Shift[3]. We did not apply Frontier Shift from before 2025 as the efficiency is already included in our forecast through the reviews of our actual costs for 2023-24 and budget targets for 2024-25, which use the PR19 determination as a base. This would therefore represent a double count of the scope for Frontier Shift.

We have applied the real price effects that Ofwat applied for the PR24 period in the Draft Determination. These are included in our Business Plan tables. The result are our cumulative net price changes as shown in Table 10 below.

[3] See for example the additional Economic Insight report, 'The importance of a balanced approach to frontier shift', August 2024

Table 10: Our updated frontier shift and real price effects, cumulative net

Cost category	2025-26	2026-27	2027-28	2028-29	2029-30
FS and RPE on Base allowances	-0.90%	-1.76%	-2.65%	-3.44%	-4.20%
FS and RPE on Enhancement allowances	-0.90%	-1.76%	-2.65%	-3.44%	-4.20%

Source: Table SUP11

SECTION 2

DRAFT DETERMINATION REPRESENTATIONS: EXPENDITURE ALLOWANCES

1. SMART METER ENHANCEMENT COSTS

A. What is the issue?

Our Business Plan included an investment programme for the rollout of universal smart metering over AMP8 and AMP9. The investment case highlighted that smart metering would play a critical role in achieving the demand reduction targets our Water Resources Management Plan (WRMP). This will be achieved through a reduction in per capita consumption (PCC) and a decreased level of leakage.

Smart metering will help us to keep customers better informed of their usage, empowering them to make informed decisions about reducing their consumption. It also supports our ambition to drive data-led decision-making on our network regarding leak detection and network performance.

In the Draft Determination Ofwat expressed support for all companies in England to roll out smart (AMI) metering. We welcome Ofwat's decision to recognise the vital role that smart metering can play in meeting some of the key challenges facing the water supply sector.

At the same time, it is vital that the cost allowance is realistic and supports the delivery of this fundamental enhancement to our infrastructure. Our Business Plan included total costs of £71.6m of enhancement costs for the smart metering programme. The programme has been fully costed and reflects extensive market testing of the different elements of the plan.

However, in the Draft Determination Ofwat has allowed only £44.2m of enhancement costs to deliver the programme. This is a reduction of £27.4m and an efficiency challenge of 38%. The scale of this cost reduction is not realistic and results in an allowance for this programme that is undeliverable.

Ofwat's allowance is based on overly simplistic benchmarking models. These models do not capture the relevant cost drivers and provide poor predictions of cost allowances. These models do not represent a robust evidence base for setting allowances.

We remain committed to this programme of smart metering and remain convinced that it is the right solution for our customers and the business.

B. Our proposed remedy

The remedy for this issue involves two stages. First, a detailed assessment of the cost components of the metering programme, ensuring that costs are allocated to the right categories and that costs are compared on a like-for like basis. Second, a reconsideration of the scope for benchmarking costs, understanding the flaws in the modelling and assigning the appropriate weight for this evidence.

1. Review of cost allocations

The Draft Determination set out Ofwat's approach to the allocation of costs between Base and Enhancement. We have reviewed the approach we took at the Business Plan, in the light of the Draft Determination information and aiming to ensure that we adopt a consistent method.

In the Business Plan we did not allocate any costs for meter replacement into Base Costs. We recognise that this is not correct and that a share of these costs should be allocated to Base. Making this change removes £8.8m from our Metering Enhancement Programme.

We have also reconsidered the appropriate treatment of the programme costs for our Geographic Information System (GIS) and Enterprise Resource Planning (ERP) investments. The position here is less clear-cut in that these elements are fundamental enablers of our smart programme. At the same time, we recognise that in other circumstances these would be considered Base Costs. Therefore, we have, as a pragmatic way forward, decided to reallocate these items to Base Costs. This removes a further £4.7m from the Enhancement Cost of the programme and this is transferred to Base Costs.

As a result of these re-allocations the adjusted programme costs are £58.1m.

2. How Ofwat should assess the efficient costs of the enhancement programme

Despite these changes to the cost of the enhancement programme there remains a significant and unrealistic gap between the cost of the programme (£58.1m) and Ofwat's Draft Determination allowance (£44.2m).

We have worked with Frontier Economics to undertake a detailed review of Ofwat's approach to setting the cost allowance. We have identified weaknesses in the approach and proposed changes to address these to enable a realistic and deliverable allowance to be set for our programme at the Final Determination.

Treatment of CRM / Meter Data Management system costs

The first change is to remove the component of our costs that related to our new Customer Relationship Management (CRM) / Meter Data Management (MDM) system from the modelling assessment. These costs are specific to Portsmouth Water and our understanding is that other companies have not included the upgrade of CRM/MDM systems in their metering costs. If they were to remain included, then the costs would not be being compared on a like-for-like basis.

Therefore, the CRM/MDM costs should be excluded and assessed separately via a Deep Dive. The evidence set out in Section C below explains how the costs have been derived from rigorous market testing, were approved through the Defra / Ofwat Accelerated Infrastructure process and therefore should be allowed in full.

This results in £3.6m of CRM costs being assessed separately and removed from the Adjusted programme costs.[4] Therefore the costs to be assessed through the modelling are £54.5m.

Issues with Ofwat's modelling

The second change is to address the material weaknesses in Ofwat's modelling. We have identified improvements to the method for benchmarking the costs of the smart metering programme that result in a more realistic allowance for Portsmouth Water. The main modelling issues are:

- Models are overly simplistic and poor predictors. The high R-Squared values are not meaningful given the variation in programme sizes. The variation between the allowance and the company estimates are implausibly large and cannot be explained by differences in relative efficiency.
- The models do not account for relevant cost drivers, including population density, the split of household and non-household meters, and meter penetration.
- Inclusion of smart infrastructure costs within the modelling is not ideal. The infrastructure costs will depend on a range of different cost factors, and it has not proved sensible to include in the modelling of meter replacements and upgrades.

We have developed a revised model, using the Ofwat dataset, addressing as many of the concerns with the Draft Determination modelling as the data permits. Although the resulting model is not perfect it is a clear improvement on the Ofwat Draft Determination model.

It results in an allowance for our costs of £52.7m-£54.3m which is much closer to our estimated programme costs.

Given the issues with modelling, even with the revised modelling, we need to carefully consider the weight that should be attached to this evidence.

[4] Under the Accelerated Infrastructure Project total cost associated with our CRM were £6m. £3.6m of this formed part of our smart meter investment case, with the balance being recharged to the Household Retail price control.

We explain below the robust market testing processes that we have followed to generate our cost proposals. In the light of the extensive engagement from the market and taking account of the commercial bids we have received and are evaluating we consider that there is clear case that there is no further scope for efficiency improvements against our restated programme costs.

Therefore, the appropriate remedy for this issue, giving due regard to the benchmarking evidence, is for our revised programme costs of £58.1m (including the CRM) to be allowed in full.

C. Supporting evidence

1. Review of programme costs

As described above we have reviewed the approach we took at the Business Plan, in the light of the Draft Determination information. This has resulted in two changes:

- We have allocated £8.8m of meter replacement costs into Base Costs.
- We have allocated £4.7m of costs associated with GIS and ERP to Base Costs.

As a result of these re-allocations the Adjusted programme costs are £58.1m.

2. Treatment of CRM/MDM costs

CRM/MDM costs should be excluded from the modelling

A vital component of Portsmouth Water's smart metering programme, included within the Adjusted programme cost of £58.1m, is the investment in a new CRM, billing and meter data management system. This investment was included in Defra / Ofwat's Accelerated Infrastructure Delivery Process. In our submission to Defra we identified that the implementation of a new CRM/MDM system was a fundamental enabler of the smart metering programme and funding through the Accelerated process would enable us to bring forward the roll out of smart meters and the benefits that it would deliver.

Our submission to Defra stated:

> *"The key critical technology enabler to unlock the smart meter initiative is the implementation of a new CRM and billing system that has the ability to lever smart metering capabilities Having clarity on the CRM and billing engines allows an efficient and cost effective procurement process to identify our key delivery partners.*
>
> *This bid is for funding to immediately pursue the CRM and Billing platform and to accelerate the procurement and subsequent MVP trialling for a prospective new delivery partner. Being able to start this process now, rather than in AMP 8 allows us to deploy smart meters 16 months sooner than planned and brings forward an additional 83 Ml/d savings benefit in the first AMP of our 10 year programme."*[5]

This investment was approved through the Accelerated Investment process. The Ofwat decision document stated (emphasis added):

> *"Portsmouth Water will invest a potential £12 million over 2023-25 and £64 million in total to accelerate their universal smart metering programme in Hampshire and West Sussex.*
>
> *The scheme will focus initially on **accelerating investment on supporting infrastructure which will enable the use of smart meters** early in the 2025-30 period. This supporting infrastructure includes a meter data management system, cloud storage infrastructure, software purchasing and system implementation and integration."*[6]

5 Portsmouth Water Limited, DEFRA Submission Appendix, October 2022
6 Ofwat, Accelerated infrastructure delivery project: final decisions, June 2023

In terms of setting a cost allowance for the smart metering programme, this expenditure on the CRM/MDM system should be excluded from the modelling and considered separately.

First, these CRM/MDM costs are specific to Portsmouth Water and our understanding is that other companies have not included the upgrade of the CRM in their metering costs. Therefore, if the costs were to remain included in the modelling they would, incorrectly, be identified as an inefficient cost.

Second, it is clear from the Defra / Ofwat Accelerated Investment process that this investment is a vital enabler of the smart metering for Portsmouth Water and therefore there should be a reasonable allowance in the overall cost.

The conclusion from this is that the CRM/MDM costs should be excluded from the modelling and assessed separately via a Deep Dive.

Our CRM/MDM costs should be assessed as efficient

We are confident that a Deep Dive assessment of the CRM/MDM costs would show that are costs are efficient and should be allowed in full. The evidence for this is set out below.

We followed a competitive procurement process

The procurement process followed best practice and ensured a competitive price and best value for the solution.

- We commenced the procurement for the replacement CRM system on 11 November 2022, via a Utilities Contract Regulations 2016 compliant procedure, with a public gov.uk “Find a Tender Service” (FTS) contract notice issued for the opportunity.
- As part of efforts to ensure the most effective competition, we engaged in a pre-market engagement process via a Prior Information Notice “PIN” that was issued on FTS on 12 October 2022.
- In addition, market research and pre-market engagement (PME) was undertaken in the September / October 2022 period. This involved engagement with seven different potential bidders.
- On the back on the PME, the strategy was to go to an open market tender. This was primarily driven by the value, the assessment of the state of competition in the market and the statutory need given the value was forecast to be over the regulated threshold.

As a result of this process fully priced commercial tenders were received from eight bidders representing a range of different solutions / backend technologies.

Outcome of the tender process

The eight bids were assessed and five of the eight passed the selection criteria and were commercially compliant. The costs were assessed over the 10-year lifecycle. The winning bidder was the Most Economically Advantageous Tender according to the price / quality weighted criteria that we had developed.

Table 1: Outcome of CRM tender process

Bidder	Cost over 5-year period	% difference to winning bid
Winning bidder	£5.1m	
Next lowest cost	£6.4m	+25%
Average of all non-winning compliant bids	£8.9m	+74%

Source: Portsmouth Water

As Table 1 shows the next lowest cost bid was 25% more than the successful tender and the average of the four unsuccessful tenders was 74% more than the winning bid. Our understanding is that the cost we achieved compares very favourably to other water companies (on a cost per customer basis), as the winning bidder, Kraken, was keen to establish a presence in the water sector and saw Portsmouth Water as the ideal partner company.

The contract was awarded on 19 June 2023 and FTS award notice issued 17 July 2023. No challenges to the process were received during the standstill period.

Assurance, Governance and Monitoring

The procurement was subject to separate assurance processes. Legal assurance of the procurement process was provided by Sharpe Pritchard LLP and commercial assurance by Barkers Procurement and Agilia Infrastructure Partners.

The governance model for CRM/MDM has been defined as way of ensuring an efficient and robust approach to time, quality, cost and realisation of benefits. Recognising the agile nature of the programme, mechanisms have been built with a high frequency over typical monthly 'waterfall' governance. The key features of the model are:

- **Portsmouth Water Board.** Major milestone approval, such as approval of Governance Structure and Approval to proceed were sought at Board level. Additionally, progress is reported and assessed at each Board Meeting.
- **Programme Steering Board.** Membership includes the key stakeholders (Chief Executive Officer, Chief Financial Officer, Chief Information Officer and Chief Customer Officer). Reporting of delivery progress and key financial and schedule metrics. Approval for all key milestones including Go/No of functional delivery and cohort migration.
- **Programme Management Meeting.** This involves the Chief Information Officer, Chief Customer Officer and Departmental heads.
- **Delivery workstream** (Daily standup meetings). Governing the day-to-day control of priorities, schedule and sprint progress, effectiveness and efficiency of the team. These standups include either the Chief Information Officer or Chief Customer Officer, demonstrating the interest and focus of executive team on ensuring timely and decision making.

The new CRM/MDM system has been successfully built and the progressive transfer of customers to the new system is nearly complete. At the time of writing, over 90% of customers have been transferred to the new system, which will enable us to commence the switching of customers to

metered charges, with the provision of detailed consumption data to drive consumption reductions, from the start of the AMP8 period[7].

Conclusions on CRM/MDM and impact on modelled allowance

The costs of the CRM/MDM should be assessed separately and allowed in full. This would recognise that a best practice procurement model was used, and a competitive bidding process resulted in a demonstrably efficient outcome for Portsmouth Water and its customers. This supports the original decision of the Accelerated Infrastructure Delivery process.

To calculate the impact of excluding the CRM/MDM from the costs of metering programme we have taken the following steps:

- The costs of the programme are converted to annual figures using a seven-year asset life.
- These costs are summed over the sic years from year 2024-25 to 2029-30, reflecting the Accelerated Infrastructure Delivery decision.
- 70% of the costs are allocated to wholesale metering programme and 30% are allocated to the Household Retail business unit. These allocations are unchanged from the Business Plan.

This results in £3.6m of CRM costs being assessed separately and removed from the adjusted programme costs. Therefore, the costs to be assessed through the modelling are £54.8m.

3. Adjustments to modelling approaches

We have reviewed the benchmarking modelling undertaken by Ofwat at the Draft Determination. We have identified some important weaknesses in the modelling, and we have been able to address some of these through improvements to the modelling method.

Although we are not able to address all the potential concerns the revised models that we have developed for benchmarking the costs of the smart metering programme result in a more realistic allowance for Portsmouth Water.

Issues with Ofwat's Draft Determination modelling

Our review of Ofwat's Draft Determination modelling of metering expenditure found the following issues and concerns.

Overall, the models are overly simplistic (i.e. too aggregated and missing important cost drivers). Although the models report a relatively high R-squared value this is not an indication of a good model. The high R-squared reflects the fact that it is modelling the absolute size of the programme (and this varies significantly depending on the size of the company). A model that is fitted to programme costs ranging from £2.1m to £270.0m will inevitably have a high R-squared value.

The model is a poor predictor of costs. The variation between actual costs and predicted costs indicates the modelling is not working well. For example, the model predicts that the costs for Affinity Water should be only 40% of its Business Plan costs while for Severn Trent the model predicts that costs should be 30% higher than the submitted Business Plan costs. Given that much of the activity is either well understood and relatively low complexity (i.e. meter installations) or is subject to market testing (meter device acquisition), this degree of variation is not intuitive. At the very least it must raise concerns that the modelling results are not capturing relative efficiency but are reflecting weaknesses in the modelling.

This point above stands regardless of the issue we address next around the smart infrastructure, which is the most uncertain part of the programme. Even given our concerns around the treatment of smart infrastructure, it cannot explain a significant proportion of the variation in predictions we refer to above.

[7] Portsmouth Water does not currently have the powers to selectively meter customers. Following our designation as an area of severe water stress, this ability is dependent on final sign-off of our WRMP24 by the Secretary of State.

The aspect of the programme that is new to most companies is the smart metering infrastructure. Some companies, including Portsmouth Water, will have based these costs on detailed market testing evidence (see below for more details). But other companies are likely to be less advanced in their planning and relied on more indicative forecasts for this element of costs.

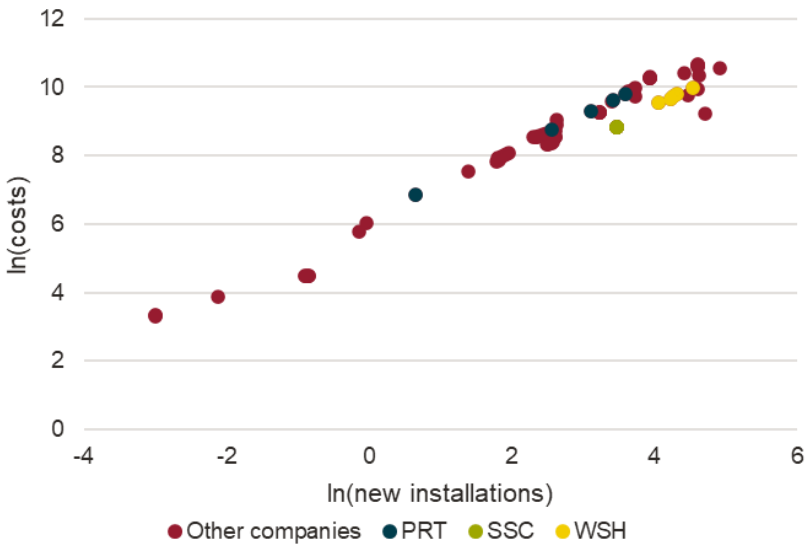
In this regard we note that the model does not appear to work well for the two companies (Anglian Water and Thames Water) with the most actual experience of smart metering. In both cases the model predictions are over 30% below the proposed costings from these two companies. This underlines the concern that the model is not working well.

More generally, it is not ideal that the smart infrastructure costs are included in the modelling and simply allocated across the two categories (upgrades and new installations). It would be better if the smart infrastructure costs could be treated separately. The cost drivers associated with the infrastructure will be different from those affecting the replacement and installation of meters. For example, the topography of the area and the extent of existing capacity in transmission networks will influence the costs of data communications. It would not be straightforward to capture these factors with a combined model (as has proved the case).

Other, more specific issues, with the Draft Determination modelling include the following:

- The model dataset does not include the Portsmouth Water data. We understand the reasoning for this, but this is an issue that we have addressed in our revised modelling below and that Ofwat can reflect in its Final Determination modelling.
- The modelling includes the data from Welsh Water and South Staffs Water even though both companies proposed AMR solutions rather than AMI solutions. It is clear from the scatterplot of costs versus number of new installations in Figure 1 that the costs associated with the metering programme of these companies are materially different from other companies. This will bias the modelling results and making a post-model adjustment for the companies that will keep the AMR solution does not address this bias. The costs for upgrades for these companies are in line with the industry - see Figure 2.

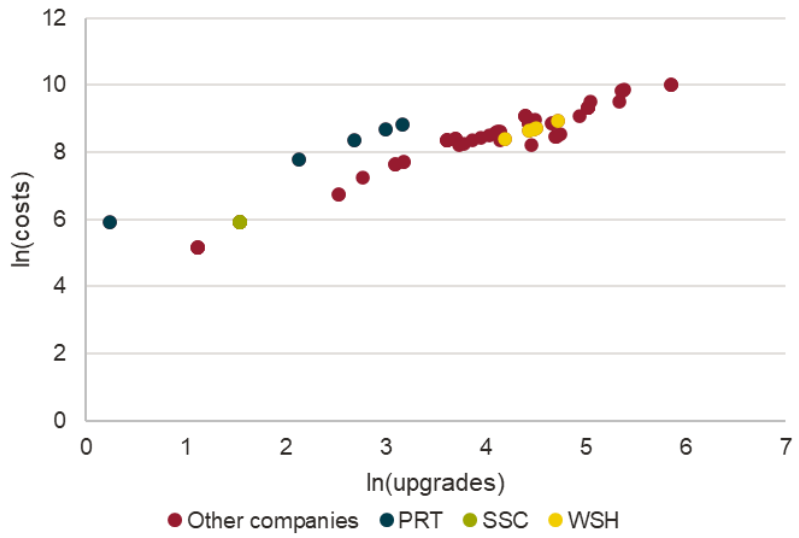
Figure 1. Scatterplot of costs vs number of meters (log scale) – New installations



Source: Analysis of Ofwat's "PR24-DD-W-Metering.xlsm" dataset

Note: Costs for Portsmouth have been restated and CRM removed. This chart excludes the observations that Ofwat deemed to be outliers.

Figure 2. Scatterplot of costs vs number of meters (log scale) – Upgrades

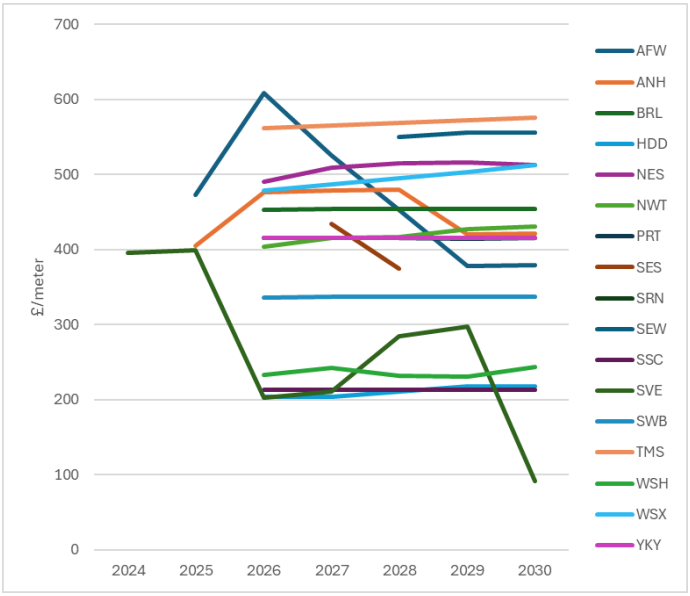


Source: Analysis of Ofwat's "PR24-DD-W-Metering.xlsm" dataset.
Note: Costs for Portsmouth have been restated and CRM removed.

- The model does not account for key explanatory variables. These include:
  - Population density. Ofwat states that it tried to include density but that the co-efficient was not significant and was counter intuitive. Ofwat's hypothesis in relation to density (a positive relationship based on high labour costs, aborted visits and joint supplies) is overly simplistic. While those factors are relevant there are other factors which can work in different directions. For example, travel time between installations (negative relationship), the number of properties that can be covered by a single comms asset (negative relationship), the cost of installing a single comms asset (positive relationship). Overall, we expect the relationship is more likely to be positive, but we do not agree that a negative relationship (if found) should be discarded.
  - Dig / no-dig installations. Ofwat models upgrades and new installations separately but does not account for the factor that a proportion of new installations will be 'no dig' (i.e. a boundary box is already in place), and these will be involve a significantly lower cost. This proportion will vary from company to company. Unfortunately, this data is not available to test the significance of it.
  - Balance of household and non-households. Non-household meter devices tend to be larger and therefore more expensive than households.
  - Meter penetration. Ofwat identified that higher current meter penetration may drive higher costs per meter for future installations. It was not able to capture this impact in the modelling.
- Panel structure error. Ofwat has flagged that it did not used the right panel structure when estimating the model (i.e. they treated the company as 'time' and 'years' as the unit). Ofwat stated that the impact is not material. Nevertheless, we agree with Ofwat that it is important that this is corrected in any further modelling.
- Estimation of random effects panel models. Ofwat estimated panel models with random effects. However, as can be seen from the unit cost time series in Figure 3 and Figure 4 below, only the data for a handful of companies show any variation *over time* (indeed there is no variation for upgrades). It is unclear whether this variation is due to differences in cost drivers over time or different allocation practices. Therefore, random effects models cannot be reliably estimated.

We have undertaken further modelling on the Ofwat dataset, with the aim of addressing as many of these weaknesses as the data enables us to. The results of this are described below.

Figure 3. Unit costs over time by company – New installations



Source: Analysis of Ofwat's "PR24-DD-W-Metering.xlsm" dataset.
Note: Costs for Portsmouth have been restated and CRM removed. This chart excludes the observations that Ofwat deemed to be outliers.

Figure 4. Unit costs over time by company – Upgrades

Source: Analysis of Ofwat's "PR24-DD-W-Metering.xlsm" dataset.
Note: Costs for Portsmouth have been restated and CRM removed.

Revised modelling

Our approach to developing a revised model involved the following steps:

- We consider it completely valid for us to include our data in the revised modelling. In particular, for new installations it is clear from the scatter plot in Figure 1 that Portsmouth Water is not an outlier compared to the rest of the industry.
- We included our restated programme costs, taking account of the re-allocations to Base Costs described above; we also excluded our CRM/MDM costs from the modelling.
- We excluded Welsh Water and South Staffs Water on the basis that their AMR programme costs were not comparable to the other companies. This is especially evident for new installations, and we expect it to be the same for upgrades.
- We tested the inclusion of population density by including in the model the same three measures of population density used by Ofwat in the wholesale water models.[8]
- We tested other potentially relevant factors, including meter penetration and the household / non-household split.[9]
- As almost all the variation is cross-sectional, we estimated cross-sectional Ordinary Least Squares (OLS) models rather than Random Effects panel models using the average over the estimation period of the variables used by Ofwat (and the additional variables that we have tested). We consider this to be more appropriate as:
  - for new installations, it is unclear whether the observed variation over time for a subset of companies is driven by exogenous factors rather than differences in allocation practices; and
  - for upgrades, there is no variation over time so a Random Effects model cannot be estimated.
- Consistently with Ofwat, we estimated models in log form.
- When comparing the performance of the alternative models we considered:
  - the goodness-of-fit of the model using a range of commonly used measures of goodness-of-fit: adjusted R-squared, Akaike information criterion (AIC), and Bayesian Information Criterion (BIC);[10]
  - whether the coefficients have the expected sign and magnitude, in particular whether the coefficients of number of meters support the engineering and economic rationale that there are economies of scale that depend on the size of the meter installation programme; and,
  - whether the coefficients are statistically significant.

Revised modelling results – New installations

For new installations the findings of our revised modelling are as follows (see Table 2 below):

- The alternative models perform better than Ofwat's model specification across both adjusted R-squared, AIC, and BIC. This is especially the case for the models with two measures of density: properties per length of mains and weighted average density (MSOA).
- All the alternative model specifications (except the model with the proportion of residential installations) show economies of scale, unlike Ofwat's specification.
- The different measures of population density show, as we expected, a positive relationship between density and costs. Two of the measures are also statistically significant.

[8] The three measures are: 1) weighted average density – Middle Super Output Area (MSOA); 2) weighted average density – Local Authority Districts (LADs); 3) properties per length of main. For more details see 'Ofwat's PR24 draft determinations: Expenditure allowances – Base cost modelling decision appendix'.
[9] The appendix explains where we've sourced this data from.
[10] See appendix for a brief explanation of the difference between these measures.

- Proportion of residential installations and average AMI meter penetration have the expected sign but are not statistically significant. This might be due to the small sample size and the quality of the forecasts, which may not adequately reflect the impact of these cost drivers which are expected to drive costs.

Overall, we conclude that the two models with properties per length of mains and the weighted average density (MSOA) are reasonable and fit the data better compared to Ofwat's specification. Therefore, these models are better at predicting the costs of the new installation metering programme.

Table 2: Cross-sectional econometrics models – New installations

	Ofwat's	Proportion of residential installations	Properties per length of main	Weighted average density - LAD	Weighted average density - MSOA	Average AMI meter penetration
Log of new installations	1.004***	1.039***	0.973***	0.975***	0.962***	0.993***
Proportion of residential installations		-1.163				
Properties per mains length			0.581*			
Weighted average density (LAD)				0.133		
Weighted average density (MSOA)					0.351*	
Average AMI meter penetration						0.997
Constant	6.004***	6.771***	3.564**	5.111***	3.305**	5.869***
Number of observations	14	14	14	14	14	14
Adjusted R2	0.982	0.984	0.986	0.983	0.986	0.985
AIC	7.054	6.126	4.276	7.033	4.141	5.658
BIC	8.332	8.043	6.193	8.951	6.058	7.575

Source: analysis based on Ofwat's dataset 'PR24-DD-W-Metering.xlsx' and reinstated data for Portsmouth Water (net of CRM).

Note: *** p-value < 1%; ** p-value <5%; * p-value <10%.

In the appendix we have presented a number of sensitivities that show that our conclusions are unchanged irrespective of whether: 1) we add back our CRM costs; and 2) we estimate random effects panel models.

Revised modelling results – Upgrades

For upgrades the findings of our revised modelling are as follows (see Table 3 below):

- The models with the density measures perform marginally better than Ofwat's specification when considering the adjusted R-squared, but worse when considering AIC and BIC. The other models do not perform better than Ofwat's.
- All of the alternative model specifications show economies of scale.
- The different measures of population density show a positive relationship between density and costs. They are not statistically significant, although this might be due to the small sample size.
- Proportion of residential installations and average AMI meter penetration do not have the expected sign. This might be due to the small sample size and the quality of the forecasts, which may not adequately reflect the impact of these cost drivers which are expected to drive costs.

Overall, we conclude the following:

- The models with the density measures could be considered in conjunction with Ofwat's model specification. However, the case is not as strong as for new installations for the reasons outlined above.
- Our cross-sectional estimation of the model with upgrades is superior to Ofwat's random effects panel specification for two key reasons: 1) the estimated model that Ofwat intends to use at Final Determination show constant return to scale, which contradicts economic and engineering rationale; 2) it is difficult to estimate a meaningful random effects panel data model if there is no variation over time.

In the appendix we have presented a number of sensitivities that show that our conclusions are unchanged irrespectively of whether we add back our CRM/MDM costs.

Table 3: Cross-sectional econometric models – Upgrades

	Ofwat's	Properties per length of main	Weighted average density - LAD	Weighted average density - MSOA
Log of new installations	0.919***	0.879***	0.887***	0.880***
Proportion of residential installations				
Properties per mains length		0.402		
Weighted average density (LAD)			0.119	
Weighted average density (MSOA)				0.216
Average AMI meter penetration				
Constant	4.745***	3.171**	4.013***	3.178*
Number of observations	15	15	15	15
Adjusted R2	0.909	0.911	0.910	0.910
AIC	11.556	12.019	12.107	12.131
BIC	12.973	14.143	14.231	14.255

Source: analysis based on Ofwat's dataset 'PR24-DD-W-Metering.xlsx' and reinstated data for Portsmouth Water (net of CRM).

Note: *** p-value < 1%; ** p-value <5%; * p-value <10%.

Allowances for Portsmouth Water

We have applied Ofwat's approach[11] to calculate our allowance across a range of reasonable alternative models:

- New installations: two cross-sectional models with two measures of density (properties per length and weighted average MSOA), estimated on a sample that includes Portsmouth Water reinstated costs (net of CRM/MDM costs) and excludes Welsh Water and South Staffs Water.
- Upgrades: same models as for new installations, as well as a model which uses Ofwat's simpler specification, but estimated as a cross-sectional model.

The table below compare our updated enhancement costs with the allowances from the Draft Determination and these different models. As can be seen from the table:

- The allowance for our costs from an improved set of models is £52.7m-£54.3m, which is much closer to our estimated programme costs.
- The allowance implied by Ofwat's Draft Determination models is significantly lower than the lower bound of our range, which is derived from an improved set of models.
- Therefore, we conclude that Ofwat has materially overstated our efficiency gap.

[11] See appendix for more details.

Table 4: Allowances for Portsmouth Water (£m over AMP8)

	New installations	Upgrades	Combined allowance
Portsmouth's reinstated costs (net of CRM)	43.2	11.6	54.8
Ofwat DD	38.7	5.5	44.2
Range of allowances from improved models			
Lower bound	46.5	6.2	52.7
Mean	46.8	6.9	53.7
Upper bound	47.0	7.3	54.3
Allowances from improved models			
Number of meters – Cross-sectional model		6.2	
Properties per mains length	47.0	7.3	
Weighted average density - MSOA	46.5	7.2	

Source: Analysis of Ofwat's dataset. These figures are below application of frontier shift.

4. Evidence to validate the Portsmouth Water's cost estimates

The improvements outlined above that we have implemented to the models show that our cost projections are close to the predicted values from the models. Therefore, the implied 'efficiency gap' would be relatively small and significantly less than that implied by Ofwat's Draft Determination.

We have carefully considered whether the revised modelling approach provides sufficiently robust evidence to be solely relied on to set cost allowances. Our view is that this modelling should not be used in isolation and that a broader range of evidence should be considered.

The reason for this is that there remains some concerns with the robustness of the modelling approach:

- The modelling does not capture all the relevant drivers for explaining the expenditure on smart metering infrastructure.
- Other relevant cost drivers, such as the proportion of non-household meters, cannot be satisfactorily captured in the modelling.

Therefore, it is important that Ofwat considers other evidence for assessing cost efficiency, including evidence from market testing and the use of more granular bottom-up cost checks. These are discussed below.

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

[redacted]

Utilising granular cost data

The other source of evidence that is available to Ofwat is the granular cost data collected as part of Business Plan submissions. Ofwat collected detailed information on company programme costs, including splits between dig / no-dig installations, household / non-household mix, project management costs, communications network costs, and so on. We are concerned by the fact that Ofwat collected this data and then did not make use of it in its assessment of cost efficiency. In our view it is a failure of process to not consider all the available evidence.

Ofwat should use this data as part of a more rounded, bottom-up assessment of company proposals, which would recognise legitimate differences in the characteristics of different companies' metering programme. It would enable Ofwat to assess the impact of the valid cost drivers discussed above that were not captured in the modelling, due to limitations in the data sample.

This would provide a valuable cross-check against the modelled results, particularly for those companies where the modelled costs were particularly low (or high) compared to the Business Plan cost figures. For these companies it would be a vital step to understand whether the modelled results reflect relative efficiency or legitimate differences in the characteristics of the smart metering programme.

Portsmouth Water does not have access to this data for the industry, so we have not been able to perform any of these cross-checks.

Nevertheless, we consider that they should form part of Ofwat's evidence base, alongside an improved benchmarking model (as described above) and the evidence from market testing of programme costs.

This analysis would confirm that Portsmouth Water's costs for the smart metering programme (as restated) are efficient and should be allowed in full.

D. Conclusion

We remain committed to this programme of smart metering and are convinced that it is the right solution for our customers and the business. It is vital that the cost allowance is realistic and supports the delivery of this fundamental enhancement to our infrastructure. The Draft Determination allowance of £44.2m is insufficient and Ofwat needs to reconsider this for the Final Determination.

We have carefully reviewed our cost allocations for this programme, and we are making some important revisions to our Business Plan forecasts. First, we reallocate £8.8m of meter replacement costs from our Metering Enhancement Programme to Base. Second, we have decided to reallocate the costs of our GIS and ERP system upgrades to Base - this removes a further £4.7m from the cost

of the programme and this is transferred to Base. As a result of these re-allocations the Adjusted programme costs are £58.1m.

Despite these changes to the cost of the enhancement programme there remains a significant and unrealistic gap between the cost of the programme (£58.1m) and Ofwat's Draft Determination allowance (£44.2m).

We have undertaken a detailed review of Ofwat's approach to setting the cost allowance. We have identified weaknesses in the modelling approach.

- The first change is to remove the CRM/MDM component of our costs from the modelling assessment. These costs are specific to Portsmouth Water and if they were to remain included then the costs would not be being compared on a like-for-like basis. This results in £3.6m of CRM/MDM costs being assessed separately and removed from the adjusted programme costs. Therefore, the costs to be assessed through the modelling are £54.5m.
- We have developed a revised set of models, using the Ofwat dataset, addressing as many of the concerns with the Draft Determination modelling as the data permits. Although the resulting model is not perfect it is a clear improvement on the Ofwat Draft Determination model. It results in an allowance for our costs of between £52.7m and £54.3m which is much closer to our estimated programme costs of £54.5m (excluding the CRM/MDM).

However, there remains concerns with the modelling and taking account of the evidence from our market testing, the commercial bids we have received and are evaluating, we consider that there is clear case that there is no further scope for efficiency improvements against our restated programme costs.

Therefore, the appropriate remedy for this issue, giving due regard to the benchmarking evidence, is for our revised programme costs of £58.1m to be allowed in full.

E. Business plan tables impacted

We have updated tables CW2 and CW3 to reflect the reallocation of costs from enhancement to base. This reduces the enhancement costs included in rows CW3.72, CW3.81 and CW3.87-88.

Appendix 1. Further modelling

Sources of additional variables tested

We sourced the additional variables tested from Ofwat's Draft Determination models:

- Density measures. Ofwat's 'PR24-DD-Base-costs-water-model-3.xlsx'
- Proportion of residential meter installations. Ofwat's 'PR24-DD-W-Metering.xlsm'
- AMI meter penetration. Ofwat's 'PR24-DD-W-Metering.xlsm'

As our models are cross-sectional, our models include the average of these variables over the estimation period.

Estimation sample

Consistently with Ofwat's approach we have excluded from the sample:

- Those company/year for which either costs or the number of meters is reported as zero
- For new installations, South East Water in 2016 and 2027 and SES Water in 2026, 2029, and 2030

The sample used in our main analysis also excludes all years for Welsh Water and South Staff Water and includes Portsmouth Water.

Goodness-of-fit measures

We used the following goodness-of-fit measures to assess the performance of our cross-sectional models:

- **Adjusted R-squared**. Adjusted R-squared is a modified version of R-squared. Similarly to R-squared it explains how well the model explains the data. The main difference is that adjusted R-squared adds a penalty for the number of variables added to the model that do not improve the fit. The higher the adjusted R-squared the better the fit.
- **AIC.** The Akaike Information Criteria is a score that can be used to measure the goodness-of-fit of a model. The AIC score weighs the trade-off between how well your model fits the data versus how complicated the model is. The lower the AIC the better the fit.
- **BIC**. The Bayesian Information Criteria is a score used to measure the goodness-of-fit of a model. Compared to the AIC it provides a higher penalty for models with a large number of parameters. The lower the BIC the better the fit.

Calculation of allowances

We applied Ofwat's methodology to estimate the allowances. In particular, we have:

- Predicted costs from the regression
- Applied Ofwat's bias adjustment to the prediction
- Set the efficiency benchmark at the mean efficiency.

Modelling sensitivity – Random Effect for new installation

The table below show our range of alternative models for new installations estimated using Random Effects. Models with density measures perform better than Ofwat's model.

Table 5: Random Effect econometric models – New installations

	Ofwat's	Proportion of residential installations	Properties per length of main	Weighted average density - LAD	Weighted average density - MSOA	Average AMI meter penetration
Log of new installations	1.001***	1.001***	0.983***	0.987***	0.978***	0.994***
Proportion of residential installations		-0.886				
Properties per mains length			0.569**			
Weighted average density (LAD)				0.127		
Weighted average density (MSOA)					0.327**	
Average AMI meter penetration						1.039*
Constant	6.012***	6.888*	3.595***	5.127***	3.456***	5.863***
Number of observations	69.000	69.000	69.000	69.000	69.000	69.000
Overall R2	0.973	0.973	0.979	0.976	0.979	0.978
Between R2	0.983	0.983	0.988	0.985	0.988	0.986
Within R2	0.931	0.931	0.930	0.931	0.931	0.931

Source: analysis based on Ofwat's dataset 'PR24-DD-W-Metering.xlsx' and reinstated data for Portsmouth Water (net of CRM).

Note: *** p-value < 1%; ** p-value <5%; * p-value <10%.

Model sensitivity – Cross-sectional models with CRM/MDM added back to our data

The tables below show our range of alternative models for both new installations and upgrades estimated adding back CRM/MDM to our cost data. The estimated coefficient and performance are not impacted by this change.

Table 6: Cross-sectional econometric models with CRM/MDM – New installations

	Ofwat's	Proportion of residential installations	Properties per length of main	Weighted average density - LAD	Weighted average density - MSOA	Average AMI meter penetration
Log of new installations	1.005***	1.041***	0.973***	0.975***	0.962***	0.994***
Proportion of residential installations		-1.179				
Properties per mains length			0.594*			
Weighted average density (LAD)				0.136		
Weighted average density (MSOA)					0.357**	
Average AMI meter penetration						0.982
Constant	6.006***	6.783***	3.514**	5.088***	3.257**	5.873***
Number of observations	14	14	14	14	14	14
Number of observations	0.982	0.984	0.986	0.983	0.986	0.984
AIC	7.101	6.099	4.097	6.967	3.990	5.836
BIC	8.379	8.017	6.014	8.885	5.907	7.753

Source: analysis based on Ofwat's dataset 'PR24-DD-W-Metering.xlsx' and reinstated data for Portsmouth Water (with CRM added back)

Note: *** p-value < 1%; ** p-value <5%; * p-value <10%.

Table 7: Cross-sectional econometric models with CRM/MDM – Upgrades

	Ofwat's	Properties per length of main	Weighted average density - LAD	Weighted average density - MSOA
Log of new installations	0.910***	0.864***	0.874***	0.866***
Proportion of residential installations				
Properties per mains length		0.455		
Weighted average density (LAD)			0.133	
Weighted average density (MSOA)				0.243
Average AMI meter penetration				
Constant	4.789***	3.008*	3.972***	3.025*
Number of observations	15	15	15	15
Adjusted R2	0.898	0.902	0.901	0.901
AIC	13.045	13.246	13.400	13.397
BIC	14.461	15.37	15.524	15.521

Source: analysis based on Ofwat's dataset 'PR24-DD-W-Metering.xlsx' and reinstated data for Portsmouth Water (with CRM added back).

Note: *** p-value < 1%; ** p-value <5%; * p-value <10%.

2. DETERIORATION IN RAW WATER QUALITY: UV ENHANCEMENT SCHEME COSTS

A. What is the issue?

Our Business Plan included a business case for enhancement expenditure of £14.912m for the provision of Ultra-Violet (UV) Treatment plants and on-site emergency connection facilities for the treatment of Cryptosporidium, and, in one case (Slindon), Ct support (PRT07.02).

Ofwat assessed the business case through a deep dive assessment. On the basis of a query response from Portsmouth Water, Ofwat erroneously included only £12.950m in its deep dive assessment. The correct sum is £14.912m as set out in the original investment case and included within the original version of Table CW3.

Based on the deep dive, Ofwat allowed only £7.770m, 60% of the assessed expenditure, and 52% of the expenditure of £14.912m required to deliver these schemes, which are supported by the DWI. A summary of the basis of Ofwat's decision is set out below.

Table 1: Ofwat Draft Determination deep dive findings

Enhancement assessment criteria grouping	Key assessment comments	Criteria decision
Need for enhancement investment	The company does not provide sufficient or convincing evidence it has fully considered base overlap.	Partial pass (resulting in a 10% downwards adjustment)
	The company does not fully explain how it has determined no other aspects of the current mobile UV can be used to deliver a permanent UV treatment at a lower cost.	
Best option for customers	The company state within their submission that alternative process options have not been explored with engineering rigour since they are known not to be cost effective. They provide membrane technology as an example and have shown it is more expensive using their own unit costs.	Some concerns (resulting in a 20% downwards adjustment)
	The company does not provide evidence of cost benefit analysis, nor is there is evidence provided to show the proposed solution is best value, no evidence of carbon impacts or natural capital accounting.	

Cost efficiency	The company provides the scheme costs but do not provide any engineering reports to show how costs were produced or any evidence of benchmarking or third-party assurance.	Some concerns (resulting in a 20% downwards adjustment)
Customer protection		Pass

Since the Draft Determination we have worked with Arcadis to provide additional evidence and assurance that the challenges set out above are not justified.

B. Our proposed remedy

Ofwat's deep dive should consider the full sum of £14.912 included within our business case and Table CW3. For ease, we have included all this expenditure in row CW3.99. This is an update from the position set out in our response to query PRT-091 which appears to have caused some misunderstandings.

Based on the additional evidence and assurance provided by Arcadis in response to the Draft Determination challenges Ofwat should allow this sum in full in the Final Determination.

C. Supporting evidence

Arcadis review

In response to the Draft Determination we commissioned an independent consultant, Arcadis Consulting (UK) Ltd to conduct a review of the original Business Plan submission and its supporting information, and Ofwat's Draft Determination findings. Their work is collated in supporting document **PRT EA 01: UV-Crypto Project Review**.

Arcadis reviewed the alternative options and the cost information provided by Portsmouth Water, and considered further options based on the application of their own extensive water sector knowledge and experience. Their findings are summarised here:

- For West Street WTW, six options were considered. The preferred option (provide new UV treatment) represents the best value for money and gives the best technical outcome to protect customers against the risk of cryptosporidium.
- For Slindon and Northbrook WTWs, five options were considered. The preferred option (re-purpose the current mobile UV) gives the required level of treatment to protect customers against the risk of cryptosporidium or other disinfection issues and represents the best value for money.
- For Maindell WTW, five options were considered. Two options scored the same from a technical evaluation perspective and the preferred option (cartridge filter plus UV) represents the lower cost solution of these two options with opportunity for further optimisation during commissioning and operation of the plant.
- The costs for the UV elements of the Business Plan as submitted are in line with Ofwat's cost curve. There is however additional cost for Portsmouth Water associated with supporting and ancillary works that are required to deliver the UV solutions. These additional costs were included in the original investment case and are broadly in line with industry expectations.
- Arcadis were able to suggest some realignment and restructuring of the project and its costs. This results in:

- a marginally lower overall cost, hence providing the same customer benefit at better value.
- improved clarity surrounding how well the costs align to benchmarked costs for UV.

Option selection

As set out in our Business Plan, one of our objectives for AMP8 is to develop further our asset management capabilities. As part of this capability building, in 2022 we invested in the Copperleaf® Decision Analytics Solution tool to enable us to improve the quantification of our investment decision-making.

While the system is not yet mature, we have been able to use the Copperleaf tool to assess the options for our investment proposals for Nitrates, UV and Service Reservoir Isolation demonstrating that our option selection is robust. We include a summary report which sets out the Copperleaf outputs for these three investment cases, as well as our new investment case for PFAS (PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases.)

D. Conclusion

Based on the review by Arcadis we believe our original Business Plan proposals are supported and we have not made any changes to the costs included in our plan. We summarise below the basis of our view, against each of the Ofwat challenges. The supporting evidence can be found in our original business case (PRT07.02) and the supporting Arcadis document PRT EA 01 UV-Crypto Project Review.

Table 2: Conclusions on Ofwat's Draft Determination challenges

Enhancement assessment criteria grouping	Key assessment comments	Conclusion
Need for enhancement investment	The company does not provide sufficient or convincing evidence it has fully considered base overlap.	The documents set out where there is the potential for base overlap and those costs were removed from the Business Plan submission.
	The company does not fully explain how it has determined no other aspects of the current mobile UV can be used to deliver a permanent UV treatment at a lower cost.	There is no 'existing mobile UV'. The preferred option for Slindon and Northbrook WTWs repurposes the current UV to provide a re-purposed flexible mobile unit and permanent UV treatment options and is the lowest cost solution.
Best option for customers	The company state within their submission that alternative process options have not been explored with engineering rigour since they are known not to be cost effective. They provide membrane technology as an example and have shown it is more expensive using their own unit costs.	The Arcadis report provides an engineering review of the alternative process options and associated costs, providing additional rigour.
	The company does not provide evidence of cost benefit analysis, nor is there is evidence provided to show	The Arcadis report provides additional evidence of cost benefit analysis.

	the proposed solution is best value, no evidence of carbon impacts or natural capital accounting.	With respect to carbon impact, the proposed solution for Slindon and Northbrook repurposes existing assets and represents the lower possible carbon impact as indicated on page 7 of PRT07.02.
Cost efficiency	The company provides the scheme costs but do not provide any engineering reports to show how costs were produced or any evidence of benchmarking or third-party assurance.	The report provides additional insight into how costs were produced and comparison to industry expectation. The Arcadis report demonstrates that these align to benchmarked costs and provides additional third-party assurance.
Customer protection		Pass

E. Business plan tables impacted

None. The review of our business case by Arcadis addresses Ofwat's challenges and supports the overall level of costs included in our October Business Plan. These costs are included in Table CW3.99. Note this line also includes the costs of our Nitrates business case PRT07.03 (see representation below).

F. Supporting documents

PRT EA 01 UV-Crypto Project Review

PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases

3. DETERIORATION IN RAW WATER QUALITY: NITRATES ENHANCEMENT SCHEME COSTS

A. What is the issue?

Our Business Plan included a business case for enhancement expenditure of £15.257m for addressing deterioration in raw water quality at our Lovedean treatment works, and our Eastergate group of sites (PRT07.03).

Ofwat assessed the business case through a deep dive assessment. Based on the deep dive, Ofwat allowed only £10.803, 70% of the assessed expenditure of £15.257m required to deliver these schemes, which are supported by the DWI.

It agreed with the need for investment but challenged the optioneering and cost efficiency. Ofwat notes in the Draft Determination that the challenge should have been 40% not 30% and states that it will updated this for the Final Determination. A summary of the basis of Ofwat's decision is set out below.

Table 1: Ofwat Draft Determination deep dive findings

Enhancement assessment criteria grouping	Key assessment comments	Criteria decision
Need for enhancement investment		Pass
Best option for customers	The company does not provide sufficient and convincing evidence that the selected option is the best for customers.	Some concerns (Resulting in a 20% downward adjustment)
	The company does not explain why it has rejected optimisation of the Lavant transfer main which is described by their consultants as significantly lower cost.	
	There is no evidence of cost benefit analysis or how the company has determined the preferred option to represent best value.	
	Their consultants also recommend that the company improve their decision-making process to include non-financial parameters such as carbon, customer, environmental benefits, and impacts or risk to performance commitments	
Cost efficiency	The company provides detail on how the range of intervention costs were produced but does not explain why the third-party consultants estimated lower cost range for the scheme was not adopted and why evidence that all costs are efficient.	Some concerns (Resulting in a 20% downward adjustment)
	In addition to this there is no benchmarking or third-party assurance provided.	

Customer protection		Pass

Since the Draft Determination we have worked with Arcadis to provide additional evidence and assurance that the challenges set out above are not justified.

B. Our proposed remedy

Based on the additional evidence and assurance provided by Arcadis in response to the Draft Determination challenges Ofwat should allow the enhancement costs of £15.257m in full in the Final Determination.

C. Supporting evidence

Arcadis review

In response to the Draft Determination we commissioned an independent consultant, Arcadis Consulting (UK) Ltd to conduct a review of the original Business Plan submission and its supporting information, and Ofwat's findings. Their work is collated in a report, please see **PRT EA 02 Nitrate Resilience Project Review**.

Arcadis reviewed the alternative options and the cost information provided by Portsmouth Water, together with the application of their own extensive water sector knowledge and experience. Their findings are summarised here:

- For Littleheath SR, six options were considered. The preferred option (sidestream nitrate removal plant) represents an overall better technical solution that provides reliable and consistent water quality whilst retaining the maximum resilience in the network. This option does have higher totex than an alternative blending solution, but still represents value for money in light of the additional benefits.
- For Lovedean SR, seven options were considered. The preferred option (Lyeheath valve automation) has technical risks that require further evaluation during detailed design and has several benefits compared to a treatment option, including being a lower cost option.
- The costs in the Business Plan as submitted represent good value when compared to Ofwat's cost curve.

Option selection

As set out in our Business Plan, one of our objectives for AMP8 is to develop further our asset management capabilities. As part of this capability building, in 2022 we invested in the Copperleaf® Decision Analytics Solution tool to enable us to improve the quantification of our investment decision-making.

While the system is not yet mature, we have been able to use the Copperleaf tool to assess the options for our investment proposals for Nitrates, UV and Service Reservoir Isolation demonstrating that our option selection is robust. We include a summary report which sets out the Copperleaf outputs for these three investment cases, as well as our new investment case for PFAS (PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases.)

D. Conclusion

Based on the review by Arcadis we believe our original Business Plan proposals are supported and we have not made any changes to the costs included in our plan. We summarise below the basis of our view, against each of the Ofwat challenges. The supporting evidence can be found in our original business case (PRT07.03) and the supporting Arcadis document PRT EA 02 Nitrate Resilience Project Review.

Table 2: Conclusions on Ofwat's Draft Determination challenges

Enhancement assessment criteria grouping	Key assessment comments	Portsmouth Water conclusion
Need for enhancement investment		Pass
Best option for customers	The company does not provide sufficient and convincing evidence that the selected option is the best for customers.	Additional options, beyond those initially proposed by Atkins, have now been considered by Arcadis The Arcadis report still supports the case for the original options selected being best for customers.
	The company does not explain why it has rejected optimisation of the Lavant transfer main which is described by their consultants as significantly lower cost.	Additional evidence is now offered by Arcadis (please see page 9 of their report). This evidence supports Portsmouth Water's view and the settled view of Atkins, that the Lavant transfer main is a non-viable option that could not be carried forward from the long-list to the short-list. There are additional benefits in terms of protecting resilience in the network and the ability to provide the required standard of water quality now and into the future. The costs of the preferred solution at Littleheath are below Ofwat's cost curve.
	There is no evidence of cost benefit analysis or how the company has determined the preferred option to represent best value.	Please see above. The Arcadis report provides additional cost - benefit evidence in support of the chosen option.
	Their consultants also recommend that the company improve their decision-making process to include non-financial parameters such as carbon, customer, environmental benefits, and impacts or risk to performance commitments	Similar parameters are considered in the report and the selected options represent best value across this range of parameters.
Cost efficiency	The company provides detail on how the range of intervention costs were produced but does not explain why the third-party consultants estimated lower cost range for the scheme was not adopted and why evidence that all costs are efficient.	See above. The costs proposed for this element do represent efficient cost when compared to the Ofwat cost curve. The Arcadis report demonstrates that the lower end estimate contained in the Atkins report makes insufficient / no allowance for the infrastructure needs to support the nitrate plant's installation

Enhancement assessment criteria grouping	Key assessment comments	Portsmouth Water conclusion
	In addition to this there is no benchmarking or third-party assurance provided.	The Arcadis study remedies this and the costs are benchmarked against cost information provided by Ofwat as described above and in the report. Proposed costs fall below the Ofwat benchmarks.
Customer protection		Pass

E. Business plan tables impacted

None. The review of our business case by Arcadis addresses Ofwat's challenges and supports the costs included in our October Business Plan. These costs are included in Table CW3.99. Note this line also includes the costs of our UV business case PRT07.02 (see representation above).

F. Supporting documents

PRT EA 02 Nitrate Resilience Project Review

PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases

4. CYBER: ECAF ENHANCEMENT SCHEME COSTS

A. What is the issue?

Our Business Plan included a business case for enhancement expenditure of £14.110m for improvements in the digital security of OT systems to align with the new Enhanced Cyber Security Framework (eCAF).

Ofwat have reviewed Portsmouth Water's PRT07.01 Security Resilience and eCAF Compliance at Operational Sites investment proposal through a deep dive assessment and have applied a 50% downward adjustment as a result.

The reduction applied to this investment inhibits our ability to deliver the security compliance level expected by the DWI and the SSP.

A 20% downward adjustment has been applied due to concerns in relation to the 'Need for Enhancement' category with Ofwat specifically highlighting concerns relating to quantification, scaling, timing, base expenditure and risk assessment.

A further 20% downward adjustment has been incurred in relation to the 'Best Option for Customers' category with Ofwat stating that insufficient convincing evidence had been provided concerning optioneering, value and option flexibility.

Lastly, a 10% downward adjustment was assigned to the 'Cost Efficiency' category on the basis that insufficient evidence had been submitted that demonstrates how the costs have been estimated.

B. Our proposed remedy

We have engaged Bridewell Consulting limited (an independent and trusted cyber security consultancy) for the purpose of reviewing the findings presented by Ofwat and to provide an externally assured response. Bridewell have provided a report in relation to the Draft Determination findings. The report provides additional context and serves as supplementary evidence supporting Portsmouth Water's investment proposal.

Bridewell agreed with the Ofwat challenge specifically relating to removing SEMD costs from the eCAF cyber security investment proposal. Whilst the justification falls within the scope of PRT07.01 due to the relationship with eCAF and the SSP, the costs associated with this element of the business case were included separately in the SEMD lines of the Business Plan Data Tables (CW3.121-123).

Based on the additional evidence and assurance provided by Bridewell in the supporting document PRT EA 03 eCAF Project Review report Ofwat should allow the enhancement costs of £14.10m in full in the Final Determination.

C. Supporting evidence

A copy of the Bridewell Draft Determination review has been provided with our response (PRT EA 03 eCAF Project Review). Based on this review, a summary of the responses provided to Ofwat's challenges are included below.

Need for enhancement

- In response to the need for enhancement challenges posed by Ofwat, we can confirm that the costs associated with the SEMD physical security components were not included in the costs associated with the eCAF cyber security investment proposal. These were deducted from total costs and separately presented in the original data tables (CW3.121-123). No changes to the tables are proposed.
- We intend to invest a considerable sum (circa £6.1m) from Base Expenditure towards eCAF compliance within the IT environment during AMP8.
- Bridewell describes the security objective within operational technology as a "significant step change" (Portsmouth Water eCAF PR24 Draft Determination Review, Page 5) and support the proposal that this should be funded as Enhancement Expenditure.
- Although a risk register inclusive of cyber security risks exists and is maintained within Portsmouth Water, the need for enhancement is driven by a compliance target (eCAF and the SSP) required by the DWI and enforced through Network Information Systems Regulations 2018 (NISR) enforcement notices (NISR, Regulation 17).

Best option for customers

- Whilst our investment proposal is based on a single option, our roadmap and associated task list includes numerous feasibility studies that drive solution optioneering. Bridewell state that "it is not feasible to investigate and select appropriate engineering solutions without first funding a detailed discovery and market engagement exercise" (Portsmouth Water eCAF PR24 Draft Determination Review, Page 6).
- Furthermore, Bridewell agrees with and supports the single option approach on the basis that optioneering detail is to be conducted throughout the programme delivery. Bridewell agrees that such optioneering will have a marginal positive or negative effect on costs.
- Evidence relating to the programme benefits is included within our business case PRT07.01 and has been explicitly detailed within the Bridewell report (Portsmouth Water eCAF PR24 Draft Determination Review, Page 7).
- The rationale for developing security architectures and associated solutions at Itchen water treatment work is included within the PRT07.01 business case and has been captured within the Bridewell report (Portsmouth Water eCAF PR24 Draft Determination Review, Page 8). Additionally, a list of sites in scope for the eCAF rollout plan is also available in the submitted business case and the Bridewell report (Portsmouth Water eCAF PR24 Draft Determination Review, Page 8).

Cost efficiency

- Further detail relating to our cost models has been provided on page 9 of Bridewell's report. Approximately 77% of the investment case is underpinned by estimates provided by incumbent framework providers. 23% of the investment case is underpinned by estimates provided internally by our technical teams. The included costs have been verified through assurance conducted by Jacobs where it was stated that "…costs are in line with OFWAT benchmarks and industry norms" (Enhancement Case Assessment, Digital Security Resilience and eCAF: Jacobs Review, Cell B37).
- With respect to benchmarking activities, Bridewell confirmed that relevant industry-specific benchmarks are not readily available for all aspects of the investment proposal due to the bespoke nature of the programme and a lack of relevant historical datasets. Bridewell concludes that it is not possible to deliver a comprehensive benchmarking exercise in consideration of the circumstances described (Portsmouth Water eCAF PR24 Draft Determination Review, Page 10).

- Portsmouth Water have incorporated feedback received from external assurers (relating to the PRT07.01 business case). Challenges specifically relating to cost efficiencies were reviewed and consequently the cost variance for the proposal was reduced from £4m to circa £1.4m.

D. Conclusion

In response to Ofwat's deep dive of our eCAF enhancement case, we commissioned expert advice from Bridewell Consulting to provide assurance that our proposals should be considered as Enhancement, that they represented the best option for customers and that they were value for money.

Bridewell's review confirmed that our proposals were necessary and that optioneering of the type considered in Ofwat's deep dive assessment is not appropriate for the nature of investment (and would have a marginal impact). The majority of our cost estimates are derived from incumbent framework providers, but Bridewell confirms that such costs are not susceptible to benchmarking of the type envisaged by Ofwat. Our Business Plan submission incorporated a 20% efficiency stretch to these forecast costs and we are therefore confident that the Business Plan cost are efficient.

E. Business plan tables impacted

None. The review of our business case by Bridewell addresses Ofwat's challenges and supports the costs included in our October Business Plan. These costs are included in Table CW3.126. Note that costs associated with the SEMD element of our business case were included within CW3.123 and are subject to a separate shallow dive assessment.

F. Supporting documents

PRT EA 03 eCAF Project Review

5. RESILIENCE: SERVICE RESERVOIR ISOLATION ENHANCEMENT SCHEME

A. What is the issue?

Our Business Plan included a business case for enhancement expenditure of £3.590m to improve supply resilience by establishing measures that allow customers supplies to be effectively maintained whilst reservoirs are isolated from supply (PRT07.04).

Ofwat assessed the business case through a deep dive assessment. Based on the deep dive, Ofwat allowed only £1.795m, 50% of the assessed expenditure of £3.590m.

A summary of the basis of Ofwat's decision is set out below.

Table 1: Ofwat Draft Determination deep dive findings

Enhancement assessment criteria grouping	Key assessment comments	Criteria decision
Need for enhancement investment	The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances and previously funded enhancement schemes. It is the company's general duty to maintain its assets so that they are in a condition to deliver outputs as they were intended to meet and continue to be able meet its statutory obligations. Our base expenditure is for companies to deliver resilient services on a day-to-day basis.	Partial Pass (resulting in a 10% downwards adjustment)
Best option for customers	The company has provided no evidence they have considered alternative options or have undertaken a cost benefit analysis.	Significant concerns (resulting in a 30% downwards adjustment)
	The company states that the single identified option provides the only practicable and economic solution. However, the company does not provide sufficient and convincing evidence to demonstrate that the proposed option is the most cost beneficial and best value for customers.	
	The company does not provide a clear explanation of the optioneering process and the rationale for the selection of the option.	

Cost efficiency	The company states that it has received third party assurance. However, there is no evidence of this or how this assurance applies to this enhancement case.	Minor concerns (resulting in a 10% downwards adjustment)
	The company states that third party engineering contractors have been used to generate cost estimates. However, the company does not provide evidence of the working of these contractors.	
Customer protection		Pass

Since the Draft Determination we have worked with Arcadis to provide additional evidence and assurance that the challenges set out above are not justified.

B. Proposed remedy

Based on the additional evidence and assurance provided by Arcadis in response to the Draft Determination challenges Ofwat should allow the enhancement costs of £3.590m in full in the Final Determination.

C. Supporting evidence

Arcadis Review

In response to the Draft Determination we commissioned an independent consultant, Arcadis Consulting (UK) Ltd to conduct a review of the original Business Plan submission and its supporting information, and Ofwat's findings. Their work is collated in **PRT EA 04 Service Reservoir Project Review**. Arcadis reviewed the alternative options and the cost information provided by Portsmouth Water, together with the application of their own extensive water sector knowledge and experience. Their findings are summarised here:

- PRT07.04 outlines a single solution for the need to provide sampling points at service reservoirs within our potable water network (to ensure compliance with DWI regulations), as well as the provision of reservoir bypass facility to improve network resilience if a reservoir is taken out of supply. Arcadis conclude that this is the only practicable solution (see Arcadis report section 3.2.2).
- Following a review of the our network, the detailing of the next best alternative, and the cost estimation of these options, it can be concluded that the proposed single solution put forward in PRT07.04 proposal is the most economically viable and suited to the needs of the organisation.
- When considering previously submitted enhancement schemes within the PR19 submission and the definitions provided by Ofwat for Enhancement and Base Maintenance expenditures, the review showed that the proposal aligned with the available definition of Enhancement expenditure. There is very little correlation with the definition of Base Maintenance, whilst the scope supported strongly the context provided for Enhancement expenditure.
- A challenge regarding the cost efficiency of the proposal was that no evidence of the contractor pricing estimates was provided with the initial submission. This document was provided for review and shows clearly the methodology undertaken for pricing the work by the framework contractor and Arcadis recommend this is shared with Ofwat. As part of their review, Arcadis priced four schemes, using market rates to enable a price comparison and demonstrated that the

prices included in PRT07.04 were a robust estimate for works of this type and at this stage in the project lifecycle.

Option selection

As set out in our Business Plan, one of our objectives for AMP8 is to develop further our asset management capabilities. As part of this capability building, in 2022 we invested in the Copperleaf® Decision Analytics Solution tool to enable us to improve the quantification of our investment decision-making.

While the system is not yet mature, we have been able to use the Copperleaf tool to assess the options for our investment proposals for Nitrates, UV and Service Reservoir Isolation demonstrating that our option selection is robust. We include a summary report which sets out the Copperleaf outputs for these three investment cases, as well as our new investment case for PFAS (PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases.)

D. Conclusion

Based on the review by Arcadis we believe our original Business Plan proposals are supported and we have not made any changes to the costs included in our plan. We summarise below the basis of our view, against each of the Ofwat challenges. The supporting evidence can be found in our original business case (PRT07.04) and the supporting Arcadis document PRT EA4 Service Reservoir Project Review.

Table 2: Conclusions on Ofwat's Draft Determination challenges

Enhancement assessment criteria grouping	Key assessment comments	Conclusion
Need for enhancement investment	The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances and previously funded enhancement schemes. It is the company's general duty to maintain its assets so that they are in a condition to deliver outputs as they were intended to meet and continue to be able meet its statutory obligations. Our base expenditure is for companies to deliver resilient services on a day-to-day basis.	The scope of the solutions put forward in the Business Plan aligns with Ofwat definition of Enhancement (not Base) and there are no demonstrable overlaps with previous (PR19) Enhancement funding.
Best option for customers	The company has provided no evidence they have considered alternative options or have undertaken a cost benefit analysis.	The Arcadis report considers alternative options and demonstrates that the options put forward in the Business Plan submission are cost beneficial, compared to these alternative options.
	The company states that the single identified option provides the only practicable and economic solution. However, the company does not provide sufficient and convincing evidence to demonstrate that the	See above and the Arcadis report.

	proposed option is the most cost beneficial and best value for customers.	
	The company does not provide a clear explanation of the optioneering process and the rationale for the selection of the option.	Additional explanation and rationale is provided by the Arcadis report.
Cost efficiency	The company states that it has received third party assurance. However, there is no evidence of this or how this assurance applies to this enhancement case.	PRT07.04 was subject to third-party assurance by Jacobs and Board assurance as described on page 16 of PRT07.04. The Arcadis report provides additional third-party assurance.
	The company states that third party engineering contractors have been used to generate cost estimates. However, the company does not provide evidence of the working of these contractors.	The Arcadis report provides additional third-party costing and recommends sharing of the previous engineering contractors cost estimates with Ofwat.
Customer protection		No comments

E. Business plan tables impacted

None. The review of our business case by Arcadis addresses Ofwat's challenges and supports the costs included in our October Business Plan. These costs are included in Table CW3.120.

F. Supporting documents

PRT EA 04 Service Reservoir Project Review

PRT EA 05 Investment Option and Valuation in Copperleaf – Enhancement Cases

6. LEAD STRATEGY ENHANCEMENT

A. What is the issue?

Our Business Plan included an amount of £2.000m in respect of the enhancement element of our lead strategy. Our programme was focused on replacement of all lead pipes supplying schools and nurseries in our area, with a target of delivering full solutions for 60 schools over the period.

In the Draft Determination Ofwat has included an allowance of just £0.167m (8% of the required sum). Ofwat's cost allowances are derived from simple unit cost models which reflect the average cost of household communication pipes, external supply pipes and internal supply pipes.

We do not believe Ofwat has properly taken account of the nature of our lead programme, which is described in PRT07.07 Lead Strategy Implementation.

Ofwat's models take no account of the fact that all our targeted properties are educational institutions for which the replacement costs will be significantly higher than is represented in Ofwat's models.

Ofwat's modelling also assumes that we will not replace any communication pipes that we identify, which is not consistent with our strategy. Where lead communication pipes are identified, we will replace these.

Finally, Ofwat take no account of the additional costs that we will incur in connection with the need to consult extensively with local authorities and governing bodies and the legal costs associated with negotiating agreements with these parties. We will also incur significantly higher project and programme management costs than would be associated with a programme of household repairs.

B. Our proposed remedy

Ofwat's lead enhancement model fails to take proper account of the nature of our lead replacement programme, which is focused on schools and other educational institutions, not households.

To properly assess the programme Ofwat should carry out a deep dive of our case for the Final Determination.

C. Supporting evidence

To help with the carrying out of a deep dive into our lead programme, below we provide a recap of the nature of our programme and hence why Ofwat's household model is not suitable to assess it. We also provide more details of the costs that make up our programme and how these have been estimated, to facilitate the deep dive. This additional information should be read in conjunction with our Business Plan appendix PRT07.07 Lead Strategy Implementation.

Our lead strategy for AMP8 and beyond

The removal of lead pipes from the water supply system is a key long-term objective for the whole water sector, including Portsmouth Water. The removal of all lead pipe by 2050 is one of the key elements of our Long Term Delivery Strategy. It is estimated that we have more than 80,000 properties in our supply area with lead pipes. Therefore, the costs of meeting this long-term goal are high – we estimate total costs in the region of £240m.

Within our Business Plan we considered three options for increasing the level of investment in lead pipe replacement in AMP8, as well as an option to continue the current strategy. The three options considered were:

Option 1 - The replacement of all customer and Portsmouth Water owned lead pipework.

Option 2 - The replacement of Portsmouth Water owned lead pipework (only).

Option 3 – Replacing Portsmouth Water and Customer owned lead pipe at schools and nurseries, since these represent a cohort of customers who are particularly vulnerable to lead in their pipework.

Based on affordability, customer support and deliverability considerations, Option 3, the targeting of the most vulnerable customers in schools and nurseries, was taken forward.

Our Business Plan scheme would involve the replacement of all pipework at these properties, including (where found) lead communication pipes and external and internal supply pipes.

While we believe this is the best option, and is supported by our customers, clearly working in schools and nurseries is hugely more complex and costly than replacing domestic lead pipes, including the need for carrying out work either at weekends or during school holidays and the need for significant liaison with both the local education authority, and school governing bodies as well as ensuring appropriate communications with parents.

A key part of our proposals will also be the need to carry out desktop studies and surveys to ensure that we are targeting the right premises to maximise the benefits of the programme.

The degree of variation between settings is also likely to be significant, with no two projects being similar and each carrying a high degree of risk, in relation to the extent of the replacement work required and the additional challenges of working in a school environment.

Arguably we have selected the most challenging and costly installations for AMP8, but we believe this is the right thing to do to maximise the benefits of a constrained budget.

This is wholly different from a programme of replacing domestic lead pipes, which are shorter, more homogeneous, less uncertain and do not require extensive communications and liaison with local authorities and other bodies.

Ofwat's cost models reflect the different costs associated with replacing lead communication pipes, external and internal supply pipes. But Ofwat has not collected any data that distinguishes between household and non-household pipe replacement, so the costs represented in the model will be dominated by household installations which are not appropriate to set the cost allowances for the schools and nurseries which make up the whole of our programme.

As we show in our own business case, the estimated direct installation costs for schools and nurseries are materially higher than for households.

Table 1: Comparative unit costs for households and schools/nurseries

	2022-23 prices
Household unit cost (communication pipe only)	£1,750
Household unit cost (all lead pipes)	£3,000
Estimated schools/nurseries unit cost	£9,000

Source: PRT07.07, Lead Strategy Implementation

Regulatory support for our strategy

Our lead strategy for AMP8 is supported by the Drinking Water Inspectorate (DWI). A copy of the DWI's letter of support is available here **Portsmouth Water Limited – AMP8 Lead Strategy - Drinking Water Inspectorate (dwi.gov.uk)**.

Costing of our lead strategy

In our Business Plan we provided a breakdown of the costs associated with our lead strategy. This breakdown is shown in Table 2 below. Further details of each line item are provided below to assist Ofwat with its deep dive of our case.

Table 2: Cost summary for our lead strategy implementation

Component	AMP8 totex (£m)
Project and programme management	0.650
Communications	0.350
Desktop study, surveys and GIS updates	0.172
Consultation/Agreements/legal fees with schools including governing bodies	0.170
Universal remediation contract (60 schools/nurseries)	0.540
Risk and contingency	0.188
PWL overhead and management fee	0.282
Subtotal	**2.353**
Internal efficiency challenge	(0.353)
Total	**2.000**

Source: PRT07.07, Lead Strategy Implementation

Project and programme management

Costs for project and programme management have been built from an assessment of the required personnel to deliver a complex programme of this nature. We assume a Programme Manager for 30 hours per week over five years, along with a QS and Governance Lead, each for 10 hours per week over five years, a Project Planner for four years for 10 hours per week and six months of procurement input at 10 hours per week.

Communications

For communications we assume a single PR Lead working over the five years of the programme at 30 hours per week. We also include costs for publications, PR activity and liaison with public health bodies, each at £50k over five years and a further £40k for leaflet production and DWI report production.

Desktop study, surveys and GIS updates

We assume £80k for desktop studies from a body such as WRc, and £50k of contractor costs for validation of desktop studies. We also include 7.5 hours a week of GIS technician time over the five years of the programme

Consultation/Agreements/legal fees with schools including governing bodies

Production of legal agreements is estimated to cost £2.5k per school premise, for 60 premises, with an additional £18k provided for negotiation and formalising of agreements.

Universal remediation contract (60 schools/nurseries)

The remediation contract is based on a unit cost of £9k per property and 60 properties. The assumed unit cost is based on a multiple of three times the typical cost for domestic premises, reflecting the significantly greater length of pipe and complexity of working arrangements.

Risk and contingency

A contingency of 5% is provided to allow for more than 60 premises being identified and 'warranty' repairs; a 4.5% risk allowance is included to reflect the significant uncertainty and variability around unit rates.

PWL overhead and management fee

A 14% overhead allocation is provided to allow for the recharge of costs of our water quality specialists and additional sampling costs, as well as a share of corporate overheads.

Internal efficiency challenge

As described in PRT09 Delivering Value for Money, to address customer concerns about affordability and Ofwat's clear direction that we should show ambition in our plan, we applied at least a 15% efficiency to all our enhancement expenditure, with a larger stretch of 20% on some of our larger programmes. The efficiency stretch applied to our lead programme equates to 15%, with costs being rounded down very slightly to £2.0m.

D. Conclusion

We have an ambition to remove all lead pipes from the water supply system in our region by 2050 at the latest. For AMP8, recognising the significant pressure on customer bills and in line with our Long Term Delivery Strategy, we will begin by targeting the highest priority customers for lead pipe replacement, with the removal of all lead pipes at 60 schools and nurseries and nurseries in our region.

Targeting schools and nurseries first will deliver the greatest benefit for the most vulnerable of our customers but represents a significant delivery challenge. It will require extensive stakeholder engagement, working closely with the Local Education Authority, school governing bodies and parents. It will also present challenges in terms of the having to complete the work outside of school hours and will require significant work to ensure that all lead pipes are removed – from communication pipe to internal supply pipes – with significant lengths needing to be replaced in many instances.

Because of the complex nature of our programme, which cannot be captured simply by considering the number of lead pipes replaced, Ofwat's modelling approach is clearly unsuitable for assessing our programme.

We therefore propose that Ofwat should carry out a deep dive to properly assess our AMP8 lead programme. Details of our programme are set out in our Business Plan in PRT07.07 Lead Strategy Implementation provides details of our plan, and we provide further information regarding the nature and derivation of the costs included in our plan to assist Ofwat in carrying out a deep dive.

E. Business plan tables impacted

None. We believe our Business Plan costs remain appropriate and that Ofwat should review them via a deep dive.

7. RETAIL COST MODELLING

A. What is the issue?

Ofwat has set a residential retail cost allowance for Portsmouth Water of £28.4m (pre frontier shift and RPEs). While Ofwat's allowances (on a post-Frontier shift basis) are broadly in line with our Business Plan costs, we consider that Ofwat's retail cost modelling materially underestimates the efficient costs for Portsmouth Water. We have worked with Frontier Economics to assess the modelling and conclude that this is because:

- The top-down model is a biased predictor for Portsmouth Water due, we believe, to a missing variable (proportion of dual household customers) and an excessive co-efficient on average bill size.
- To compound this, when calculating allowances, Ofwat places significantly more weight on this top-down model (75%) than its bottom-up models (25%).

As our average bill size is significantly lower from other companies, this means that the top-down models materially underestimates our costs compared to the bottom-up estimates.

The refinements that Ofwat intends to make for the Final Determination are unlikely to address the omitted variable bias, as they are focussed on correcting the potential inconsistency in price basis and finding a better proxy of revenue at risk.

B. Our proposed remedy

For the Final Determination, Ofwat needs to ensure that it does not unduly reduce Portsmouth Water's residential retail cost allowance because of a poor statistical model and Portsmouth Water being an outlier in having the lowest average bill in the industry.

One pragmatic remedy, to reduce the bias, is to apply a 50:50 set of weights for the bottom-up and top-down models, which recognises the limitations of both modelling approaches.

At the same time, we recognise that the problem we have identified is not impacting on all companies equally and has by far the most material effect on Portsmouth Water. Should Ofwat conclude that its current approach remains appropriate for the industry an alternative remedy would be to apply a specific adjustment to our allowance to reflect the fact that the top-down models do not work for us.

C. Supporting evidence

Introduction

At the Draft Determination, Ofwat set Portsmouth Water's base cost allowance for Residential Retail equal to £28.4m (pre frontier shift and RPEs). The allowance is calculated as the weighted average of a set of top-down and bottom-up models with a catch-up efficiency challenge applied to it.

- Four top-down econometric models of total residential retail costs (75% weighting).
- Two bottom-up econometric models of bad debt costs and two models of other costs, (25% weighting).

The approach used to set the PR24 allowance is similar to PR19.

Table 1 below compares the predicted costs from the bottom-up and top-down models used at PR19 and PR24 (before the catch-up efficiency challenge is applied). As can be seen Portsmouth Water's PR24 top-down costs are 16% lower than the bottom-up predicted costs. This is a considerably larger difference than at PR19 (6%) and compared to other companies (the average difference is 2% at PR19 and -5% at PR24. For most companies the top-down prediction is higher than the bottom-up. The only other exception is South Staffs Water (SSC) and in that case the difference is 1%.

It is clear therefore that we are an outlier in terms of the top-down models. We have reviewed Ofwat's approach to investigate the possible reasons behind this discrepancy.

Table 1: Comparison of predicted costs from bottom-up and top-down models – PR19 vs PR24

	Bottom up	Top down	Difference	Bottom up	Top down	Difference
PRT	**26**	**25**	**6%**	**35**	**30**	**16%**
Average (excluding PRT)			**2%**			**-5%**
SSC	73	74	-1%	87	86	1%
SBB				274	278	-1%
AFW	168	168	0%	181	184	-2%
ANH	496	470	5%	567	582	-2%
NES	294	297	-1%	366	376	-3%
TMS	900	889	1%	1,140	1,177	-3%
SVE	605	575	5%	804	840	-4%
HDD	18	17	5%	16	17	-5%
NWT	579	556	4%	705	745	-5%
SRN	315	308	3%	393	416	-6%
WSX	173	168	3%	220	235	-6%
SEW	111	102	9%	116	124	-6%
YKY	391	377	4%	472	505	-7%
WSH	242	239	1%	308	337	-8%
SES	33	33	2%	40	45	-12%
SWB	171	165	3%			
BRL	60	60	-1%			
DVW	13	13	-1%			

Source: Based on data reported in https://www.ofwat.gov.uk/wp-content/uploads/2019/12/FM_RR4_FD.xlsx and https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-Base-costs-residential-retail-3.xlsx

Note: Values reflect pre-catch up modelled allowances N/A indicate change in company ownership structures

Ofwat's approach at PR24

Ofwat's Draft Determination approach calculates modelled retail allowances as a weighted average of predicted costs from eight different models; four 'top-down' models and four 'bottom-up' models. 75% weighting is given to top-down and 25% bottom-up.

The four top-down models each individually estimate 'total retail unit costs' (dependent variable) based on:

- average bill size (across all models);
- log number of households (two models); and
- two alternating measures of income deprivation (across all models).

Covid dummy variables are included in 2020 and 2021. The predicted unit costs from each model are multiplied by number of households and the results are (simple) averaged.

Of the four bottom-up models, two estimate 'bad debt' unit costs (dependent variable) and two estimate 'other' unit costs (dependent variable) – which are summed together in two pairs to give two bottom-up estimates of total costs which are then (simple) averaged.

The bad debt models are based on:

- average bill size (both models); and
- two alternating measures of income deprivation with Covid dummies.

Of the two other costs models, one model only includes a dummy variable for dual households (i.e. a univariate model) while the other includes both dual household dummy and log number of households.

Assessment of the modelling approach

In our assessment we conclude that the discrepancy in the bottom-up and top-down allowances at PR24, for Portsmouth Water, is likely due to a combination of three factors:

- **The PR24 and PR19 top-down models do not capture well the relationship between bad debt costs and revenue at risk**. This is because the coefficient of average bill size (used as a proxy of revenue at risk) is biased. This is due to the fact that 'proportion of dual households', which drives 'other retail costs', is excluded from the model and it is highly correlated with average bill size. This causes 'omitted variable bias', which prevents the coefficient from being estimated accurately.
- **The poor relationship seems to affect Portsmouth Water more compared to other companies**. This is likely because we have a materially lower average bill size. Ofwat also places more weight on this biased relationship, which amplifies its impact.
- **The PR24 top-down (and bad debt bottom-up) models might not be as good as the PR19 models to estimate the relationship between costs and cost drivers**. For example, we note an increase in volatility in average bill size in the years included in the PR24 models.

The sections below provide more details.

The PR24 top-down models are biased

Ofwat's top-down models suffer from omitted variable bias. Omitted variable bias occurs when an explanatory variable of costs which is correlated with other cost drivers in the model is omitted. As a result, the regression model attributes the effect of the omitted variable to those that are included.

The omitted variable is 'proportion of dual households'. This variable is:

- An important explanatory variable of costs. Proportion of dual household explains 'other retail costs', which accounts for about half[12] of all residential retail costs. Ofwat includes it in the bottom-up models of 'other retail costs' and finds it to be statistically significant.
- Correlated with average bill size, as stated by Ofwat itself in the PR24 Draft Determination base cost modelling decision appendix.[13]

As a result, the other variables included in the model will capture the effect of the omitted variable. This effect is different for the different companies in the sample, as the proportion of dual households is 0% for the water only companies and varies for the other companies. However, this biased specification implicitly assumes that the impact is the same across the companies.

The poor relationship affects Portsmouth Water more compared to other companies

We have the smallest average bill size across all companies. We have carried out a sensitivity analysis to assess the impact that average bill size has on the difference between bottom-up and top-down model predictions. The analysis consisted of increasing our forecast of average bill size.

We find that inflating our average bill size over the period 2024-25 to 2029-30 significantly narrows the gap between bottom-up and top-down modelled allowances for Portsmouth Water by increasing the top-down cost estimates by proportionately more than bottom-up estimates. We increased the average bill size to be equal to the next lowest in the sample (an average increase in bill size of about 41%). This increased the predicted costs under both sets of models but importantly the difference between the top-down and the bottom-up closed to 4%, much closer to the differentials observed for other companies.

We conclude that the biased top-down models estimated by Ofwat do not capture very well the relationship between costs and cost drivers for Portsmouth Water with a very low average bill size.

One possible solution to this is to include a cost driver from the bottom-up models for 'other costs' in the top-down models – in particular, 'proportion of dual households'. However, doing so results in coefficients with the wrong sign, consistent with Ofwat's findings. In this model, it is likely that the average bill size coefficient is overestimated and the proportion of dual household coefficient is underestimated.

D. Conclusion

The Draft Determination allowance for residential retail costs does not reflect the true efficient level of costs for Portsmouth Water. Our assessment shows that this is primarily due to a weakness in Ofwat's cost modelling and, in particular, the top-down models that have a biased co-efficient on average bill size. This specifically penalises Portsmouth Water as our average bill size is materially lower than any other company.

In the Draft Determination Ofwat has signalled that it intends to revisit the Residential Retail cost models for the Final Determination, by:

- Adjusting the data for potential inconsistencies in price bases.
- Attempting to resolve circularity with the average bill size.
- Considering whether to apply a more stringent efficiency challenge.

[12] Industry average
[13] See Ofwat's PR24 DD base cost modelling decision appendix. *"We do not include the proportion of dual customers in our bad debt cost models or total retail costs models. This is due to the high correlation with average bill size".* ***https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-draft-determinations-Expenditure-allowances-Base-cost-modelling-decision-appendix.pdf***

Our concern is that the changes that Ofwat has signalled for the Final Determination are unlikely to correct for the variable bias issue on average bill size.

Therefore, it is vital that Ofwat addresses the weakness in the current modelling, that the top-down models are not as good as the bottom-up models at forecasting efficient costs, specifically for Portsmouth Water. One pragmatic remedy would be apply a lower weight on the top-down models and use 50:50 weighting rather than 75:25.

At the same time, we recognise that the problem we have identified is not impacting on all companies equally and has by far the most material effect on Portsmouth Water. Should Ofwat conclude that its current approach remains appropriate for the industry, an alternative remedy would be to apply a specific adjustment to our allowance to reflect the fact that the top-down models do not work for us.

E. Business plan tables impacted

None. The representation relates only to Ofwat's modelling approach.

8. METER REPLACEMENT ADJUSTMENT

A. What is the issue?

In the Draft Determination Ofwat recognises that most companies will be replacing significantly more meters in AMP8 than is implicitly funded by the base cost models. It therefore makes an adjustment for the difference between the number of meters implicitly funded and the proposed level of replacements in AMP8. We agree with the approach that Ofwat has taken to assessing the level of implicit funding and hence the calculation of the gross uplift required.

However, Ofwat has clawed back a significant proportion of this meter replacement uplift on the premise of "holding companies to account for the delivery of forecast meter replacements included in PR19 business plans."

The PR19 Final Determination did not specify any deliverables in relation to meter replacement. This adjustment amounts to imposing a retrospective change to the terms of the PR19 Final Determination, which does not align with what we accepted.

Furthermore, Ofwat's approach is internally inconsistent and illogical, as it 'claws back' more funding than Ofwat's own calculation of the implicit allowance included within Botex.

B. Our proposed remedy

Ofwat's adjustment in relation to meter replacement is both unwarranted and internally inconsistent. For the Final Determination Ofwat should remove this adjustment and allow the full uplift to base cost allowances that is has calculated.

C. Supporting evidence

Meter replacement adjustment

We welcome Ofwat's recognition that an adjustment to the base cost allowance is required to account for higher levels of meter replacement in AMP8 than historically. As noted above, we originally included costs associated with both meter replacement and upgrade of meters to smart devices within our Enhancement business case. Ofwat's Draft Determination makes clear that costs associated with replacing meters should be allocated to Base, with only the differential between a basic and smart meter being included as Enhancement costs. We have therefore reallocated £8.8m from our Enhancement business case into Base.

However, Ofwat has applied a downward adjustment on the basis of a comparison of meter replacement numbers included in our PR19 Business Plan with those actually delivered.

The impact of this clawback for Portsmouth Water is shown in Table 1 below.

Table 1: 'Clawback' of PR19 meter replacement costs

Left column title is left aligned	Household (£m)	Non-household (£m)	TOTAL (£m)
Meter replacement uplift	6.068	0.723	6.791
Adjustment for PR19 "under-delivery"	(1.565)	(1.579)	(3.144)
Net unfunded replacements	4.503	(1.579)	(3.647)

Source: Portsmouth Water analysis of Ofwat Draft Determination

This adjustment is incorrect for two reasons:

- Applying a PR19 adjustment amounts to retrospective regulation as the PR19 which we accepted did not include a specific deliverable in relation to meter replacements.
- Ofwat's adjustment is internally inconsistent as the amount of the 'clawback' far exceeds Ofwat's own view of the implicit allowance included within Base costs.

Retrospective regulation

Ofwat states that the adjustment is required to prevent customers from "paying twice for meter replacement". We agree that in cases where specific projects are funded and specified as part of a Final Determination companies should be held accountable for delivery, and customers should not pay again for a specific project that has already been funded.

That is not the case here, however. There was no explicit funding provided for meter replacement at PR19, nor were any specific deliverables in respects of meter replacement set out in the PR19 Final Determination. We have reviewed Portsmouth Water's Final Determination and there is no reference at all to meter replacement.

Ofwat's adjustment instead relies on its view that meter replacement is implicitly funded within the overall base cost allowance. Base cost allowances are set by Ofwat to cover costs "which companies incur in the normal running of the business to provide a base level of service to customers". Within this overall allowance companies are free to prioritise how they best use those base cost allowances to provide that base level of service. Within an AMP there will be competing cost pressures and companies will constantly re-prioritise how they deliver these services.

If it was Ofwat's intention at PR19 that all companies should deliver the exact number or meter replacements set out in their PR19 Business Plans, it could have included a Performance Commitment or price control deliverable as part of the Final Determination. Given that Ofwat did not do so it is reasonable for companies to assume that they have flexibility to deliver, subject to meeting their performance commitments and other specified deliverables and their over-arching duty to maintain services to customers.

To retrospectively hypothecate a part of the base cost allowance for a specific purpose that was never set out in the PR19 Final Determination amounts to rewriting the terms of the PR19 Final Determination in a way that is unreasonable Ofwat has not done for any other base cost category.

Internal inconsistency

In addition to the adjustment being wrong in principle, Ofwat's calculation of the clawback for Portsmouth Water is also internally inconsistent and illogical.

As shown in Table 2 below, Ofwat's calculation of the implicit funding included within base cost allowances for meter replacement is £1.999m for Portsmouth Water. This is based on the average rate of meter replacement over the period 2011-12 to 2022-23, and Ofwat uses this implicit allowance to calculate the uplift required for the higher rate of meter replacement required in AMP8.

Table 2: Under-delivery adjustment compared with implicit allowances

	Household (£m)	Non-household (£m)	TOTAL (£m)
Ofwat calculation of implicit allowance (PR24)	1.777	0.723	1.999
Adjustment for PR19 "under-delivery"	(1.565)	(1.579)	(3.144)

Source: Portsmouth Water analysis of Ofwat Draft Determination

However, as the table clearly shows, Ofwat has applied a 'clawback' which far exceeds the amount that was implicitly funded in the PR19 base cost allowance. It is clearly illogical to apply a clawback of prior funding that is so much higher than the amount funded in the first place.

D. Conclusion

Ofwat's recognition that an adjustment to base cost allowances is required to account for higher rates of meter replacement in AMP8 is welcome. However, Ofwat has clawed back a significant proportion of the uplift for Portsmouth Water on the basis of "under-delivery" of meter replacements during the current period.

This adjustment is incorrect for two reasons: first, it amounts to a retrospective change to the terms of the PR19 Final Determination, which did not include any specific deliverables in relation to meter replacement; second, Ofwat's calculation is internally inconsistent and illogical, in that the value of the clawback exceeds Ofwat's own calculation of the implicit funding in base.

For the Final Determination Ofwat should revisit its decision to retrospectively set a PR19 deliverable for the level of meter replacement. If it does retain an adjustment for the Final Determination it needs to be proportionate and internally coherent, such that the clawback does not exceed the level of implicit funding provided at PR19.

E. Business plan tables impacted

Table CW2 has been adjusted to include an additional £6.8m of base expenditure in relation to meter replacement. This is the full value of the adjustment calculated by Ofwat, before the adjustment for PR19 "under-delivery".

The equivalent amount has been removed from the smart metering costs included in Table CW3.

9. BUSINESS RATES

A. What is the issue?

Business rates payable by all water companies are subject to a revaluation in 2026, the first year of AMP8, and a further revaluation in 2029.

Ofwat has not included any adjustment to the cost allowance for business rates in its Draft Determination but has provided for a 90:10 cost sharing arrangement for business rates (i.e. 90% of any cost increase will be recoverable from customers, and vice versa for any reduction).

We have taken advice from a business rates consultant, who has confirmed that, subject to any unanticipated changes in methodology, the business rates payable by all water companies are certain to increase as a result of the 2026 revaluation.

Ofwat's proposed approach in the Draft Determination creates two issues.

(i) With no adjustment until PR29, companies will bear the cashflow risk on a material item of expenditure for a significant proportion of the AMP8 period, eroding financial resilience.

(ii) Allowing only 90% of a cost that is certain to increase, amounts to an unjustified additional efficiency challenge on companies.

B. Our proposed remedy

There are two potential remedies that Ofwat could apply in the Final Determination to address the issues set out above. It could allow for an increase based on its best estimate, with a true-up mechanism for PR29, or it could allow for full recognition of the additional business rates costs in the PR29 true-up (rather than allowing only 90%).

While the preferred mechanism is recognition of likely additional costs in the Final Determination, we recognise that there is a significant degree of uncertainty associated with the precise magnitude of any increase. We would therefore propose that:

(a) Ofwat allows for full recognition of business rates increases (i.e. a 100% sharing rate), subject to companies being able to demonstrate that they have appropriately challenged the revaluation.

(b) Ofwat specify business rates as a Notified Item for PR24, so that if any increases are of a sufficient magnitude, either alone or in combination with other relevant changes of circumstance, they can be adjusted for via an Interim Determination of K.

C. Supporting evidence

The Central Rating Lists, published by the Valuation Office Agency (VOA), contain the rating assessments of the network property of major transport, utility and telecommunications undertakings and cross-country pipelines, including water utilities. The Valuation Office Agency (VOA) last updated the Central Rating List for England in 2023. Central Rating List for England (publishing.service.gov.uk)

Previously the rating lists have been subject to revaluation on a five-year basis. However, the Non-Domestic Rating Act 2023, reduced the revaluation cycle for business rates in England from five years to three years. This means that the next revaluation is required in 2026, with a second revaluation within the period of AMP8, in 2029. This three-year revaluation timetable is enshrined in primary legislation, so there is a high degree of certainty that a revaluation will be required in 2026.

For most properties, the methodology adopted by the VOA for valuations reflects the market rental value for the property. In the case of water undertakers there is no clear basis for determining the market rental value. The VOA therefore uses a proxy for determining the rent that would be paid by a hypothetical tenant, using a methodology known as Receipts and Expenditure Method (R&E).

The R&E methodology seeks to determine the 'divisible balance', which is the amount to be split between the hypothetical landlord and tenant, by deducting expenses from the gross profit. While the R&E methodology is relatively complex and makes a large number of assumptions, fundamentally, the key determinants of rateable value for water undertakers are the allowed return on capital and the capital base on which this return is earned.

It is clear that in both cases, the PR24 final determination will result in an increase in both the RCV and the allowed return (as compared to that allowed at PR19) which is reflected in the current ratings). To confirm our view that, absent a fundamental shift in approach, the 2026 revaluation would result in an inevitable increase in the Rateable Value and hence business rates payable for AMP8, we asked Jones Lang LaSalle (JLL) to review our Draft Determination to help estimate the potential impact. Their analysis confirmed that:

> *A combination of higher infra-structure and enhancement expenditure in AMP8 to meet the changing pressures on the water industry, together with the higher rates of return as interest rates are no longer at historic lows, means that the rateable values for 2026 are going to be much higher than for 2023. As the emphasis of Ofwat changes from keeping water bills low to one where environmental expectations and climatic changes are driving the need for more resilience and therefore investment in the industry, this trend will affect the 2026 rateable values and continue through to the rating revaluation in 2029 (which is also within the same AMP). The method of valuation used for rating means that essentially the rateable value moves in line with the investment return on the RCV. So high rates of investment in the industry throughout AMP8, unless matched by an increase in the PAYG ratio, inevitably leads to an increase in rateable value.*
>
> *Within the parameters of rating law and valuation practice, there is little scope for the water companies to reduce this effect by appealing their rateable values. Since the water industry has been valued for business rates on a commercial basis, the method of valuation substantially has been agreed, with little room for radical changes that would be needed to alleviate the higher costs for 2026 and 2029.*
>
> *For Portsmouth Water, unless substantial transitional phasing is introduced for the 2026 rating revaluation, we are predicting that in 2026-27 something like 13% of customers water bills will be a direct pass-through to the Treasury through business rates.*

The certainty of an increase resulting from the 2026 revaluation makes this price review different from previous ones, where there was uncertainty over the impact of revaluations, including whether they would result in material increases in valuations. Given the near certainty of an increase in business rates payable from 2026, we do not think that Ofwat's Draft Determination policy of providing a true-up of 90% of the value at PR29 is reasonable.

It will mean that the financial headroom that the sector has, is materially eroded by carrying these additional costs, and disallowing at 10% of a legitimately incurred cost, over which Ofwat has historically recognised we have little control[14], amounts to an unwarranted additional efficiency challenge.

While ideally Ofwat would address both these issues at the Final Determination we do recognise that estimation of the likely impact on the business rates payable by all companies, for inclusion in the Final Determination is likely to be very challenging. We therefore believe Ofwat, as a minimum should allow for full recognition of increases in business rates via a 100% sharing rate.

We understand that Ofwat has proposed 90% to ensure that companies retain an incentive to challenge any revaluations, where appropriate. Given the materiality of these costs, and the fact that companies will have to manage the cashflow risk for four full years, our view is that companies already have a strong incentive to challenge the VOA. However, it would be reasonable for Ofwat to require companies, in order to secure full recognition of these costs, to demonstrate that they have taken appropriate advice and challenged the revaluation where this is required.

Furthermore, given that the revaluation is known about, but the magnitude of any impact is difficult to predict, we propose that Ofwat specify business rates as a Notified Item for PR24, so that if any increases are of a sufficient magnitude, either alone or in combination with other relevant changes of circumstance, they can be adjusted for via an Interim Determination of K. This aligns with the approach that Ofwat took at PR14 and addresses the risk that companies' financial resilience could be substantially impacted by a very material increase in business rates.

D. Conclusion

Rating revaluations of water undertakers will take place in 2026 and 2029, and the impact of these revaluations is a near-certain and potentially material increase in the business rates payable by all companies. In its Draft Determinations, Ofwat has provided for a true-up of 90% of the costs of any increase at PR29.

This results in companies bearing both a significant cashflow risk for four years (from 2026) and disallowing 10% of any increase imposes an unwarranted additional efficiency challenge on companies.

Our expert advice has confirmed that an increase in valuations for water undertakers, and consequently business rates payable, is inevitable as a result of the 2026 revaluation. This is largely a mechanical consequence of the increase in allowed returns for AMP8 and the significant growth in RCV over the period.

While including a forecast of the increase in business rates in the Final Determination would be preferable, we recognise the challenges with forecasting the precise level of any increase. We therefore propose that Ofwat should:

(a) Allow full recognition of business rates increases (i.e. a 100% sharing rate), subject to companies being able to demonstrate that they have appropriately challenged the revaluation.

(b) Specify business rates as a Notified Item for PR24.

E. Business plan tables impacted

None. We have not amended the business rates forecast in our plan.

[14] In the PR19 final determination Ofwat said: "…we recognise that companies have limited control over the level of business rates and the effect of revaluations", pg.45, PR19 final determinations, Securing cost efficiency

10. ACCELERATED INFRASTRUCTURE INVESTMENT: COST PROFILE

A. What is the issue?

In October 2022, the Department of Environment, Food and Rural Affairs (Defra) launched the Accelerated Infrastructure Delivery Project. This was partly in recognition of the significant level of projected investment required in the sector over the next regulatory period, and concerns over deliverability, as well as part of a wider effort to kick-start the post-Covid economy.

As part of this initiative Portsmouth Water submitted proposals for three projects: acceleration of our smart metering programme; change of occupier metering; and, our Maindell/Slindon Drought scheme. The latter two were rejected, but the first, an acceleration of our smart metering programme, was accepted.

The forecast pre-AMP8 costs in 2023-24 and 2024-25 were £11.5m (2022-23 prices), which was split broadly evenly between early deployment of our meter data management and billing system, and establishment of the delivery programme, including all procurement activities.

In putting forward our proposals, we recognised that the overall programme costs would be subject to Ofwat's normal efficiency review as part of the price review, but the expectation of our investors in committing to this early expenditure was that it would be recognised in full at PR24 via an adjustment to the AMP8 opening RCV on 1 April 2025. In the Draft Determination Ofwat has only included £6.4m of our accelerated investment in the midnight adjustment, which does not align with our expectations in committing to the early spend.

B. Our proposed remedy

To align with our expectations in committing to early investment under the Accelerated Infrastructure Delivery Project, Ofwat should recognise the full value of the £11.5m investment in AMP7 in our PR24 RCV midnight adjustment. The balance of the efficient allowance should then be spread across the five years of AMP8, as per the Draft Determination.

C. Supporting evidence

As part of Defra's Accelerated Infrastructure Delivery Project, Ofwat allowed PR24 transition expenditure funding for accelerating investment in our AMP8 smart meter programme, which forms a key part of the optimal solution within our 2024 Water Resources Management Programme.

This accelerated investment was focused on the supporting infrastructure to enable the use of smart meters early in the 2025-30 period, including a new meter data management and billing system, as well as programme set up and procurement. Details of Ofwat's approval were set out in its decision document published in June 2023. A0-accelerated-process-final-decisions.pdf (ofwat.gov.uk)

The total value of the associated investment was £11.5m which we anticipated would be recognised in full at PR24 via a midnight adjustment to the RCV. However, Ofwat's Draft Determination only includes accelerated investment of £6.4m, as shown in Table 1 below.

Table 1: Accelerated Infrastructure Delivery Programme costs

Left column title is left aligned	2023-24	2024-25	AMP7 total
Accelerated Infrastructure Delivery Programme / Business plan (£m)	6.712	4.753	11.465
Draft Determination (£m)	3.763	2.665	6.427
Difference (£m)	2.949	2.088	5.038

Source: PR24_DD_W_Metering.xlsm, Ofwat

Since June 2023 we have made good progress and, at the time of writing, we have procured and installed a new meter data management and billing system and have transferred over 90% of our customers to the new platform and are well advanced with our procurement of our smart meter delivery contracts. Actual expenditure in 2023-24 was £4.5m and we are forecasting to spend the remainder of the £11.5m in 2024-25.

Our shareholders were content to commit to and fund this early investment on the basis that the costs would be recognised at PR24. This is consistent with Ofwat's statements within its final decision document where it said the decisions: *"…provides companies **with certainty** that approved schemes would be funded through the transition expenditure programme at PR24".*

We recognised that expenditure across the whole programme would be subject to the normal efficiency assessment as part of the PR24 price review, but our expectation, given the clear statements in Ofwat's decision document, was that costs incurred in 2023-24 and 2024-25 would be recognised in full in the RCV midnight adjustment. Without such surety of expenditure recognition at the earliest opportunity, it would have been very difficult to commit to funding material expenditure ahead of PR24.

We very much welcomed the Defra initiative as a way of delivering early benefits for customers, providing a welcome boost to regional economies in the wake of the Covid-19 pandemic and enhancing the deliverability of AMP8 programmes. However, our clear expectation was that investment that was approved through the project would be fully recognised on 1 April 2025. We would therefore request that in the Final Determination Ofwat recognise the full £11.5m in our PR24 RCV midnight adjustment, with the balance of the efficient allowance spread across the five years of AMP8.

D. Conclusion

We welcomed the Defra initiative to bring forward vital investment in water resources into AMP7, delivering earlier benefits for customers and a much-needed economic boost. We were pleased that Ofwat and Defra recognised the value of the proposed acceleration of our smart metering investment as part of the project.

In making our proposals we understood that overall programme costs would be subject to Ofwat's normal efficiency scrutiny as part of the PR24 process but were of the clear understanding that costs approved under the scheme would be recognised at the earliest opportunity, via a midnight adjustment to the RCV from 1 April 2025.

We have made good progress with our programme acceleration and expect to deliver all the outcomes set out in our proposal, with outturn costs expected to be in line with our forecast of £11.5m. As part of its broader challenge of our smart metering programme costs, Ofwat's Draft Determination has allowed just £6.4m of this accelerated expenditure via the midnight adjustment.

This does not align with our expectations or those of our investors in committing to and funding the acceleration of our programme and, if maintained, would put at risk our ability to take part in any similar initiatives in future. For the Final Determination we therefore request that Ofwat recognise the full £11.5m in our PR24 RCV midnight adjustment.

E. Business plan tables impacted

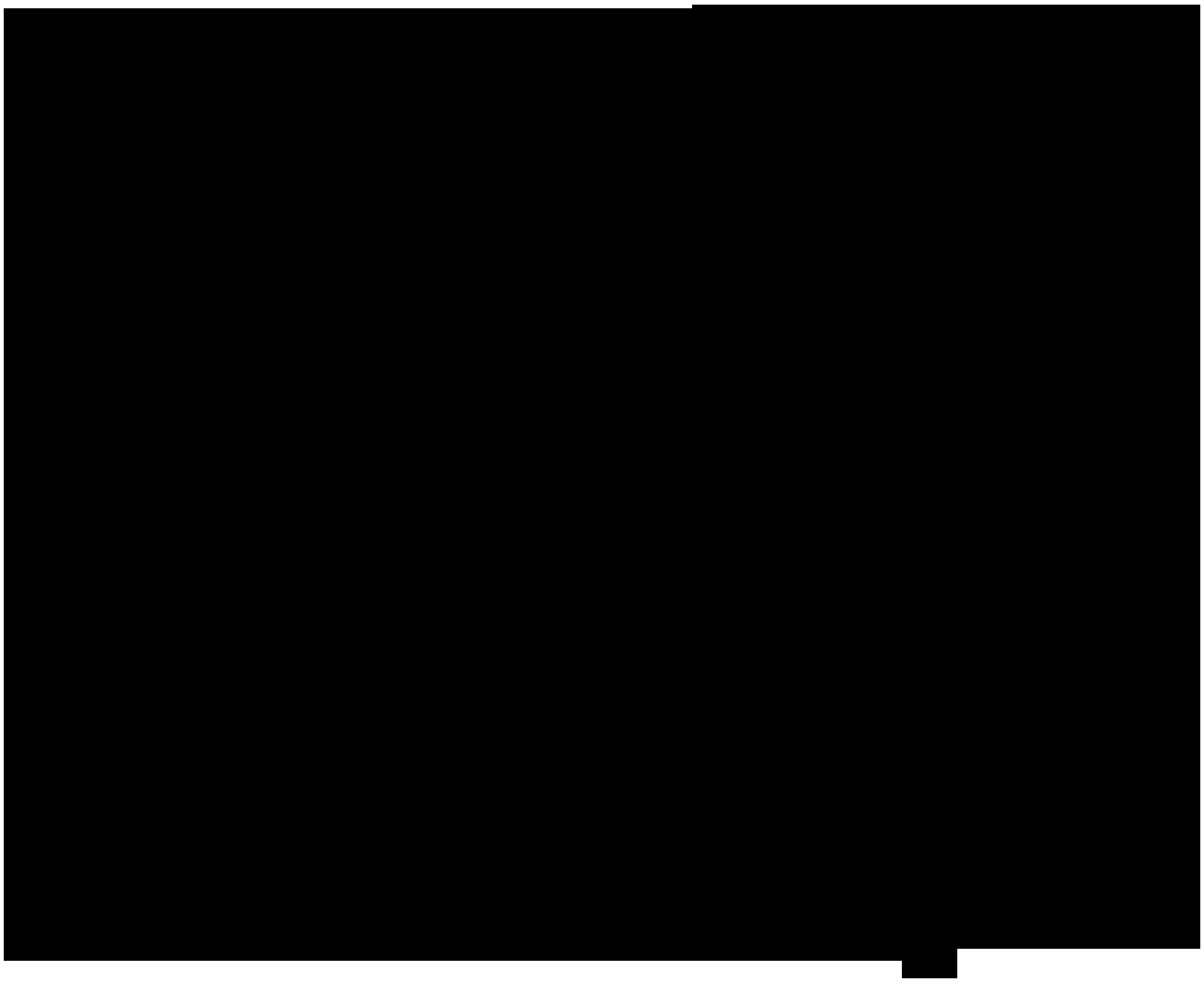
None.

SECTION 3

RESPONSE TO DRAFT DETERMINATION ACTIONS

RESPONSE TO DRAFT DETERMINATION ACTIONS

[redacted]



2. CLIMATE CHANGE RESILIENCE PROPOSALS

Overview

In the Draft Determination Ofwat has allowed additional funding for all companies to mitigate Climate Change risks. For Portsmouth Water an allowance of £1.3m has been made, subject to our setting out in our Draft Determination response how we would use this additional funding to improve our resilience to Climate Change.

In this document we outline the process and principles we followed to identify the schemes that represent the best value for the use of the additional uplift funding that has been proposed in the Draft Determination. We detail the schemes we have proposed and the outcomes they will deliver to improve our resilience to Climate Change to the benefit of customers.

To assess our vulnerability to Climate Change we have looked to be guided by the five-stage framework laid out in ISO14090:2019 “Adaptation to Climate Change”. ISO 14090:2019 is an international standard that provides principles, requirements, and guidelines for adapting to Climate Change.

In following this framework, we used both the high-level insights provided by the Government published Climate Change Risk Assessment 3 (CCRA3) and our own detailed Climate Change risk assessment completed by Arcadis in May 2023 to identify where we needed either a better understanding of risk across our business, a detailed understanding of risk at an individual site level or where ‘no-regret’ investment would provide tangible mitigation to a known risk straight away.

As a result of this work, we are proposing to use the additional uplift funding to deliver a programme consisting of:

- One study to increase our understanding of the Climate Change risks embedded in our wider supply chain and actions we might take to mitigate such risks.
- Two region-wide studies, making use of new groundwater models only recently available to us. One to better understand the risks of saline intrusion into our groundwater aquifers posed by rising sea levels. The other to revisit our current assessments, based on previous groundwater models, of the risk of groundwater flooding impacting our production assets, driven by changing rainfall patterns.
- Four detailed flood risk assessment and mitigation plans for our highest risk production assets. These will inform the next Long-Term Delivery Strategy (LTDS), provide fully costed engineering solutions, and suggest, within an adaptive planning framework, when implementation is likely to be required.
- Seven detailed site studies to provide options and costs to delivery power resilience and remote start or auto restarting schemes on those sites most vulnerable to the in-combination risks of power and transport network failures.

We will aim to deliver as many of these power resilience schemes as possible within AMP8. However, until the detailed studies have been done, we will not fully understand our ability to do this or the associated costs. To protect the best interests of our customers we are proposing that the associated monies are securely ringfenced by Portsmouth Water, and if we are unable to fully implement all four schemes, we will return any residual monies to customers. We will however use the information gained in the detailed studies to inform the LTDS and our Business Plan submission for PR29.

This work will provide the tangible outcomes of:

- Protecting us from risks that Climate Change may be introducing to our supply chain.
- Providing high confidence assessments of the risk posed to our current and future assets by groundwater flooding and saline intrusion because of sea level rise.
- Providing a clear investment plan to achieve power resilience and self-start capability to key production sites.

- And potentially provide the outcome of achieving power resilience and self-start capability at key production sites, whilst also decreasing potential health and safety risks to our production staff.

Our approach

ISO14090:2019

To assess our vulnerability to Climate Change we have been guided by the framework laid out in ISO14090:2019 “Adaptation to Climate Change”. This standard is designed to help organisations proactively manage the impacts of Climate Change and improve resilience to future climate-related challenges.

ISO 14090:2019 is an international standard that provides principles, requirements, and guidelines for adapting to Climate Change. It helps organisations integrate Climate Change adaptation into policies, strategies, plans, and activities. The key aspects of ISO 14090:2019 include:

Principles and Requirements: The standard identifies the principles and requirements for effective Climate Change adaptation, ensuring organisations can systematically address climate-related risks and opportunities.

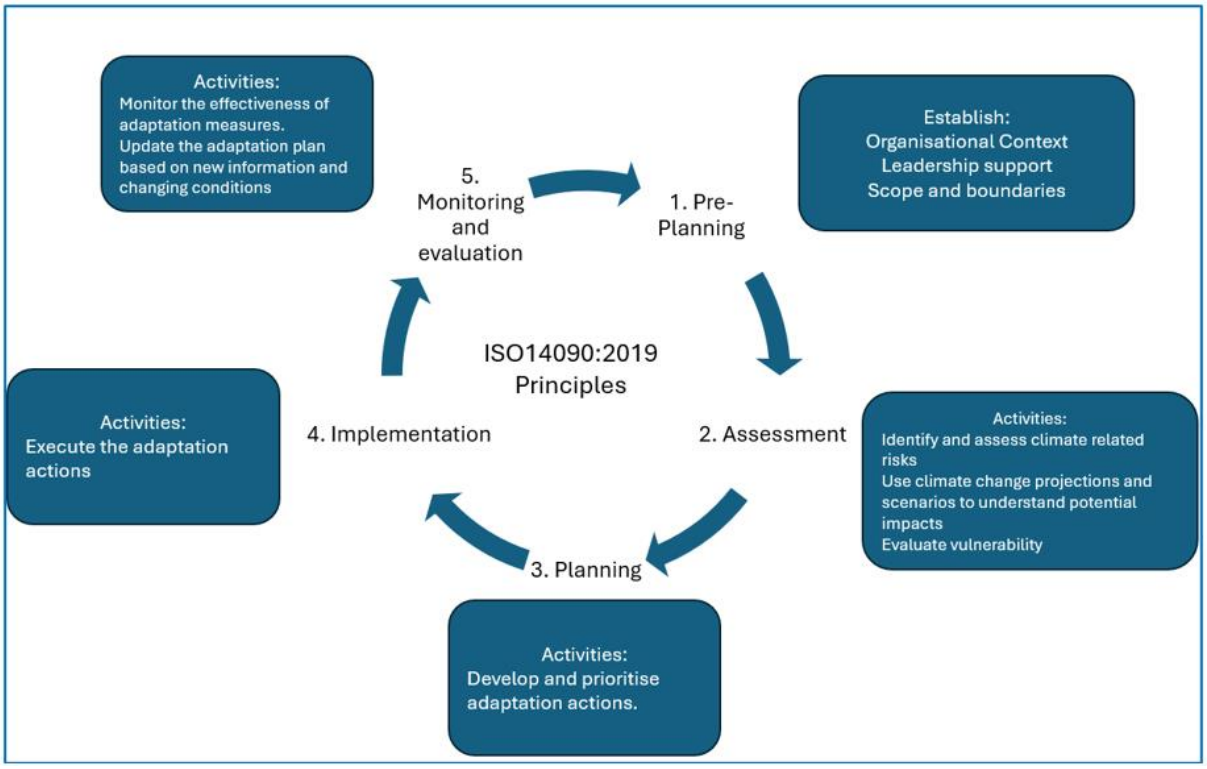
Guidelines: It offers guidelines on how to assess Climate Change impacts, understand uncertainties, and use this information to inform decision-making.

Applicability: The standard is applicable to any organisation, regardless of size, type, or nature, including businesses, government bodies, and non-profits.

Integration: It emphasises the integration of adaptation measures within or across organisations to enhance resilience and sustainability.

At the heart of ISO14090:2019 is a cyclical process as shown in Figure 1 below.

Figure 1: Overview of ISO14090:2019 process



Source: Portsmouth Water.

We have not been able to follow the exact processes in the standard at this point in time but have used the principles found within it to provide shape and a framework to our thinking. We intend to continue to mature our thinking in this space over the coming years and will continue to look to the International Standard to maintain the discipline around the work.

Process

Pre-planning

Our Vision, adopted in 2024, acknowledges Climate Change as a key factor.

"*Our vision, against the backdrop of climate change and population growth, is to provide an affordable, reliable and sustainable supply of high-quality water for our customers. By being smart in our approach we will work with our local communities to meet our goals while protecting and enhancing the environment for future generations*."

PW-Vision-Brochure-Interactive.v2.pdf (portsmouthwater.co.uk)

Furthermore, our Vision acknowledges our role in the drivers of Climate Change:

"*We need to reduce our emissions to meet net zero and help slow climate change.*"

And our Vision identifies the need for us to have a better understanding of the impact of Climate Change, identifying that one of our uncertainties is:

"*The extent to which climate change will impact our physical assets*"

The focus of Priority one in our Vision is to:

"*Secure sustainable water supplies for our customers*".

Our Vision also understands the external impacts of Climate Change on our environment and how that might affect our business, noting that:

"*Climate change and changes to land use could put sensitive environments, such as chalk streams, at risk*"

The Vision, adopted and supported by the Board and the Executive team, and supported by customers, establishes the commitment and mandate for Climate Change resilience work.

Assessment

National overview

Initially we assessed risk through the lens of the UK Climate Change Risk Assessment (CCRA3).

CCRA3 serves as a crucial document for understanding the potential impacts of Climate Change on the UK and outlines the steps the government is taking to prepare and adapt. It sets a clear direction for future policies and investments to build a resilient society in the face of climate-related challenges.

The water briefing arising from CCRA3 was particularly helpful to provide focus to our thinking.

Figure 2: UK Climate Change Risk Assessment Evidence report 2021

Source: UK Climate Risk

The water briefing summarises how the water sector has been assessed in the 2021 UK Climate Change Risk Assessment (CCRA) Technical Report, and what types of action to adapt to Climate Change risks and opportunities would be beneficial in the next five years.

The key messages from this report are:

1. Water infrastructure assets are at risk from increases in the **frequency and intensity of surface water and coastal flooding**.
2. Water infrastructure assets could be affected by **failures of other assets** due to extreme weather, such as energy systems, transport and information and communications technology (ICT).
3. Increased risks to buried infrastructure, such as water pipelines, with damage potentially becoming **more frequent in future due to flooding and subsidence**.

4. More frequent flooding could also impact on water treatment facilities **leading to potential reductions in water quality**, in turn impacting upon health.
5. Future projections of more frequent and intense dry periods lead to concerns around the **availability of public water supplies** in future, especially in England and parts of Wales.
6. Aquifers near the coast could be at greater risk from **saltwater intrusion** due to sea level rise, though the risk is thought to be low in places where aquifers are important water sources

This insight triangulated our thoughts on the Climate Change risks we believed we were facing and allowed us to be confident in the focus we put into subsequent company scale assessment work.

Portsmouth Water's Assessments

In 2011 Portsmouth Water published its first 'Climate Change Adaptation Report'. The report recognised the importance of climate risk, and ensured its management was, so far as possible, embedded in business-as-usual activities. (For example, the water quality risks associated with catchment flooding is understood by the Drinking Water Safety Plan, whilst the availability of public water supply is understood by the Water Resource Management and Drought Planning Processes.) The report also considered and initiated the building of further adaptive capacity.

A second report was published in 2015 which reviewed progress since the first report and 'adapted' the planned response according to the updated risk and uncertainties.

A third report was published in 2021 which built upon the first two submissions and CCRA3. Progress against the action plan was reviewed, and climate change risks updated based on the latest Climate Change Risk Assessments (CCRA3). This included new risks that had emerged through our planning frameworks.

The report also acknowledged that the importance of adapting to Climate Change was growing ever greater and that this report should be used as a building block in the development of future plans such as our PR24 Business Plan. This would continue to ensure that Climate Change was further integrated into the companies decision-making processes.

The third report also provided examples of the work required to adapt to Climate Change and to reduce our contribution to it. For example, we are building the Havant Thicket winter storage reservoir to help secure long-term resilience for the South East and to help reduce abstraction from chalk streams. Solar arrays have also been installed and greener electricity purchased, as part of a strategy to achieve net zero carbon emissions.

Despite these efforts in the past we recognised that there is more to do. We have identified a number of areas where we felt that our understanding and processes were less mature or were not in step with the latest understanding and tools available to us.

Long Term Delivery Strategy and Adaptive Planning

In April 2022 Ofwat issued guidance surrounding their expectations of Adaptive Planning and scenario testing, within a Long-Term Delivery Strategy (PR24 and Beyond: Final Guidance on long-term delivery strategies). This guidance defined reference scenarios, one of which was climate based. Here companies were required to consider climate scenarios ranging from a benign scenario (RCP2.6), where Climate Change would have a 'low' impact, to an adverse scenario (RCP 8.5), where the impact of Climate Change may be 'high'.

Companies were required, for their own geography, to:

- Use the UKCP18 probabilistic projections (where possible), using 50th percentile probability level at RCP 8.5 and 2.6, for land projections, covering maximum temperature and total precipitation.
- Use the UKCP18 marine projections, for Sea Level rises.

As a response to this new and specific requirement, and as a response to our ambition to continuously evolve and improve our stance, we engaged 'Arcadis' to help us. Arcadis are a global consultancy and offer a specialist expertise and service in this area.

Arcadis were engaged to undertake a Climate Change Risk Assessment (CCRA) that accorded with the Ofwat guidance, on 93 assets across 51 sites within the Portsmouth Water supply area, with specific emphasis on:

- Sea level rise and storm surge
- Rainfall events
- Extreme weather events.

The scope of this study included all our strategic assets (Table 1) that abstract, treat, pump, store, and control water. Data was obtained from a wide range of publicly available sources to derive risk assessments for each asset considering the impacts of the reference scenarios.

Table 1: Assets assessed as part of the Arcadis CCRA study

Asset Type	No. of sites	No. of Assets
Abstraction points – Boreholes (BH) / Intake works and pumps	20	35*
Water Treatment Works	20	20
Reservoir	18	18
Pumping Station	2	2
Pressure Reducing Valve	6	6
Booster Station	6	6
Office	1	1
Flow Control Valve	4	4

Source: Arcadis Climate Change Assessment, May 2023.

* Boreholes located within the same area were considered as one group. The number of borehole groups is 20

The conclusions of this study included:

- Two critical assets had a 'major' and one had a 'significant' probability, that they would be subject to flood risk consequent on sea level rise.
- Seven critical assets had a 'major', seven more a 'significant', and one more a 'moderate', risk that they would be subject to fluvial (river initiated) flooding.
- Three critical assets had a 'major', twenty-one more a 'significant', and twelve more a 'moderate' risk of surface water (rain initiated) flooding.
- There were some elements of the assessment that could only be assessed at a stage 1 'screening' level, rather than on a detailed site-by-site basis. This was particularly evident in respect of saline intrusion and groundwater flooding risk.

With the data available, of the 93 assets assessed, 11 of these assets (across eight sites) were identified to be at 'major' risk of climate change impacts.

The report recommended that these assets are prioritised for further investigation. Beyond these 11 assets, there are a number of assets that are assessed to be of a 'significant' to 'moderate' risk of impact, it was recommended that these assets are also reviewed further to identify opportunities to mitigate identified impacts to Climate Change.

Case Study: Storm Eunice and the Power Distribution Network

The climate change scenario within the LTDS of Portsmouth Water recognised the increasing frequency and severity of weather events. This was highlighted in early 2022 when Storm Eunice hit the UK. Portsmouth Water's back-up systems, where they exist, have not been designed to initiate automatically. Back-up systems rely on operators attending sites to start generators, then restart water abstraction, treatment, and pumping processes. Storm Eunice highlighted the fragility of Portsmouth Water plants and the consequent risk to water sufficiency in the event of broad area power supply interruptions. This fragility was reinforced, in the same year, by the unprecedented pressure on individual sites during the summer drought.

The severity of Storm Eunice resulted in power supply failures, over a broad geographic area, affecting multiple water abstraction, treatment and distribution assets. In the largely rural locality, transport by road, either for the power companies to repair damaged overhead lines, or for Portsmouth Water's site operatives to access sites, was prevented by wind-felled trees. This had caused multiple road closures for extended periods.

Climate change is already beginning to result in wider-scale power outages where previously more localised events were the norm, whilst their effects mean that not only are these interruptions becoming more widespread; their durations are also increasing.

Source: Portsmouth Water

Intervention Planning

It is critically important that all the risks identified as arising from climate change are routinely assessed, tracked and appropriate mitigation actions are planned and appropriately funded.

For several of the risks there are mature planning and delivery processes in place. For instance, raw water availability is a key feature of the cyclical Water Resource Planning process, which not only assesses the scale of the risk over a 25+ year horizon, but also provides mitigation options and investment pathways for solutions – with the assessment being refreshed every five years with the publishing of updated Water Resource Management Plans. However, some of the risks identified do not readily fall into such existing processes and so require particular consideration to ensure they are not overlooked.

We also need to be clear on the levels of confidence we had in the data we were using to understand the risks. For some risks, such as coastal flooding, the access we have to national datasets and modelling facilities provided by the Environment Agency and local flood defence authorities allows us to have high confidence in our understanding of risk. For other risks, such as groundwater flooding, we are aware of new data sets or modelling capability that we have yet to apply to our assessments.

There are several types of intervention or mitigation activity that might be appropriate in response to the risks identified. These fall into three categories:

- **Region-wide study.** An assessment of risk, using a recognised methodology, across our full operational region / asset base / processes to identify risk. This allows us to prioritise future studies and resources.

- **Site specific study.** The quantification of a risk(s) previously identified as faced by a site (i.e. the depth and duration of fluvial flooding). The identification of all mitigation options available, implementation timings, and a recommendation of the best value solution for that site.
- **Site specific action.** The delivery of a mitigation scheme identified through a site-specific study. We undertook an exercise to review all the risks identified in the Arcadis assessment to confirm:
  a. If they fell into a wider, mature process.
  b. How confident we were in understanding that risk.
  c. At a high level, what intervention we could anticipate.

The results of this assessment are replicated in Table 2 below.

Table 2: Our assessment of the current position

Risk	Assessment Process	Confidence in our understanding of the risk	Necessary intervention
Coastal Flooding	Environment Agency sources Internal Arcadis report	High	Design and deliver site specific interventions on highest risk sites
Fluvial Flooding	Environment Agency sources Internal Arcadis report	High	Design and deliver site specific interventions on highest risk sites
Groundwater flooding	Environment Agency sources Internal Arcadis report	Low	Re-assess site risk based on newly updated groundwater models
Surface water flooding	Environment Agency sources Internal Arcadis report	Medium	Design Site specific interventions on highest risk sites
Raw Water Quality - flooding	Drinking water safety plan	High	Deliver DWSP actions
Raw Water Quality – sea level rise	Internal Arcadis report	Low	Increase our knowledge of site risk based on latest understanding of sea level rise and using newly updated groundwater models

Raw water availability	Water Resource Management Plan	High	Delivery WINEP investigation programme and feed that into WRMP29 process.
Demand for water changes with weather patterns	Water Resource Management Plan	High	Follow WRMP29 process
Extreme dry weather/Drought	Drought planning process	Medium	Update drought plan following latest EA guidance.
Failure of external infrastructure (power and transport)	Internal Arcadis report	High	Design Site specific interventions on highest risk sites
In-combination risks	Internal Arcadis report	Medium	Design Site specific interventions on highest risk sites
Risks in the supply chain	Internal procurement and contract management	Low	Undertake a study to ascertain our exposure to supply chain (specifically chemicals)

Source: Portsmouth water.

Summary conclusions from Table 2:

- Most of the flooding and power supply risks are independent of the formal WRMP and DWSP processes and require independent assessment; with the exception of groundwater flooding, we understand those risks with confidence.
- Our low confidence rating for groundwater flooding stems from being aware that newly updated groundwater models have just been published for our region by the Environment Agency. As the previous groundwater flooding risk assessments had been conducted using the previous version of the models, we downgraded our confidence in this area to 'low' as a better source of data is now available.
- The exercise highlighted that our confidence in our data around saline intrusion risks were low.
- Our confidence that we understand the risks due to climate change effects across the entirety of our supply chain were low.
- As a coastal water company that takes most of its water from the ground, rather than rivers or reservoirs, we were conscious of the low confidence grading we assigned to our understanding of saline intrusion. The majority of our sources do sit in the higher reaches of our catchments, on the chalk downlands. These sites are often significant distances away from the coastal plain and at low risk of saline intrusion, so in the past our low confidence would not have been so significant. However, these downland locations are sensitive from an environmental point of view and one of the options we are exploring to reduce our environmental impact, is the potential to move some of our abstraction capability from the downlands to locations much closer to the coast. This would require a much more granular understanding of the risk of saline intrusion over the lifetime of any relocated assets.

We therefore identified three studies to be delivered that would increase our confidence to Medium or High. These studies are not part of the existing planning and funding processes and so we believe would represent a legitimate use of the additional uplift funding.

The data from these studies will inform our business planning for PR29.

Table 3: Studies identified to increase our confidence in data

Study	Outcome
Groundwater flooding	Using the latest EA groundwater models for the region, assess the risk of groundwater flooding to our assets across the Region under recognised future climate scenarios.
Raw Water Quality – sea level rise	Undertake a detailed assessment of risk of saline intrusion into the aquifers we access for public water supply using the latest understanding of sea level rise.
Risks in the supply chain	Identify key elements in our supply chain that might be impacted by climate change and gauge the preparedness of those elements to mitigate those impacts.

Source: Portsmouth Water

The Arcadis report concluded that:

- Two critical assets were at 'major' risk consequent on sea level rise, with a further single site 'significant' risk.
- Seven critical assets had a 'major', seven more a 'significant', and one more a 'moderate', risk that they would be subject to fluvial (river initiated) flooding, and
- Three critical assets had a 'major', twenty-one more a 'significant', and twelve more a 'moderate' risk of surface water (rain initiated) flooding.

It further identified seven sites at risk of power loss through high winds (increased storminess in weather patterns).

In work completed as part of the Arcadis risk assessment, the locations of these sites were cross referenced with flood risk schemes planned or being delivered by local flood risk authorities. This identified that the locations of Farlington and Hilsea Pressure Reduction Valves (PRV) would benefit from a significant coastal defence scheme currently being delivered. We felt this defence scheme alleviated much of the risk identified by the assessment and therefore we do not propose interventions on these sites at this time.

In order to prioritise our investment focus, we tabulated the sites identified as having a major risk of flooding together with those identified as at risk of power loss, replicated in the table below.

Table 4: Sites with major risks identified

	Coastal flooding	Fluvial flooding	Surface water flooding	Groundwater flooding	Power/transport failure
Sites with 'Major' risk identified	Portsmouth Farlington PRV*	Lavant (BH & treatment)	Eastergate (BH)	Aldingbourne	Eastergate (BH and treatment)
	Portsmouth Hilsea PRV*	Itchen (intake)	Farlington	Westergate	Lavant (BH and treatment)
		Walderton (BH & Treatment)	Itchen (intake)	Eastergate (BH and treatment)	Portsmouth Farlington PRV
		West Street (BH & trestment)		Fishbourne	Portsmouth Farlington PRV
				Lavant (BH and treatment)	Itchen (intake and treatment)
				West Street (BH and treatment)	Walderton (BH and treatment)
					West Street

Source: Portsmouth Water

* see comment above

Assessing the in-combination flooding risk led us to identify four priority sites.

- Lavant (borehole and treatment)
- Itchen (intake)
- Eastergate (borehole and treatment)
- West Street (borehole and treatment)

These sites are all considered at major risk of two sources of flooding and are significant sites in our network. These sites do all have historic flood mitigation measures installed on them, including the ability to manually fit barriers across identified ingress points for floodwater and raised electrical gear, but they do not benefit from a refreshed site flood risk assessment, based on our latest understanding of climate change scenarios.

We are therefore proposing to undertake these detailed site-specific assessments in the early part of AMP8 using the additional uplift funding. This work will inform our asset investment proposals that will be in our Business Plan for AMP9.

From a power/transport failure perspective, a view of the criticality of the identified sites suggests all seven sites identified are priorities for intervention:

- Lavant (borehole and treatment)
- Walderton (borehole and treatment)
- West Street
- Itchen (Intake and treatment)

- Eastergate
- Portsmouth (Farlington) PRV
- Portsmouth (Hillsea) PRV

There are no effective standby power arrangements at Itchen or the PRV installations.

Where standby power supplies do exist then all these assets require manual intervention to initiate these arrangements and to restart water production processes. A further short duration manually initiated stoppage is subsequently required to re-instate the mains power supply after it has been restored.

The Arcadis assessment identifies an in-combination risk that weather severe enough to cause a power outage is very capable of also adversely affecting the transport network to an extent to restrict access to these sites at the same time. This is reinforced by the recent experience described in the case study. Such a scenario negatively affects our ability to restart the site(s), whist potentially also putting employees at heightened risk.

We are therefore proposing to:

1. Undertake site specific engineering studies to identify and cost all the options available on a site to provide power resilience and an auto-restart (preferable) and/or remote-control capability.
2. Use this information to produce a risk-prioritised implementation plan for the remainder of the investment period.
3. Undertake implementation of the climate change mitigation work, at each site, according to the plan.

It is always a challenge to undertake a detailed study and then commit to delivery in a single investment cycle. Until the detailed studies have been undertaken, the interventions and costs necessary to achieve the outcomes are unknown. Potential works may include:

- Replacement, or the installation of, new standby generator systems.
- Upgrading generator control and synchronisation systems.
- Additional process monitors and instrumentation.
- Upgraded process control systems including provisions to return process control to a predetermined state on power failure.
- Additional or upgraded site infrastructure, for example automating valves and modifying washout systems.
- Upgrade site communication systems and SCADA modifications.

Our ambition is to deliver the work necessary to deliver the outcomes 1 & 2 (above) on all the identified sites within the first two years of AMP8.

Furthermore, our ambition is to implement (3 above) all the work identified in the previous work within AMP8, up to the constraints of the funding available.

Outcomes

Implementation

Following the planning element of the process we are proposing that the following schemes are funded from the uplift provided in the Draft Determination. The combination of region-wide studies and site-specific studies will inform our asset management planning in turn feeding into our Business Plan proposals for AMP9 and beyond.

We will implement work necessary to achieve power resilience and remote start capability on as many of the sites as the funding allows.

Table 5: Proposed Schemes

Region-wide studies	Site specific studies (Flood risk and mitigation)	Site Specific Studies (Power resilience and remote start)	Site specific action (Power resilience and remote start)
Groundwater flood risk	Lavant	Lavant	Lavant
Raw water quality - Saline intrusion	West Street	West Street	West Street
Risks in the supply chain	Itchen	Itchen	Itchen
	Eastergate	Walderton	Walderton
		Eastergate	Eastergate
		Portsmouth (Farlington) PRV	Portsmouth (Farlington) PRV
		Portsmouth (Hillsea) PRV	Portsmouth (Farlington) PRV

Source: Portsmouth Water

Scope and Costing

Table 6 below summarises, at a high level, the scope, outputs and anticipated costs of our proposals.

Table 6: Scheme Scope, Outputs and Costing

Scheme	Scope	Outputs	Estimated cost (£k)
Groundwater risk assessment	Using the latest EA groundwater models for the region, assess the risk of groundwater flooding to our assets across the region under recognised future climate scenarios	Assessment of risk across our asset base we can attribute high confidence to. Inform the adaptive plan and LTDS	30
Saline intrusion risk assessment	Undertake a detailed assessment of risk of saline intrusion into the aquifers we access for public water supply using the latest understanding of sea level rise.	An assessment of risk across our current sites. The assessment of risk associated with our potential options to relocate current abstraction points to locations lower in our catchments. Inform the adaptive plan and LTDS	50
Risks in the supply chain assessment	Identify key elements in our supply chain that might be impacted by climate change and gauge the preparedness of those elements to mitigate those impacts.	An identification of the robustness of our supply chain to climate change. A risk led suggestion of interventions we could make to increase our resilience to risks identified. Appropriate tactical changes within AMP 8 Ongoing monitoring plan.	25
Flood risk and mitigation study	Quantify the risk posed by flooding on the identified sites and the identification of mitigation interventions that can be made.	Quantification of inundation depth and durations for identified sites. An assessment of the risk posed to our processes as a result. An engineering design and comprehensive costed list of all interventions to mitigate the risks identified.	120
Power Resilience and remote start study	Identify and cost all the options available on a site to provide power resilience and a remote start capability	A costed list of options to achieve resilience and self-start capability on each identified site.	150

Scheme	Scope	Outputs	Estimated cost (£k)
Power resilience and remote start site specific action	Delivery of the best value option for each individual site.	A resilient power source and auto / remote start capability for the identified sites.	2,060
		Lavant	300
		West Street	300
		Itchen	600
		Walderton	300
		Eastergate	500
		Portsmouth (Farlington) PRV	30
		Portsmouth (Hilsea) PRV	30
Total (see notes below)			**2,435**

Source: Portsmouth Water

Cost notes

a. The estimated costs for the studies are based on market costs for broadly similar scale studies undertaken for Portsmouth Water by third party specialists.
b. Costs are on a 2023-24 price base.
c. The estimated costs for the engineering studies are based on market costs for other engineering investigative work routinely carried out for Portsmouth Water by its MEICA framework partner Trant.
d. The estimated costs for the engineering works associated with power supply resilience are based on engineering judgements concerning the likely outcomes of the engineering studies. These can only be considered as 'order of magnitude' estimates.
e. Attendant operating costs are unknown until the engineering studies are completed.
f. There is no overlap with base allowance.

Ensuring value

- All the contracts for delivering the region-wide and site-specific studies will go through a competitive process to ensure they represent efficient costs.
- All the engineering studies will be completed prior to starting any implementation. This is to ensure overall judgements can be made concerning customer value, risk and cost benefit.
- Our Copperleaf optimisation tool will be used to assess and optimise the available options, customer benefits, and the implementation program.
- All mitigation implementation contracts will be let through a competitively tendered process to ensure they represent efficient costs.

Customer protection

- Climate Change funding will be ring-fenced by Portsmouth Water for these works.
- The program will prioritise 'studies' to ensure future risks are best understood. Engineering mitigation will follow only when the full cost (totex) implications of the study and engineering components are known with certainty.
- The expected costs for the whole program exceed the climate change up-lift provision and it is likely that the program will be financially constrained. If the ring-fenced costs are lower than the Climate Change provision the difference will be refunded to customers.

- We suggest a PCD is based on completing the study components within AMP8 and completing the engineering mitigation components up to the fiscal limit of the climate change provision, with any residual monies being returned to the customer.

Delivery plan

The proposed delivery schedule for the plan, noting that mitigation implementation is subject to the findings of the studies, the detailed project planning, and co-ordination within the overall AMP8 program.

Intervention	Location	2025/26				2026/27				2027/28				2028/29				2029/30			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Region-wide Study	Groundwater flooding																				
	Saline intrusion																				
	Supply chain risk																				
Site specific study (flood risk)	Lavant (BH and treatment)																				
	Itchen (intake)																				
	Eastergate (BH and treatment)																				
	West Street (BH and treatment)																				
Site specific study (Power & Auto recover)	Lavant (BH and treatment)																				
	Walderton (BH and treatment)																				
	West Street (BH and treatment)																				
	Itchen (intake and treatment)																				
	Eastergate																				
	Portsmouth (Farlington) PRV																				
	Portsmouth (Hilsea) PRV																				
Site Specific Action (Power and Auto recover)	Lavant (BH and treatment)																				
	Walderton (BH and treatment)																				
	West Street (BH and treatment)																				
	Itchen (intake and treatment)																				
	Eastergate																				
	Portsmouth (Farlington) PRV																				
	Portsmouth (Hilsea) PRV																				

Earliest practical start

Conclusion

Through the Draft Determination we have been allowed an uplift of £1.3m in funding in order to increase our resilience to Climate Change.

In this section we have described how we have used the framework identified in the International Standard ISO14090:2019 to shape our approach to planning for climate change resilience and how the third national Climate Change Risk Assessment (CCRA3) and the company scale Climate Change risk assessment conducted by Arcadis in May 2023 have been used to identify specific interventions. We also include a case study relating to the resilience benefits of the proposal.

Following a prioritisation process we are proposing to use the uplift in funding to deliver:

- One study to increase our understanding of the climate change risks embedded in our wider supply chain and actions we might take to mitigate such risks.
- Two region-wide studies, making use of new groundwater models only recently available to us. One to better understand the risks of saline intrusion into our groundwater aquifers posed by rising sea levels, the other to revisit our current assessments, based on previous groundwater models, of the risk of groundwater flooding impacting our production assets, driven by changing rainfall patterns.
- Four detailed flood risk assessment and mitigation plans for our highest risk production assets.
- Seven detailed site studies to provide options and costs to delivery of power resilience and remote-start schemes on sites most vulnerable to the in-combination risks of power and transport network failures.

We will then aim to deliver as many of these power resilience schemes as is possible within the up-lift funding constraint.

We have described how we will protect customers in terms of benefit to the customer, and how we will ensure best value for the customers, through careful program construction, competitive processes, and a Price Control Deliverable that returns any residual value to them.

This work will provide the tangible outcomes of:

- Protecting us from risks that Climate Change may be introducing to our supply chain.
- Providing high confidence assessments of the risk posed to our current and future assets by groundwater flooding and saline intrusion because of sea level rise.
- Providing a clear investment plan to achieve power resilience and an auto recovery capability to production sites most at risk through climatic events.
- Provide the outcome of achieving power resilience and auto recovery capability in up to seven key production sites, whilst also decreasing potential health and safety risks to our production staff.

Portsmouth Water

GET IN TOUCH

portsmouthwater.co.uk

pr24@portsmouthwater.co.uk

PortsmouthWater

PortsmouthWater