SRN25 Supply Resilience Enhancement Programme

Enhancement Business Case – Special Cost Claim

2nd October 2023

Version 1.0

from Southern Water

Contents

List of Tables and Figures

Glossary

Acronym	Description
ARM	Asset Risk Management
AMP	Asset Management Plan
CAP	Competitively Appointed Provider
CAPEX	Capital Expenditure
Cl2	Chlorine
CIT	Cost Intelligence Team
CRI	Compliance Risk Index
CWT	Clear Water Tank
DAF	Dissolved Air Flotation
DI	Distribution Input
DNO	Distribution Network Operator
DO	Deployable Output
DPC	Direct Procurement for Customers
DWI	Drinking Water Inspectorate
EA	Environment Agency
EBCT	Empty Bed Contact Time
ERI	Event Risk Index
FEO	Final Enforcement Order
FMECA	Failure modes, effects, and criticality analysis
GAC	Granular Activated Carbon
HAZREV	Hazard Review
HLPS	High Lift Pump Station
HV	High voltage
ICG	Independent Challenge Group
LLP	Low lift pumps
LTDS	Long-Term Delivery Strategy
LV	Low voltage
M3	Meter Cubed (1000 litres)
MCC	Motor Control Centre
MF	Microfiltration
Ml/d	Mega litre per day
NDW	Net Direct Works
NEC4	New Engineering Contract 4
OPEX	Operational Expenditure
PAC	Powdered Activated Carbon
PCV	Prescribed Concentration or Value
PLC	Programmable Logic Controller

Acronym	Description
PWPC	Peak Week Production Capacity
PR24	Price Review 2024
R&V	Risk and Value
RGF	Rapid Gravity Filter
ROV	Remotely Operated Vehicle
RTU	Remote Terminal Unit
RTW	Run to waste
SCADA	Supervisory control and data acquisition
SDP	Strategic Delivery Partners
SEMD	Security and Emergency Measures Direction
SEW	South East Water
SWR	Surface Water Routing
T2ST	Thames to Southern Transfer
TOC	Total Organic Carbon
TOTEX	Total Expenditure
UPS	Uninterruptable Power Supply
UV	Ultraviolet
VFM	Value for money
WBS	Water Booster Station
WfLH	Water for Life Hampshire
WINEP	Water Industry National Environment Plan
WLC	Whole Life Cost
WQSD	Water Quality Standards Database
WRMP	Water Resources Management Plan
WRZ	Water Resource Zone
WSR	Water Service Reservoir
WSW	Water Supply Works

Executive Summary

[redacted] are our largest, and most strategically important Water Supply Works (WSW) currently in operation. These four WSW are responsible for providing safe drinking water to over 710,000 properties daily and are a core component of our long-term strategy for water supply in 2050.

Our customers, and the drinking water quality regulator, expect us to provide safe, clean water that can reliably meet industry standards. Despite significant investment over the last three Asset Management Periods (AMPs), these four sites are no longer able to meet these standards consistently without enhancing the sites existing capabilities to meet the future needs of our customers.

Over the last ten years the DWI has served Notices at each of the four sites. Working closely with the DWI, we then reviewed all our Notice commitments for the four sites and proposed new delivery dates and solutions that would deliver the long-term site strategies and produce the best outcome for customers. We have since received Final Enforcement Orders (FEOs) from the DWI in February 2023 at each of the four sites.

We have relaunched holistic strategies for the four WSW to ensure that they are fit for purpose and are resilient to future changes, enabling the four sites to continue to play a central role supplying water for our current and future generations. These strategies span multiple AMPs, including AMP8.

The investment covers everything from renewing our aging control systems, to installing additional treatment processes to cover changing raw water requirements and improving our handling of waste. We are doing this so that we can deliver on the ambition and long-term priority outcomes as set out in our Long-Term Delivery Strategy (LTDS):

- Understanding and supporting our customer's trust in our ability to consistently supply safe, clean drinking water.
- Improve quality of the drinking water received at taps, despite a deteriorating and changing raw water product.
- Protect and improve the local environment, reducing and improving the handling of waste.

Crucially, this is a single programme of strategic investment at each WSW, which is delivering synergies that we wouldn't otherwise be able to deliver through small, incremental projects. This is reducing the total investment, for the same customer outcome.

The convergence of multiple external factors, combined with the fact these are large WSW with assets at the end of their useful lives, has meant that all four require significant atypical expenditure between 2025 and 2030 to maintain supply to 900,000 people.

We are seeking an additional £318.7m of capital expenditure in AMP8 to deliver this urgent and necessary programme of work and a further £123.8m in AMP9 to complete the remaining aspects of the strategy.

Of this £318.7m, £52.0m relates specifically to transition funding that is required in AMP7 to deliver the AMP8 scope and has been calculated as a % of the total AMP8 cost. The second column in the table below therefore shows the total value of the AMP8 cost inclusive of the AMP7 transition funding element i.e.

£10.8m at [redacted] represents 9% of the total scheme cost (£120.2m) for work that must be completed this AMP.

Table 1: Summary of Requested Capex Funding (by site and AMP) (£m)

Site	AMP7 (Transition Funding only)[1]	AMP8 (inclusive of transition funding)	AMP9
[redacted]	*10.8*	120.2	84.2
[redacted]	*13.5*	111.3	3.3
[redacted]	*8.5*	29.2	-
[redacted][2]	*19.0*	58.0	36.2
Total	***52.0***	**318.7**	**123.8**

Additionally, the programme of works is highly interdependent between traditional botex and enhancement activities. This is so that we can achieve the best possible synergies and cost efficiencies for our customers, given the size of the investment. Given the inter-dependencies of the works in supplying water to our customers, we consider managing it as a single programme of works delivers the best outcome and hence are treating it as a single claim (hereafter referred to as a 'Special Cost Claim').

We have calculated an AMP8 allowance of £62m for the operation of all four WSW. This cost is largely used to address ongoing opex and capital maintenance works at the sites. We have invested more than double this (£137m v £65m) during the first 3 years of AMP7 across the four sites, demonstrating the need to enhance the resilience of our assets that are fast approaching the end of their useful life. We are requesting the £318.7m in addition to the £62m allowance within base.

The table below summarises our base allowance in relation to the four sites, total expenditure incurred at the sites during AMP7 to date, and total capex3 that we are requesting for AMP8 and AMP9.

Table 2: Summary of actual capex spend (AMP7) and requested capex (AMP8&9) (£m)

	AMP7 (£m)	AMP8 (£m)	AMP9 (£m)
Four sites funding through base allowances (ongoing opex & capital maintenance)	65.3	62	62
Actual spend to date (AMP7 only)	136.8	-	-
DWI Mandated Interventions (AMP8&9)	-	*262*	*5.9*
Strategic Enhancements (AMP8&9)	-	*56.7*	*117.9*
Planned Expenditure on Four Sites	-	380.7	185.8
Funding Gap	(71.5)	(318.7)	(123.8)

[1] Transition funding cost estimates for AMP7 have been derived through our engineering and costing teams and calculated as a percentage of the APM8 planned works relevant to the specific scope
[2] Requested funding at [redacted] includes SEW's contribution of 25%. For further information on the commercial arrangement at [redacted] WSW between Southern and SEW please refer to SEW's letter of support.
[3] We have excluded opex from this table due to insufficient time to submit this information as part of our PR24 data table submission.

Our programme of works at the four WSW will restore trust with customers and provide high quality drinking water. It will do this whilst mitigating against the growing risks from climate change, improving system resilience and a need to reduce our impact on the local environment. Customer feedback is supportive and states that the Four Site strategy is an essential part of the overall business plan.[4] Understanding the risks if work is not undertaken reiterates the need for intervention to take place as soon as possible. The main benefits the customers want to see from the plan are enhanced water quality, a more reliable supply of water, and improved drought resilience.

Summary of Case	
Name of Case	Supply Resilience Enhancement Programme
Summary	• Four of our major WSW require significant upgrades and improvements to deliver against an ambitious DWI improvement programme. • These WSW supply over 700,000 properties and 900,000 customers, and do not currently perform in line with ours, our regulators', nor our customers' expectations. • These WSW are required to at least 2050, if not beyond. They form a key part of our Long-Term Delivery Strategy (LTDS) and WRMP. • These WSW are facing deteriorating raw water quality, and do not have modern treatment processes fully integrated with conventional processes. • These WSW will have new sources of water to mitigate against impacts of licence reductions. The WSW need to be prepared for this change.
Expected Benefits	• Additional £17m saved for customers out to 2055 • Improved treatment process resilience under a range of operating conditions • Enhanced treatment of variable raw water qualities experienced at the sites • Avoiding compliance failures at our WSW the wider zones that they supply • Reducing levels of unplanned outage, particularly at [redacted] and [redacted] • Reduced interruptions to customers and businesses through more sustainable use of water, protecting our critical rivers and chalk streams • Improving water taste, odour, and appearance within zones fed by the WSW • Securing long-term supply of WSW under normal and drought conditions. • Reduced carbon footprint and greater protection against waste discharges
Price Control	PR24 – Wholesale Water
TOTEX (2022-23p)	**£337.2m in AMP8** (inclusive of AMP7 transition funding)[5]
OPEX p.a. (2022-23p)	[redacted] – £1.0m [redacted] – £1.9m [redacted] – £0.5m [redacted] – £0.3m **Total = £3.7m p.a. (or £18.5m AMP8)**

4 Four Site Strategy Customer Feedback and Water Futures Wave 4 Quant

5 AMP9 funding to be requested ahead of PR29

Summary of Case	
CAPEX (2022-23p)	[redacted] – £120.2m [redacted] – £111.3m [redacted] – £29.2m [redacted] – £58.0m **Total = £318.7m**
Is this case proposed for a direct procurement for customer?	No – we have proposed a Price Control Deliverable (PCD) to protect customers from under, or inefficient delivery. We do not believe DPC is appropriate for this type of investment and asset because these assets are highly integrated with our wider operations and therefore don't meet Ofwat's technical discreteness test.

.

1. Introduction and background

[redacted] and [redacted] are our four largest water supply works (WSW). [redacted] and [redacted] treat surface water and [redacted] and [redacted] treat a mixture of surface and ground water. [redacted] and [redacted] are in Hampshire, [redacted] in Sussex, and [redacted] in Kent. The four works supply, either alone or in combination with other treatment works, water to 900,000 properties and over 1m people, representing 62% of our customer base and supporting a proportion of customers for both South East Water (SEW) and Sutton and East Surrey Water (SES Water). Therefore, the four works remain our most strategic sites.

Figure 1: Catchment area of our major four supply works

As would be expected [redacted], we have carried out a detailed and thorough internal review of the condition and performance of these assets. Based on this review we have concluded that the age and design of these WSW cannot consistently meet the latest industry standards around best practice, new DNO obligations, enhanced requirements for resilience and supply, and the expectations of our customers, Ofwat, the Drinking Water Inspectorate (DWI) and other sector regulators without significant and immediate investment. All four sites were built over 40 years ago and while they have been adapted over time to reduce new water quality risks as these have been identified, or to improve the processes in light of changing public health and regulatory requirements, they are no longer able to reliably deliver the services that our customers and stakeholders expect. The four sites are also in need of enhancement to respond to changing circumstances, including deterioration of raw water quality and reduced water available for abstraction due to the increasing impacts of climate change and required protection of the surrounding natural environment.

Based on detailed optioneering and striving to deliver the best possible value for money for our customers, our proposed solutions for these four sites are described in detail in this document: we are seeking approval for £318.7m of capital expenditure during the 2025-30 period (AMP8).

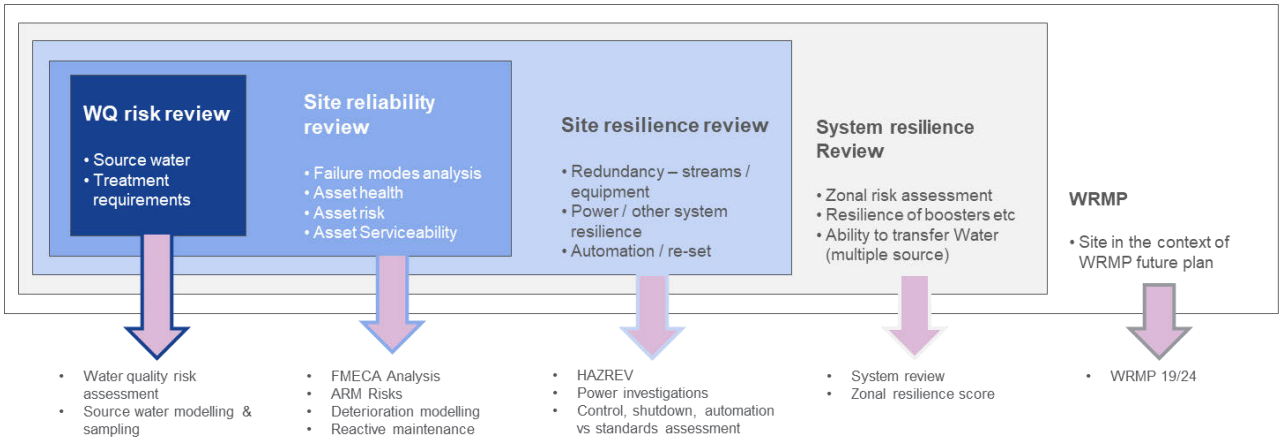
Due to its scale and ambition, this is a significant, once in a generation programme of work for us. It is also atypical when compared to the expenditures undertaken by the water industry historically. As a result, Ofwat's botex assessment, based on econometric models populated with historical data that does not include projects like these, will not provide a sufficient allowance to fund these activities. Moreover, the proposed solutions involve both base and enhancement-related expenditure, which are inextricably linked throughout this programme of works in order to achieve the synergies and enable cost efficiencies that provide the best outcome for our customers. As a result, we are submitting a Special Cost Claim for the

additional £337.2m of totex in AMP8, over and above the £62m that our analysis suggests Ofwat's PR24 botex models would provide for expenditure on these four sites.[6] We refer to the claim as a Special Cost Claim because, given its nature, it falls outside both Ofwat's criteria for a standard cost adjustment claim or an enhancement cost claim.

Each of the four WSW requires substantial investment to fulfil obligations within improvement programmes set by the DWI as part of the PR24 process. To generate these improvement programmes, we engaged extensively with the DWI following a thorough risk-based approach to create a strategic roadmap for each site and identify the sequence of investment needs, rather than a set of piece-meal interventions that wouldn't have delivered the long-term resilience outcome we are seeking. Our risk-based approach took a whole-system view for each site, a key step to ensuring best value investment for customers. Our plan was developed through assessment of the five key pillars which influence the ability for each site to function effectively. The five areas considered during the risk review were:

1. Current and future risks to water quality, quantity, and variability
2. Reliability of the site to deliver safe drinking water without interruption
3. Resilience of the site to deliver safe drinking water in different operating scenarios
4. Resilience of the supply zone fed from each WSW and impacts on customers (this was considered at a site, zone, and inter-zonal level)
5. Interface between each site's long-term strategy, the Water Resources Management Plan (WRMP) and our 30-year LTDS

Figure 2: Key Strategy Components considered in our risk review



General Standards and Expectations of our WSW

There is a set of minimum standards and expectations we expect our sites to operate to, reviewed as part of the PR24 process and the development of our strategies for the four WSW. The four sites do not fully meet the standards we have set, and the DWI has supported the improvements we are proposing. Notable areas include:

[6] See Table 4 for further information

- **Power resilience** – power from the grid is becoming less reliable, due to climate change parameters, an ageing electricity grid, and more volatile electrical flows from embedded generation. [redacted].
- **Water quality** – we need to improve the quality of our drinking water immediately. Short-term mitigations are in place to understand the sources of poor taste, odour and appearance within the raw water system, but there is a need to provide a permanent solution to these problems and upgrade the sites for the longer term to improve overall treatment quality.
- **Automation and Control** – [redacted].
- **Ageing Assets** – the four WSW are legacy sites, and we have had an extensive programme of maintenance to keep them in service. Capital maintenance is no longer sufficient to keep the WSW in operation and many structures require rebuilding to appropriate modern technologies and design.

[redacted]

- [redacted] supplies 187,000 properties in Southampton, Winchester, and the surrounding areas. The combined works abstract water from the sensitive River Itchen chalk stream and from groundwater sources.
- The site needs the ability to expand in a modular process in order to enable increased production from Havant Thicket and water recycling sources in the future to meet water demand.
- T2ST further compounds the need to move towards modular treatment technologies. This scheme is planned to be operational post-2030 but requires investment in the short-term to prepare both sites to receive flows.
- By the late 2040s there may also be an additional requirement for the site to supply a proportion of Portsmouth Water's customers.
- [redacted].
- [redacted]
- The current treatment process is unable to meet the challenge posed by key water quality parameters, [redacted].

[redacted]

- [redacted] supplies 178,000 properties in the Southampton and Isle of Wight areas. Abstraction from the sensitive River Test chalk stream is becoming increasingly challenging in drought conditions, alongside licence reductions and water quality becoming more variable at different times of the year.
- [redacted] requires integration with the regional Hampshire water supply grid to meet the increasing demand, whilst also achieving abstraction reductions set by the Environment Agency (EA).
- This WSW is undergoing a significant transformation in light of these new requirements, and this needs to continue to ensure it can flexibly meet a reduced output based on wider system production.

[redacted]

- [redacted] supplies 246,000 properties in West Sussex and the surrounding areas. [redacted].
- There are multiple sources of water that [redacted] draws from, including groundwater, the River Rother, the River Arun, and a treated Portsmouth Water import. [redacted].
- [redacted]

[redacted]

- [redacted] is a largely conventional site built in 1973 that is [redacted] It supplies 169,000 properties currently within Southern Water's zones alone.
- Whilst the current site can treat for many of the water quality parameters specified by the regulator, there are new treatment processes that need to be added [redacted].

Burham is a key asset beyond 2050 and will need to accommodate a new raw water supply as part of water resource plans (recycling plant), in the face of reducing raw water availability from the river source. The site improvements we are making as part of this upgrade allow for modular additions in the future.

1.1. Document structure

This document explains the need for investment, our optioneering process to reach the proposed solutions, and how we've ensured that the expenditure is as efficient as possible and in customers' interests. It also describes how customers will be protected in the event of non-delivery. These factors align closely to the requirements Ofwat has set out for a Cost Adjustment Claim, so while our Special Cost Claim differs in some important ways, the remainder of this report is structured as follows:

- Section 2 sets out our approach to preparing this Special Cost Claim for the aspects that apply across each of the four sites, including:
  - Need for investment;
  - Selecting the best solution for customers;
  - Customer and stakeholder engagement; and
  - Customer protection
- Sections 3-6 details the evidence on a site-specific basis for [redacted] and [redacted] respectively; and
- Section 7 presents the conclusions of our findings.

We also provide appendices to supplement the main body of our report:

- Appendix A details our approach to deriving costs at PR24.
- Appendix B contains a summarised set of technical and engineering justification papers supporting our proposed need for investment at the four sites.
- Appendix C summarises the detailed optioneering process considered for each proposed solution across the four sites.
- Appendix D lists out the assumptions used in our benefits estimation.

- Appendix E presents a flow chart outlining the risk and value process used as part of the optioneering assessments.
- Appendix F provides information on historic expenditure incurred at each of the four sites dating back to AMP4.
- Appendix G states how our proposed scope of works for 2024/25 (AMP7) is eligible for transition funding against Ofwat's specific criteria.
- Appendix H provides a breakdown of the population and properties served by each of the four sites.
- Appendix I details the full scope and planned delivery schedule for our proposed supply resilience enhancement programme for each site.
- Appendix J presents our calculation of the AMP8 implicit allowance for each site.
- Appendix K contains an embedded file showing the DWI's letter of support for our claim.

Ofwat's PR24 Final Methodology outlines that any request for additional expenditure through a cost adjustment or enhancement claim must consider the need for investment, optioneering, cost efficiency and customer protection, with supporting evidence provided to justify the case.

The table below presents summarised evidence against each of Ofwat's requirements and informs the reader where additional information can be found to provide further sufficient and convincing justification throughout the remainder of the document.

Table 3: Aligning our Special Cost Claim with Ofwat's requirements

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
Need for adjustment	*Unique circumstances* Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment? Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers (considering, where relevant, circumstances that drive higher costs for other companies that the company does not face)? Is there compelling evidence of alternative options being considered, where relevant?	Each site faces its own unique challenges that means we are likely to face higher efficient costs relative to our industry peers at PR24. [redacted]	• Section 2.1 - Need for Investment • Section(s) 3.1 - 6.1 - Overview of Site Strategies • Section(s) 3.2.1 - 6.2.1 - Options Assessments • Appendix C – Engineering Justification for Options Appraisal

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
		[redacted] Addressing each site's separate, distinct challenges will help us deliver against the interim requirements that we must meet, as set by the Drinking Water Inspectorate, as well as our vision for resilient assets for the future. We have considered several options (nature-based, sustainable solutions, as well as opex/capex) for each proposed intervention across the four sites. This process is outlined both in Appendix C (detailed engineering justification for options appraisal) and the site-specific chapter summaries.	
	Management control Is the investment driven by factors outside of management control? Have steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	Several large assets are reaching the end of their useful life and require replacement. For all sites, assets were not simply replaced based on age as this is inefficient for customers – where the condition of assets has remained at a high level, we have not needed to replace them until the present time. For example, we installed [redacted] ten years ago, and in line with their design life, they will need replacing during AMP8. These factors are outside management control but remain crucial to maintaining power resilience on site. We have structured our proposed works through one large programme rather than a series of smaller projects to ensure that we maintain control over any potential cost escalation with our delivery partners. Any economies of scale generated through cost efficiency savings will be passed back to our customers.	• Section 2.2.4 – Cost Efficiency • Section(s) 3.1.3 - 6.1.3 - Site Resilience
	Materiality Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale? Is there compelling quantitative evidence of how the factor impacts the company's expenditure?	We have already invested more than double our entire AMP7 implicit allowance over the past 3 years across the four sites, demonstrating the need to enhance the resilience of our assets that are fast approaching the end of their useful life.	• Section(s) 3.1.2 - 6.1.2 - Site Reliability
	Adjustment to allowances Is there compelling evidence that the cost claim is not included in our modelled baseline? Is there compelling	The convergence of multiple external factors, combined with the fact these are large WSW with assets at the end of their useful lives, has meant that all four require significant atypical expenditure between	• Executive Summary • Section 2 – Our Approach

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
	evidence that the factor is not covered by one or more cost drivers included in the cost models? Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance? Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant? Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim? Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?	2025 and 2030 to maintain supply to 900,000 people. The scale of the investment required is such that it would not be covered by botex assessment models (we believe these would provide us with AMP8 allowance of £62m for all four WSW). The net value of our claim for AMP8 [(gross value of claim – implicit allowance) / business plan totex] for the four sites significantly exceeds Ofwat's materiality threshold of 1% in order to be considered for an adjustment claim. Our claim size of £318.7m exceeds this threshold. Through delivering this enhancement programme through large work packages, we can realise cost efficiencies that will be passed on to our customers, reducing overall risk and maximising our delivery capability. Our proposed interventions have taken a long-term view of our ambition (including reference to the LTDS and WRMP) and allocated where appropriate requested allowances between AMP7-9, also noting the mandated timelines as directed by the DWI.	• Section 7.1 - Deliverability
Cost efficiency	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	The appendices explain the approach we have taken to arrive at our final optioneering cost estimates and preferred solutions. We start with a long list of potential options before applying an options scorecard to reduce to a shortlist – the greater the score, the more likely that the option will deliver the best value for money, whilst reducing the greatest risk to the business.	• Appendix C – Engineering Justification for Options Appraisal • Appendix E – Risk & Value Process
	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	We have examined the scope breakdown to provide a like-for-like benchmark to be created from comparable sources across the water sector where possible, improving confidence in the position.	• Section 2.2.4 – Cost efficiency (benchmarking process) • Section(s) 3.2.2 - 6.2.2 – Cost efficiency
	Does the company provide third party assurance for the robustness of the cost estimates?	Mott MacDonald have provided external assurance on the cost estimates derived in our Special Cost Claim. Jacobs have also provided third-party technical assurance on the solutions proposed.	• Section 2.2.5 – Assuring cost estimates
Need for investment	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in	We have no choice about delivering the parts of this investment scope that are covered by DWI notices at each of the four sites on areas including excess turbidity and deteriorating water quality standards.	• Section 2 – Our Approach

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
	service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	Beyond this, as part of each site's strategic investment plan, we have proposed a set of projects that will ensure that emerging resilience issues are mitigated, including recent outages, source pressure issues, asset condition and [redacted]. This aligns with the objectives as set out in our LTDS.	
	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	The scale and timing of the investment is in part directed by mandated, prescribed timelines as set out by the DWI notices across the four sites. Beyond that, the magnitude of investment for long-term strategic works is driven by the fact that we have now reached the point where significant additional funding is needed to provide longer term technological improvements and enhancements to the overall treatment processes.	• Section 2 – Our Approach • Section 2.1.2 – DWI Notices and quality requirements
	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	This programme of works is highly interdependent between traditional botex and enhancement activities. This is so that we can achieve the best possible synergies and cost efficiencies for our customers, given the size of the investment. We provide a clear analysis and breakdown of implicit allowance in each site-specific chapter and compare this to actual spend during AMP7 to date.	• Section 2 – Our Approach • Section(s) 3.1 - 6.1 - Overview of Site Strategies • Section(s) 3.1.2 - 6.1.2 - Site Reliability
	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	Our requested expenditure is focused on areas that do not overlap in scope with funding that was awarded at PR19 (or prior). Where we are continuing to invest in existing process areas where funding was previous awarded, we can clearly distinguish between areas where funding was previously made available and what is now to be delivered in AMP8&9. For example, [redacted]. None of these items were funded at PR19. These are set out in each of the site-specific chapters.	• Section(s) 3.1.2 - 6.1.2 - Site Reliability
	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	We have assessed this programme against the criteria for low regret investment identified in the LTDS guidance and Appendix 9 of the PR24 Final Methodology.	• Section 2.1.4 – Alignment with LTDS

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	Feedback from our customer engagement sessions informed us customers were largely supportive of the plans we have in place and understood the long-term risks of inaction. This included the proposed scale and timing of the works across the four sites. There is clear support for moving at pace to improve the resilience of these sites.	• Section 2.3.1 – Customer Engagement
Best option for customers	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	We considered a range of possible solutions (not just capex) which might be available, including nature based and opex solutions. We produced our long list of options based on the best available information on the current issues facing these sites, taking into consideration the areas of scope highlighted in previous DWI Notices that we had addressed at previous price controls, as well as industry best practice information on similar assets that we have access to.	• Section 2.2.1 – Options Assessment
	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	Our options appraisal and preferred outcome solutions were based on both whole life costs and wider benefits provided by the intervention. This included the longer-term impact on the wider environment e.g. carbon impacts, as well as impact on local communities e.g. social impacts. Third-party technical assurance of this analysis was provided by Jacobs.	• Section 2.2.1 – Options Assessment • Section 2.2.4 – Cost Efficiency
	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	As part of our optioneering and best value process, we considered not only the lowest cost solution that could be provided to customers, but also solutions which provided the best whole life value to customers and the wider environment. In most cases, the works on site do not detrimentally impact either wider society or the environment surrounding each of the four sites. However, there are specific areas where clear benefits are likely to be observed. We provide our view of the qualitative impacts on the environment and other natural capital benefits (including carbon impacts) in the claim.	• Section 2.2.3 – Wider Benefits
	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	We have quantified the estimated benefits to customers as a result of our enhancement programme. This includes quantified impacts on performance commitments (water supply interruptions, compliance risk index, unplanned outages, and the quality of water in terms of taste, appearance & odour).	• Section 2.2.2 – Outcomes for Customers

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	Our optioneering process considered all types of mitigations including redundancy; resistance; reliability; and respond and recovery measures. We have also proposed a PCD to account for any uncertainty around costs and benefit delivery. We have proposed flexible, modular solutions across the four sites. For example, [redacted] needs to be able to expand in a modular process in order to enable increased production from Havant Thicket and water recycling sources in the future to meet water demand. The Thames to Southern Transfer (T2ST) option within our WRMP further compounds the need to move towards modular treatment technologies.	• Executive Summary • Section(s) 3.1 - 6.1 - Overview of Site Strategies
	Has the company appropriately considered the scheme to be delivered as DPC where applicable?	We have reviewed Ofwat's DPC guidance to consider whether the proposed investment would be suitable as measured against the technical discreetness criteria and tests. Our analysis sets out why we do not consider the proposed works at the four sites as being suitable for delivery through DPC.	• Section 2.4.1 – Direct Procurement for Customers
	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	It is critical that we know and understand what our customers value and that this is reflected in our PR24 business plan and LTDS. We have conducted customer research in relation to these four sites on an ongoing basis through our Water Futures programme. The information provided has ensured customer views have been sufficiently informed in the research.	• Section 2.3.1 – Customer Engagement
Customer protection	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	We have developed a price control deliverable (PCD) to return money to customers at the end of the AMP in the event of potential non, partial, or delayed delivery of investment across the four sites to ensure customers only pay for the improvement that they will benefit from. This clawback mechanism and associated cost will be based on the proportion of works that have not been delivered during the AMP, based on the delivery schedule at each specific site.	• Section 2.4.2 – Price Control Deliverable
	Does the protection cover all the benefits proposed to be delivered and funded (e.g. primary and wider benefits)?	The protection covers all proposed works and hence all related benefits to be delivered.	• Section 2.4.2 – Price Control Deliverable

Evidence needed	Ofwat Requirements	Summarised evidence	Cross-reference for additional justification
Affordability	Has the impact on affordability been considered?	We have considered the potential impacts on customer bills as part of our proposed works and the overall impact has £18 impact by the end of AMP8. Customers have indicated they are willing to pay this extra amount through our engagement with them.	• Section 2.5 – Affordability
	For large investment schemes in particular, is there persuasive evidence that the investment does not raise bills higher than what is affordable?	We have ensured that the planned investment across the four sites does not raise customer bills higher than what is considered affordable through an appropriate calculation of the run-off rate to ensure bill matching to the life of the asset. For further information please see our response to SRN04 Cost and Outcomes Approach (Chapter)	• Section 2.5 – Affordability
Board assurance	Does the company's Board provide assurance that investment proposals are robust and deliverable, that a proper appraisal of options has taken place and that the option proposed is the best one for customers?	Our Board Assurance Statement provides confirmation that our investment proposals are deliverable and can be considered robust and efficient. We have sought independent assurance from Jacobs and Milo Purcell (former DWI Deputy Chief Inspector) for these plans and the Board has since approved the overall.	• Board Assurance Statement SRN11 Data and Assurance Chapter

2. Our approach

2.1. Need for investment

Over the last ten years the DWI has served Notices at each of the four sites. Working closely with the DWI, we then reviewed all our Notice commitments for the four sites and proposed new delivery dates and solutions that would deliver the long-term site strategies and produce the best outcome for customers. We have since received Final Enforcement Orders (FEOs) from the DWI in February 2023 at each of the four sites.

This case is built upon four distinct sites, each with their own specific drivers for change, [redacted]. We require urgent investment to deliver against the DWI FEO and ensure that the four sites can continue to deliver to the levels of performance required by our customers, regulators, and other stakeholders.

We have already spent over £130m TOTEX at the four sites during the first 3 years of AMP7, and £206m Capex since 2010 to maintain the level of service that our customers depend on and to provide short-term stabilisation in terms of resilience at each site. We have now reached the point where significant additional funding is needed to provide longer term technological improvements and upgrades to the overall treatment process.

Our ambition over AMP8&9 is to upgrade each of the four sites to enable a step change in service delivery through a fundamental reconfiguration of the existing processes. In order to do this, AMP8 Capex is required to not only provide immediate benefits, but also to lay the foundations for future investment.

2.1.1. Driving the case for change

We need to enhance these assets during AMP8 to meet the challenges set out below:

- Emerging raw water quality challenges: [redacted].
- Treating more water at different times due to weather extremes: As part of the Water for Life Hampshire Programme (WfLH), we are connecting Yewhill WSR, [redacted], to Rownhams WSR, [redacted]. This will provide greater resilience to customers currently served by [redacted] This ensures that in times of moderate to extreme weather conditions, such as periods of drought, water can be supplied to all customers without harming the local environment. [redacted]. This investment will significantly improve the quantity and quality of water supply being sent for treatment at these sites. For example, [redacted]. Our WRMP assessment of problem characterisation returned high complexity and large strategic need scores for the zones which these sites serve.
- Increasing water demand: We're investing over £1bn across Hampshire and the Isle of Wight between now and 2030 to ensure a reliable water supply for our customers served in the Hampshire South region, as well as to protect and enhance the environment. We're also investing in a major upgrade at [redacted] so that we can continue to provide customers with high quality drinking water and replacing equipment which has come to the end of its working life, whilst also improving parts of the treatment

process. This work will ensure the site, which supplies water to over 250,000 customers, can operate effectively and efficiently well into the future.

- Facilitating sustainable environmental-based solutions: All four sites will see changes as a result of the Water Resources Management Plan (WRMP). As part of our own long-term commitment, we're planning to introduce a Water Recycling Plant in Havant, and a new water transfer pipeline to provide a new source of water for our customers in Hampshire during a drought. We currently rely on chalk streams and their associated aquifers from the River Test and the River Itchen to provide the majority of water to our customers in Hampshire. However, we will need to find new sustainable sources of water to help keep taps and rivers flowing due to the pressures of a growing local population and changing climate. Our treatment works must be reconfigured to allow new sources to be treated effectively. Taking [redacted] WSW as an example, we are planning to implement innovative technologies such as [redacted] to increase capacity, decrease the footprint occupied by concrete civil structures on site, and provide more space for modern, sustainable treatment processes in the future.

Table 4: Summary of main issues and benefits

Site	AMP8/9 issues being addressed	Scope items	Primary benefits
[redacted]	• Future capacity requirements (WRMP driven) • Site specific raw water quality challenges • Aged infrastructure • Lack of site automation • Power resilience • Waste handling	• [redacted]	• [redacted] • Increased site resilience and reliability • Improved automation and control of site
[redacted]		• [redacted]	• Reduction in taste and odour incidents • Increased site resilience and reliability • Improved automation and control of site
[redacted]		• [redacted]	• [redacted] • Increased site resilience and reliability • Improved automation and control of site
[redacted]		• [redacted]	• Improved process performance and long term resilience • [redacted] • Increased site resilience and reliability • Improved automation and control of site

2.1.2. DWI Notices and quality requirements

Over the last ten years the DWI has served Notices at each of the four sites:

- The Notice on [redacted] was issued in 2018 after a DWI audit.
- The first Notice on [redacted] was issued 2018 after two events and a DWI audit. It has undergone significant changes due to the issues identified on the site during events and compliance breaches.
- A Notice was served on [redacted] in 2018 for risks associated with radiation, disfinection and turbidity.
- [redacted] had a Notice served in 2018 after a DWI Audit. Hazard Review (HazRev) actions were added to the Notice in 2020. In April 2022 DWI issued an FEO Consultation under Section 20 of the Water Industry Act.

All four Notices have been updated by the DWI over time due to changes in both solution design and delivery dates. A piecemeal picture of changes to sites was emerging that wouldn't lead to the best long-term solution. This risked investing in temporary spend that didn't manage the underlying risk profile appropriately for customers. We raised this concern with the DWI and in the summer of 2022, we finalised our end-to-end site strategy reviews which defined the best long-term solution and roadmap for each site.

We sought assurance from an independent expert, Milo Purcell, formerly Deputy Chief Inspector of the DWI. This independent assurance was sought in the context of ongoing and escalating regulatory enforcement action by the DWI that included potential further enforcement action at these four sites. Milo reviewed the development of the strategic reports for each site, to provide our Board/Executive with confidence that the final strategies are fit for purpose and will deliver against the objectives.

Working closely with the DWI, we then reviewed all our Notice commitments for the four sites and proposed new delivery dates and solutions that would deliver the long-term site strategies and produce the best outcome for customers. We have since received Final Enforcement Orders (FEOs) from the DWI in February 2023 at each of the four sites.

The DWI has issued several FEOs across the four sites over multiple AMPs on areas including [redacted]. Addressing these long-term problems [redacted] throughout AMP8 within the context of their wider zones – [redacted] – remains our utmost priority.

Maintenance of our assets is essential. We have no choice about delivering the parts of this investment scope that are covered by DWI notices at the four sites on areas including [redacted]. We have proposed a set of strategic investment projects that will ensure that emerging issues are mitigated, including recent outages, source pressure issues, asset condition and [redacted].

2.1.3. Major improvements to Southern Water's resilience across the four supply works

Upgraded process treatment technology

We plan to meet future requirements of each site through modernisation and enhancement of the treatment process. This will ensure a step change improvement in performance, and greater resilience against current and future water quality challenges. To do this, we require a fundamental reconfiguration of several of the works, which has a significant upfront cost, but will lead to a reduced burden on future generations. For example, we will upgrade our pumping stations to make them more energy efficient. We will introduce granular activated carbon (GAC) treatment to reduce the impacts of taste and odour at our sites that are worst affected. We will also provide permanent ultraviolet (UV) treatment upstream of the disinfection system

at [redacted], to replace the temporary system rapidly deployed to meet a cryptosporidium challenge in AMP7.

We have actively sought the deployment of new and innovative technologies to achieve these site upgrades. [redacted] This additional space can be used for on-site electricity generation to reduce the operating costs and carbon footprint of running the site (noting that this additional investment is not included within this claim).

By having modern, flexible treatment works, our operations teams will have enhanced control over process flows – being able to treat at reduced flows during external events which would currently lead to outages. This is a key aspect of the enhancement on each of these sites.

We will continue to adopt innovative pathways to enable a step change in delivery during AMP8&9 in order to deliver this programme of works on time and to budget.

Enhanced Power Resilience

We have developed a long-term view of power resilience requirements across our estate. This has allowed us to understand areas to target, which we have subsequently mapped against the four sites. Our proposed investment will seek to increase the maturity of our power estate, to deal with new requirements and an enhanced resilience standard. We will do this through measures which provide adequate standby generation, uninterruptable power supply (UPS) backups to key processes and, where possible, provide the foundations for on-site generation in the future through our non-appointed business, funded outside of our core regulated business. These measures are driven by a need to ensure no interruptions to the existing process throughput due to issues with either DNO infrastructure, or assets that we own. The existing power system needs to replace [redacted]. Our proposed solutions will enhance resilience through implementing a superior technological design compared to the current systems with increased functionality.

Our planned investment need is derived from our proactive approach to asset management. In addition to these measures, [redacted] in upgrading the infrastructure supporting the sites. We need optimal technology to ensure no interruptions to our core processes or final water quality output and performance.

Long-term benefits of these interventions include reduced power outages leading to loss of service, with greater resilience to cope with future demand.

Improved Automation and Control

We have proposed investment which will increase the level of site automation and control across our key production assets. [redacted]. This will also optimise process performance and provide additional visibility of issues before they arise, to enable enhanced mitigations and greater protection of customer supply. To do this we must upgrade our existing infrastructure during AMP8 to build our level of site control up to a sufficient standard prior to AMP9 deployment of enhanced control and automation processes.

In the shorter term, to provide additional flexibility over production, additional automation and control will be provided at all four sites during AMP8 where not already present, [redacted]. There is also a need for increased monitoring and visibility of the raw water being received by each of the sites, and the quality of water being produced. Targeted upgrades to raw water monitoring and process controls are planned to [redacted].

Benefits include increased flexibility in process control, reduced outages due to process failures, and an increase in the maturity of our site data and visibility.

Efficient Waste Handling

For each of the four sites, there is a need to improve discharge quality by better treating and handling the waste that is produced. Our internal resilience assessments highlighted the need to improve the protection provided to the downstream sewer network serving the sites to reduce overflows. There are also new requirements relating to the safe treating and handling of waste sludges, alongside an ambition to return water to the head of the works where possible, given the degree of water scarcity we are operating under.

Through targeted investments around waste handling, we can help to maintain a protected environment within our catchment zones. [redacted] – this will also reduce the environmental impact of production on the surrounding catchment.

This investment will alleviate problems handling and treating our waste efficiently whilst reducing the environmental impact on the surrounding catchment.

2.1.4. Alignment with LTDS

Low Regret Assessment

We have assessed this programme against the criteria for low regret investment identified in the LTDS guidance and Appendix 9 of the PR24 Final Methodology. The guidance identified that low regret investments meet the needs across a wide range of plausible scenarios, meet short-term requirements; or keep future options open, including cost minimisation.

We consider that the investment proposed in this Special Cost Claim is a least regret investment for the following reasons:

- **Need** - this programme of work is required in order for us to meet FEOs from the DWI to address water quality issues, as well as enhancing the resilience of our assets to deliver sustainable solutions for our existing and future customers.
- **Timing** - the FEOs have a fixed delivery date (spread across AMPs 7-9) and we are unable to delay investment to future periods. We therefore need to undertake significant and immediate investment now to ensure that we improve the quality of the drinking water received by customers now.
- **Options** - we have carried out an assessment of options across each of the four sites and identified a set of low regret solutions (including nature based and opex solutions) based on whole life costs and benefits, for example, through considering wider impacts on the environment. We have also ensured that the proposed investment will increase the flexibility and adaptability of the sites and making them more resilient and able to cope with different common reference scenarios should they emerge in the future, forcing us to divert away from our core pathway. For example,

installing [redacted] will mean that we will be able to add future capacity in a modular fashion, a benefit relative to more conventional treatment processes in coping with additional requirements for demand. See site-specific chapter sections 3.2.1-6.2.1 and Appendix C for further detail on our options appraisal.

- **Future** - we have assessed a range of plausible futures against each preferred solution. These include flexing expected levels of water demand we need to provide for, climate change impacts on existing assets (e.g. likelihood of drought conditions), abstraction levels, and technology adaptation scenarios. For example, we considered how specific works at [redacted] would still be required to deliver high quality water when additional resources from Havant Thicket reservoir are available. We have also taken onboard feedback in relation to the environmental ambition and outcomes customers would like to see from us as part of any planned works.

The proposed works will ensure that each site will become more adaptable and flexible in response to growing demand, with future investment carried out more efficiently as a result. By having modern, flexible treatment works, our operations teams will have enhanced control over process flows and be able to treat during external events which would currently lead to unplanned outages.

The sites are in need of enhancement to respond to changing circumstances, including reduced water available for abstraction due to the increasing impacts of climate change and required protection of the surrounding natural environment. Part of our proposed works has been to identify additional interventions to mitigate the effects of climate change on our wider network, for example, by providing permanent flood barriers (where applicable) based on our Flooding Resistance Assessments.

For further detail on how this programme of works aligns to our longer-term ambitions to provide innovative and sustainable solutions to ensure a resilient water future for customers in the South East, see our additional PR24 submissions relating to WRMP.

2.2. Selecting the best solution for customers

To make sure that we are addressing those problems and securing the opportunities for our customers in the most value-for-money (VFM) manner, we need to ensure that the scope of our proposed solutions is right for customers now and in the future, and that our expenditure proposals are as cost efficient as possible. To do that we have conducted a detailed optioneering process to make sure that we are providing the best outcome for our customers based on the routes available to us, and that we have robustly benchmarked our unit costs with appropriate comparators to make sure that they are deemed efficient. Further detail on our cost and option methodology can be found in our technical annex.

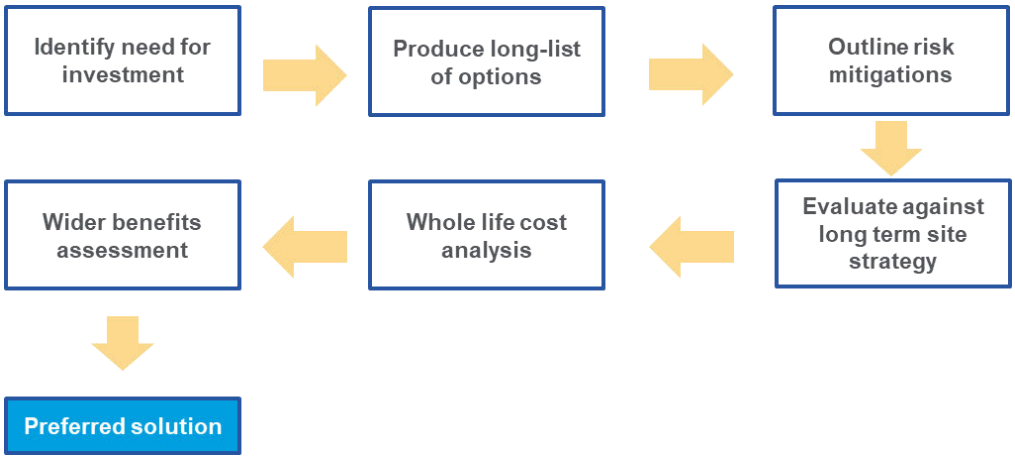
2.2.1. Options assessment

We considered a range of possible solutions (not just capex) which might be available, including nature based and opex solutions. We produced our long list of options based on the best available information on the current issues facing these sites, taking into consideration the areas of scope highlighted in previous DWI Notices that we had addressed at previous price controls, as well as industry best practice information on similar assets that we have access to. Where information is known about the sites due to existing studies, this detailed information has been used to cost the delivery elements, through the application of our solution hierarchy.

Our optioneering process considered all types of mitigations as referenced in Ofwat's PR24 Final Methodology, including redundancy; resistance; reliability; and respond and recovery measures. This should provide confidence to customers that we will deliver the best option available. We then evaluated our long list of options against a scorecard of objectives (such as the delivery schedule, cost efficiency etc) and discounted those options not deemed viable for further consideration.

Having reached a short list of options to achieve the desired outcome for the specific intervention, our Cost Intelligence Team (CIT) team then used a set of cost curves based on outturn costs of past projects completed to date to price solutions for AMP8. We conducted a full review of all unit costs ahead of this process to reflect our view of what would be needed to represent efficient costs across the four supply works for AMP8 and beyond. We then used this information to select the preferred outcome based on both whole life costs and wider benefits provided by the intervention. Our optioneering process is summarised below.

Figure 3: Optioneering process to identify preferred solutions



We applied this process to each of the four sites for the material interventions required during AMP8. A summary of the preferred solutions for each site is presented in the site-specific chapters in the remainder of this Special Cost Claim. Detailed engineering justification used during the options appraisal process is presented in Appendix C.

2.2.2. Outcomes for Customers

We have quantified the estimated benefits to customers as a result of our enhancement programme. The proposed solutions will enable a significant increase in resilience at the four sites during AMP8, ensuring customers' water supply is not impacted and can withstand the increasing pressures posed by climate change and the strain on our raw water sources. We will also be reducing the financial burden on future customers, and thereby ensuring an intergenerational fairness aspect across our programme of works, as the proposed solutions will be more cost effective than reactively maintaining and managing existing aged assets and replacing with like-for-like technologies in 10-15 years' time.

There will also be fewer instances where customers are unhappy with the taste, odour, or appearance of their drinking water. Finally, through an increased level of process automation and control to allow greater flexibility, we will be able to avoid a significant number of unplanned outages or supply interruptions.

We summarise below the resulting performance and quality improvement at each of the four sites, as measured against several of Ofwat's PR24 performance commitments (PCs).

Table 5: Estimated benefits at each of the four sites (baseline = APR22 Data)

			2030	2035	2040	2045	2050	2055
	Performance Commitment	Unit	*Forecast*	*Forecast*	*Forecast*	*Forecast*	*Forecast*	*Forecast*
Relative improvement v 2022 APR baseline	CRI	#	2.06	2.73	3.00	3.00	3.00	3.00
	Supply Interruptions	minutes	4.00	5.31	5.84	5.84	5.84	5.84
	Customer Contacts - T&O	#/1000 population	0.03	0.07	0.10	0.11	0.12	0.12
	Customer Contacts - Appearance	#/1000 population	0.09	0.20	0.32	0.42	0.50	0.55
	Unplanned Outages	%	0.18%	0.24%	0.27%	0.27%	0.27%	0.27%
Cumulative Improvement (%)	CRI	%	44%	59%	65%	65%	65%	65%
	Supply Interruptions	%	44%	59%	65%	65%	65%	65%
	Customer Contacts - T&O	%	26%	40%	46%	50%	51%	52%
	Customer Contacts - Appearance	%	15%	23%	30%	38%	46%	53%
	Unplanned Outages	%	44%	59%	65%	65%	65%	65%

For information relating to the assumptions made in deriving these benefits, please see Appendix D. Note that benefits in future AMPs assume that the modularity built into the design enables more efficient further investment in latter AMPs not covered within this claim.

Our 'Performance Commitments Methodologies' technical annex provides further detail on the methodology we have used.

2.2.3. Wider Benefits

As part of our optioneering process, we considered not only the lowest cost solution that could be provided to customers, but also solutions which provided the best whole life value to customers and the wider environment. In most cases, the works on site do not detrimentally impact either wider society or the environment surrounding each of the four sites. However, there are specific areas where clear benefits are likely to be observed. We provide more detail on these aspects below.

Table 6: Qualitative Natural & Social Capital Enhancement Assessment

Category	Qualitative Analysis	Future State
Land Use Change/Habitats	No detrimental impacts anticipated for specific habitat types (marine, woodland, grassland). No impact to wetlands perceived from these works. There are no changes to land type which may impact upon flooding within the natural environment. There is no perceived benefit in terms of pollution removal (air quality).	No detriment
Biodiversity Assessment	Our target for AMP8 is for our projects to achieve a 10% net biodiversity gain, in line with planning legislation. At each of the four sites, there are no detrimental impacts perceived in the planned scope. By enhancing our waste handling on site, this will reduce damage to the environment from unwanted/untreated spills, and thus any impacts to local flora & fauna. Our source waters in the future in this area will be fed less from chalk streams, which will protect these sensitive and unique ecosystems.	Improvement
Water Abstraction	At [redacted] and [redacted], we are seeing a change in raw water sources aligning with the Havant Thicket WRMP scheme. This will safeguard internationally rare chalk streams by providing a sustainable source of water.	Improvement

Category	Qualitative Analysis	Future State
Water Quality (Rivers, lakes, estuaries)	The upgrades to the waste stream at each site should improve the quality of discharges being passed to the nearby rivers.	Improvement
Shellfish Production	There are no applicable shellfish impacts	No detriment
Recreation (including angling)	By improving the quality of our discharges into the River Test & Itchen, recreational users of these water bodies will benefit.	Improvement
Nature based volunteering & educational visits	Currently there are no opportunities anticipate for nature based volunteering or educational visits	No detriment
Carbon	Through our interventions which are required to keep the sites resilient into the future, there is inherently some carbon impact. However, we have selected the best long-term solutions in terms of risk reduction, whole life cost, and carbon impact. Following our interventions, each site will run more effectively and with a lower operational carbon than in the current time. Schemes involving ceramic membranes are currently expected, based upon trial data, to have a higher OPEX spend due to chemical consumption. However, they have a smaller footprint than conventional solutions which have a higher embodied carbon. The upgrades to existing pumping infrastructure with new, more efficient pumps will see a reduction in operational carbon over the lifetime of these assets specifically.	Improvement
Other	There are several other ways in which our proposed schemes will improve the natural and social capital within the Southern Water catchment. We are working to ensure flows are returned to the head of the works at [redacted] WSW. This will lead to a reduction in wasted water leaving the treatment process. This is turn is better for the environment, through more efficient use of water. By improving the resilience of our works, there will be fewer interruptions to supply. This will lead to less negative impacts on our customers including lost time or revenue for businesses that rely upon our water and less disruption within people's homes. We are also increasing the level of automation on our sites. By the end of AMP9, this will allow us to conduct fewer manned visits to site, reducing the carbon footprint of operations and maintenance activities.	Improvement

2.2.4. Cost efficiency

We have benchmarked the costs of undertaking these activities to demonstrate the efficiency of our proposed expenditure. We have well established procedures for benchmarking the costs of our business-as-usual projects but given that the scale of this investment is significantly larger than any work we have previously undertaken, we have sought external expertise from Mott MacDonald to provide a robust and independent view of what works are required along with a view on the efficient level of required costs.

Cost estimates

The four sites each have a cost estimate applied for their potential options. These estimates have been generated either from Net Direct Works (NDW) that were issued to the CIT team, or from scoping documents that CIT costed themselves. For the CIT cost estimates, costs have been generated from a combination of cost curves at function and asset level, manufacturer quotations, and delivery partner estimates through the Risk and Value (R&V) process[7].

Once the NDW estimates are assumed or calculated, an inflation forecast factor is applied to bring the costs in line with their expected construction date.[8] Additionally, a Southern Water multiplier of 1.494 is added to the costs which accounts for indirects, risk, tender-to-outturn ratio, and site-specific factors.

Finally, by delivering this enhancement programme through large work packages, we can realise cost efficiencies that will be passed on to our customers. Through our early engagement of the supply chain and working to ensure the transfer of site knowledge from the incumbent to the future delivery partner, we can reduce overall risk and maximise our delivery capability. Based on the above, we have applied economies of scale benefits of up to 8% of total cost (prior to submitting our overall cost claim) relative to carrying out a series of distinct, smaller projects. Further information relating to how we will deliver these works more efficiently can be found in Section 7.

The economies of scale generated through delivering one large programme of works relative to a series of smaller projects will save up to 8% of total costs.

Appendix A contains further information and detail on our overall PR24 approach to cost estimation.

Benchmarking process

To ascertain areas where Mott MacDonald could provide an industry benchmark, the scope breakdown was examined to align components and build-ups to Level 1 function models where appropriate. This allowed a like-for-like benchmark to be created from comparable sources across the water sector, improving confidence in the position. Additionally, to gain a better comparison with the current market position, only direct works were considered in these models before being subject to the same inflation process and additive multiplier that the NDW cost estimates used. As such, the cost estimates and benchmarking presented in the site-specific chapters are consistent.

[7] Please see Appendix E for additional information and explanation on the R&V process used
[8] The medium-term forecast through to 2026 applies the CPI forecast as published by the Office for Budget Responsibility (OBR). Beyond that, to 2031, the long-term annual average growth of CPIH has been applied

The benchmarking process itself revolved around using a catalogue of sector-specific function curves to determine an industry benchmark cost for comparable processes to each cost estimate. Curves from various water companies have been used to gain greater coverage of all process types and to improve confidence in the benchmark value. Where the scope of the cost estimate defines a different yardstick to those present in the benchmark curves, a conversion factor has been generated from best-practice engineering equations and assumptions to ensure all costs are relate to the same asset size.

The scoping documents have been examined to match groups of assets and processes to function level curves. The nature of top-down curves means they are not site-specific, and as such are based off a generalised list of inclusions and exclusions associated with that process. As the scoping documents are more comprehensive and site-specific, it may be that curves have been aligned with a typical build-up for a process with miscellaneous items excluded. Where the scope has aligned sufficiently with a process benchmark, if there is sufficient curve data a benchmark cost with 75% confidence regions has been generated and detailed. If a partial benchmark is achieved, the cost estimate has been analysed to ascertain the costs associated with the comparable benchmark process.

The nature of the solutions across the four sites means there are some assets for which no comparable model exists, with other assets falling outside of any function level process. Where no comparable model exists, if a cost can be justified that represents the market position instead of a benchmark cost, it has been provided. Failing this, the process and associated cost have been excluded from the cost estimate.

We present the results of the benchmarking exercise in the site-specific chapters in the remainder of this Special Cost Claim.

2.2.5. Assuring cost estimates

Our CIT team have undertaken several checks on any costs that have been generated. For example, to assure that cost estimates are accurate, the first activity focuses on data point validation. Data points captured from our past delivered projects by CIT will be cleansed and benchmarked using historical schemes and programmes prior to inclusion with Equipment Set and Function Level Cost Models. Where anomalies are found, cost information is scrutinised and challenged prior to inclusion or exclusion.

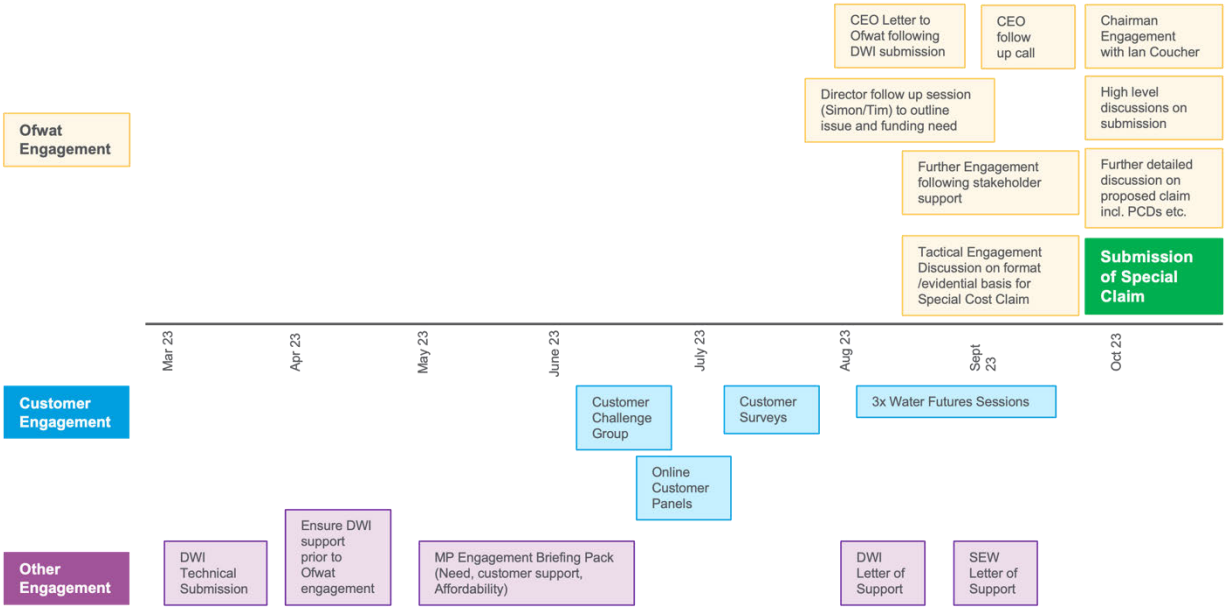
We have also sought external technical assurance on the cost estimates derived by Mott MacDonald and the solutions proposed in our Special Cost Claim from Jacobs.

2.3. Customer and stakeholder engagement

We have engaged with a range of different stakeholders over an extended period to gather support for our programme of work on these four sites, including Ofwat, the DWI, and our customers. We have received letters of support from the DWI and South East Water[9] reiterating that this investment is both critical and timely. We remain committed to ongoing dialogue throughout PR24 and beyond on the progress and planned outcome of our investment.

[9] Specifically in relation to proposed works at [redacted] WSW

Figure 4: Southern Water engagement with relevant stakeholders



Since the start of AMP7 increasing resilience of existing assets and maintaining the quality of water supplied in the wake of the increasing impacts of climate change and rising water demand has become a united priority amongst industry stakeholder bodies. This has been driven in part through binding net zero targets pushing water companies to increase their sustainability and reduce their environmental footprint.

Ofwat's PR24 Final Methodology tasks water companies to prioritise the resilience and maintenance of existing assets by 2030 and beyond. This aligns with the investment drivers proposed to support our Special Cost Claim. Other industry bodies also expect to see significant change during AMP8. For example:

- Drinking Water Inspectorate (DWI): The DWI expects several areas to be fully assessed following each water company's strategic long-term planning as part of PR24, including risk mitigation through investment in local infrastructure, asset management and asset health assessments against extreme weather events, and resilience arrangements in water resource planning by accounting for environmental pressures, demographic changes and shifts in customer behaviours.
- Consumer Council for Water (CCW): Climate change means that we're experiencing extreme weather like storms, floods, and heatwaves more often. When these things happen, it can affect the availability of water. The CCW have asked water companies to make sure their networks are ready to cope with the demands of climate change at PR24 by calling for business plans that clearly show water companies are looking ahead to keep customers taps running long into the future.

Improving the condition of our largest supply works is critical to help alleviate the concerns of industry regulators and consumer-facing bodies.

2.3.1. Customer engagement

It is critical that we know and understand what our customers value and that this is reflected in our PR24 business plan and LTDS. An overview of recently conducted customer research relevant to this Special Cost Claim has told us that the areas of focus are:

- Resilience | Customers recognise the need for and importance of urgent investment in basic infrastructure in the face of climate change

- Drinking water quality | Customers believe that safe drinking water is their number one priority as they need huge trust in the quality of water coming out their tap
- Carbon and Net Zero | Does not feel like a core priority for acceleration, though customers acknowledge wider importance of less carbon
- Deliverability | Informed customers express reservations about how much is achievable in AMP8

Customers feel that the Four Site strategy is an essential part of the plan and are supportive.[10] Understanding the risks if work is not undertaken really brings home the need for this work to take place and reinforces customer support. The main benefits the customers want to see from the plan are enhanced water quality, a more reliable supply of water and improved drought resilience.

Customers feel the approach is well planned and thought our acknowledgment of recent outages in the network adds credibility, with customers aware of these incidents and happy to see them being addressed.

"I am 100% supportive of this plan and for Southern Water to progress with this work. We are talking about something that will affect people's health. So, for me, that is hugely important, and I am supportive of this plan." Household customer

Although support for the plan is high, many customers lack confidence in whether we can deliver these plans. There was also some scepticism around motivations for the work.

Customers feel like this work needs to happen, rather than it being a nice to have, so customers feel that we must find a way to deliver. This confidence is muted, however, with many feeling that it will only happen as there will be public scrutiny and Ofwat monitoring. If it was just down to us to achieve, then many customers lack confidence due to negative PR and perceptions of Southern Water being reactive and having outdated infrastructure.

"I am really supportive, but in a kind of begrudging way - that it has to be done because they have not previously put the required work / upgrading in place." Household customer

Customer feedback remains at the heart of both this Special Cost Claim and our LTDS. We have significantly improved our approach to customer engagement ahead of PR24, using a wide range of qualitative and quantitative techniques.

For example, the qualitative Water Futures online panel is a key source of insight and is a 'go to' to inform our PR24 planning. It comprises 40+ customers that represent a wide variety of demographics. A quantitative element was also added to the workstream to explore issues raised from the panel and provide insights from more 'uninformed' customers (over 1,000) via an online survey, across our area of operation.

The most recent survey informed us that our customers prioritise:

- Greater resilience: Most realise that we are facing issues such as aging infrastructure. Customers reported that it is "great to see Southern Water are addressing this very visible and tangible issue".

[10] Four Site Strategy Customer Feedback and Water Futures Wave 4 Quant

- Affordability: Affordability concerns remain considerable, with 3 in 10 struggling to afford outgoings. Future bill increases and associated communications will need to be sensitive to customers in varied situations. Information will be required to explain why they are needed and what they will provide.
- Safe, reliable drinking water: Reliability of supply and ensuring that drinking water remains safe are the main issues that customers have with tap water. Confidence is high as many appreciate that there are standards in place, and quality is regularly checked.

Table 7: Summary of water futures findings (July 2023)

Issue raised by customers	How this has been addressed in our claim
Which improvements will have the most significant tangible impact / create more issues if we do not implement them soon?	*This has been fully considered in our appraisal of options, with supporting narrative within our claim to highlight short term transition elements which are crucial to ensuring specific current risks are minimised (also covered by our DWI Final Enforcement Notices) and also to allow us to deliver our AMP8 interventions*
Undertaking risk assessments and allocating risk levels to every element and which may require planning permission.	*We have leveraged our Asset Risk Management system to score, rank, and prioritise risks. This has then fed through into our risk and value process when determining preferred solutions, which seek to provide the maximum risk reduction at each works.*
Looking at which elements are a longer-term fix vs. more temporary measures – which are more future focussed.	*We have created a strategic plan that covers from the end of AMP7 through to AMP9 - within this we have set out our short-term measures and longer-term strategic aims*
Customer affordability, cost of implementation and impact of inflation – now and in the future.	*We have worked to assess the scale of impact to our customers from these works, but additionally also assessed the benefits which we have quantified.*
The logical flow of implementation, which measure will have a positive impact on those implemented later.	*We have considered which items are critical enablers to ensuring benefits are realised in our longer-term strategic aims for each site. Our engineering and construction teams have reviewed the deliverability of these works and provided timelines for implementation to ensure an efficient programme.*
Level of impact locally upon customers whilst work is taking place, timing of when this happens e.g. school holidays.	*Our engineering and construction teams have considered the possible impacts of large works on communities, and in the next phases of detailed design for each site, this will be further considered in the form of temporary works.*
Environmental impacts and potential for sustainable solutions	*We have evaluated each option for potential additional environmental benefits and considered this in our selection of preferred solutions.*

We have also looked at the role of the independent challenge group (ICG) panel. Our ICG is made up of four key components to challenge us to work better and more efficiently.

Figure 5: Overview of Southern Water's Independent Challenge Group

In June 2023 we held five additional online sessions as our part of Water Futures 2030 engagement with customers across all counties in the Southern region to explore overall reactions to the planned four sites enhancement programme. This feedback told us that:

- Customers were largely supportive of the plans we have in place and understood the long-term risks of inaction.
- Customers positively see benefits to both themselves, and to the local economy of the proposed investment programme, feeling that their previous views have been represented.
- Customers understand the need for work to be prioritised and are happy to see that our current thinking matches their own.
- References to sustainable solutions, use of technology and improving resilience for future generations increases confidence and support.
- The current plan feels proactive and innovative and matches well with customers' desire for more modern and innovative methods of delivery.

When engaging on the Four Sites strategy, there are several conditions customers wish to hear about:

- ✓ **Measurability & accountability:** Giving more information around targets and how often these will be measured; and demonstrating not just how customers will / will not be impacted, but how Southern Water and shareholders will be impacted – in terms of investment and penalised for failure.
- ✓ **Level of ambition:** There is a sense that we are doing the bare minimum needed; we need to be more vocal about where and how we are going above and beyond vs. Ofwat stipulations, but importantly vs. other water suppliers.
- ✓ **Environmental impacts:** Environmental factors such as how any negatives will be mitigated and what enhancements will happen to the environment need to be dialled up much more.
- ✓ **Technology lifespan:** The use of technology is praised and is a significant hook in terms of support, but we need to show how futureproof this technology is – are we just playing catch up? Will we be behind the industry curve again in 5-10 years?
- ✓ **Costs to the customer & value for money:** Although mechanisms are in place to ensure that no unanticipated costs will be passed on, customers want to know what element of the bill impact previously looked at is covered here. We also need to reassure the process of gaining value for money from sub-contractors used / processes and new technology procured – are we being sensible?

- ✓ **Lack of a plan B:** Whilst not having a plan B gives confidence of the importance of the work, it can feel naive. We need to explain more around this and what other fail safes are in place – what if it all goes wrong? What if we do not achieve this plan, what happens to our supply?

The protection mechanism adds reassurance

Learning about the protection mechanism, customers think it is great to see that investment will be protected. The fact customers will not pay if it is not achieved creates a sense of doubt that we lack confidence in their own plan. However, once more informed about the mechanism, customers are more reassured. This is because we will be independently held accountable and the monitored so the plan will be delivered. As seen with ODIs, there is also some concern that being penalised for not hitting targets will create a downwards spiral. Some feel it would be better to learn about what support mechanisms are in place, rather than 'penalty' mechanisms.

"I am very surprised and impressed with this deliverability monitoring. It is showing that SW are taking complete responsibility, but it is also instilling confidence in me as a consumer as it means they truly intend to carry this out and think they can do it." Household Customer

"That doesn't inspire me at all. It seems to say that if Southern Water doesn't meet its targets, then it will be penalised but somehow that will help it improve its services. It won't, it will just put them further in the mire." Household Customer

The plan is right for the long term

Customers tell us the Four Sites strategy shows a proactive approach in addressing what are seen to be global current and future challenges, such as climate change, droughts, and population growth / increased demand. The approach being modular and flexible feels logical and future thinking. It shows we are thinking about the future, which helps to go some way to challenge perceptions of the business. However, there are some customers who feel that whilst these improvements are positive, we are only just catching up with modern times and maybe not going far enough to future proof. Customers want to ensure the following are considered in our decision making on the strategy:

"I think that Southern Water should look to do the work that will cause the most amount of damage and cost further down the line if it is not done." Household customer

"I would put priority on longer lasting fixes, so they don't have to be revisited. Also, anything that needs planning permission so maybe other work could be got on with while that process goes on." Household customer

"This is what I really believe in our generation has been so short sighted and profit orientated we really need to change our attitude and conduct the consequences of what we are doing and the legacy we are leaving our children and grandchildren." Household customer

2.4. Customer protection

Ofwat stated for PR24 that it considers any ***"large-scale investments that are unsuitable for DPC require protections to be in place…[and] may need bespoke funding and delivery arrangements to allow schemes to proceed***". Bespoke arrangements would be considered necessary where the investment is "***significant compared to the overall company totex"*** (e.g. £500m or 10% of wholesale totex) and the delivery is likely to be multi-period.

Consequently, to ensure that our customers are protected against non-delivery of the outcomes that the funding requested is intended to deliver, and to make sure that customers receive value for money, we have considered whether the projects could be delivered via DPC or, if not, what an appropriate alternative form of customer protection would be.

2.4.1. Direct Procurement for Customers

We have reviewed Ofwat's Direct Procurement for Customers (DPC) guidance[11] to consider whether the proposed investment would be suitable. Based on our assessment of the technical discreetness criteria and tests, we do not believe the Special Cost Claim to be appropriate to be delivered through DPC.

Although the total proposed investment across the four sites exceeds £200m, they are four separate assets. Therefore, individually, each site is significantly under the £200m threshold. The assets are also deeply integrated into our network.

We outline our supporting reasons against each test below:

- Programme Scalability – For individual projects or assets, is the sum of the whole life totex for the single project or combined projects/assets proposed by a water company over one or more successive control periods less than £200m?
  - The sum of the requested whole life totex in our Special Cost Claim does exceed £200m at PR24 and is therefore applicable for DPC. However, they are four separate assets, and should be considered individually, therefore, each site is significantly under the £200m threshold. The assets are also deeply integrated into our network.

- Construction Risk - Is there any significant reason why most construction risks cannot be effectively transferred to the CAP and/or managed or mitigated through contractual arrangements, or by adapting the project scope for delivery by DPC?
  - There are several programme-specific risks and interface issues that would prohibit construction risk being managed or mitigated effectively. For example:
    - Both [redacted] and [redacted] require integration with the regional water supply grid by 2026 and will need to receive water from different sources (i.e. Havant Thicket). The appointed CAP is unlikely to have the site-specific knowledge and information required to deliver this solution more efficiently than our own team.
    - A bulk supply of treated water leaving [redacted] is also provided to neighbouring water company South East Water (SEW). This means that ahead of carrying out any large building works, a third-party contractor would need to consider the risks faced by more than one company: a significantly more complicated set of arrangements than business as usual interface issues. This could result in significant additional costs and/or impact the operability of the Appointee's existing assets.

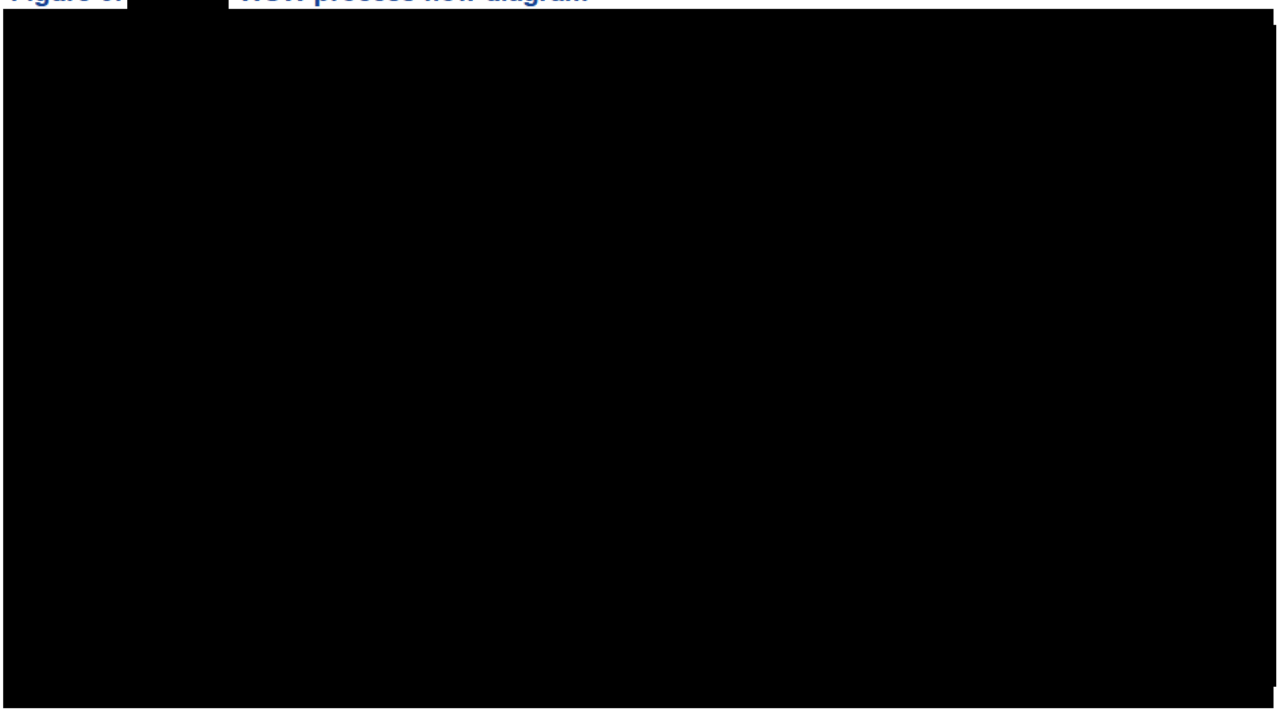
[11] https://www.ofwat.gov.uk/wp-content/uploads/2023/04/DPC-Technical-discreteness-guidance.pdf https://www.ofwat.gov.uk/wp-content/uploads/2023/04/DPC-Technical-discreteness-guidance.pdf

- [redacted] An appointed CAP may find it difficult to address this supply demand balance within the zone.
- Construction risk will be high for this programme – significantly higher than a typical series of water projects. This is in relation to both deliverability and the associated cost escalation risk. For example, the works will potentially span multiple AMP periods, well into the operational phase, increasing the regulatory, policy and planning risks associated (e.g. caused by unforeseen changes in the regulatory landscape or external economic factors such as changing input prices, labour market conditions). The nature of these projects also means that construction may take place in locations that inherently give rise to increased uncertainty. Some of the larger and more complex projects will also deploy advanced technologies e.g. digital twins that appointed providers may be less familiar with.

- Operations & Maintenance Risk: Is there any significant reason why the maintenance, and/or operations of the asset cannot be effectively transferred to the CAP and or managed or mitigated through contractual arrangements?
  - There are several programme-specific risks and interface issues that would prohibit operations & maintenance risk being managed or mitigated effectively. For example:
    - The location of several new assets and treatment planned are so integrated into the existing sites that this is likely to cause an issue for an appointed CAP with no prior knowledge of these locations. All four water treatment works have significant, complex, and frequent interactions with our wider network and each other. As such, they are deeply integrated within our operations, providing economies of scale and scope with the rest of our system compared to if they were being operated on a standalone basis under the DPC approach. For example, below we illustrate below how the process flow will change at [redacted] WSW in AMP8&9 as a result of the proposed works. There will be numerous new assets mid-stream between existing assets making interface management with a third party complex.
    - Due to the detailed scope of the DWI Notices that are currently placed on each site, transferring the ongoing maintenance and operations of part or all of the sites may give rise to concerns that the DWI may not be able to exercise all its enforcement and regulatory powers in respect of the aforementioned CAP operating a WSW.
    - There is greater risk posed by failures of internal processes during the design aspect of the process, or system-wide risk caused by inadequate testing ahead of production if operations were transferred to the CAP. There may also be external factors such as unforeseen changes to the regulatory landscape or natural environmental or economic conditions that may lead to greater interface issues.
    - The interface risk of these projects will change over time as some of these works are already in process and others will run until the end of AMP9. For example, certain assets will become less manual with more automation over this period (e.g. run-to-waste) - but there will be a transitional period that will require personnel with knowledge of existing processes. Appointing a CAP or third-party

means that there will be greater scope for project delay relative to ex-ante expectations.

Figure 6: [redacted] WSW process flow diagram



When applying the new tests set by Ofwat for PR24, the outcome is summarised below.

Table 8: Evaluating Special Cost Claim for DPC appropriateness

DPC Test	Supporting conclusion
Programme scalability	No, whole life totex is greater than £200million threshold. ***Conclusion - Suitable for DPC***
Construction risk	Yes. Construction risk for is not able to be transferred. Construction risk for the overall programme would be better managed in-house through a dedicated workforce that has the necessary experience, knowledge, and expertise of managing the existing assets across each of the four-supply works for several years already. These individuals are best placed to ensure that any future works are carried out more efficiently, timely and deliver the best outcome for customers in the long run, relative to independent contractors without the prior knowledge of previous works undertaken at the sites (particularly noting the mandated works required by the DWI). ***Conclusion: Not suitable for DPC***
Operations & Maintenance risk	Yes. Complexity of arrangements would be increased due to overall performance being dependent on a third-party's ability to meet scope contained within DWI FEOs. We have also considered whether procuring only operations and maintenance is viable. We are unable to transfer operations and maintenance to a third party due to location of planned works within existing assets / sites and the interlinked nature of both the mandated works and longer-term strategic works that will in part enable the scope as prescribed by the DWI. ***Conclusion: Not suitable for DPC***

2.4.2. Price Control Deliverable

We have developed a price control deliverable (PCD) to return money to customers in the event of potential non, partial, or delayed delivery of investment across the four sites to ensure customers only pay for the improvement that they will benefit from. This will ensure a responsible and efficient use of capital that aligns with our long-term delivery strategy.

Having certainty on allowed revenues for AMP8 at the start of AMP8 is necessary to protecting our customers in the case of non or late delivery. This is because it reduces the likelihood of supply chain delays as our delivery partners need assurance that we can deliver a stable pipeline of projects. There are well known supply chain issues within the South East (e.g. labour, materials, costs) and so we must ensure that we remain attractive and can secure the right partners ahead of time to deliver efficiently and provide the best value outcome for our customers. Certainty over allowed revenues also allows us to manage in-house resource requirements more effectively to meet the required scope with greater cost and time certainty. Given that we also understand what scope items need to be delivered at each site during AMP9, entering early discussions with Ofwat during AMP8 to agree a distinct pot of allowed revenues for AMP9 expenditure is critical to preventing any future delays to our planned investment works.[12]

We are proposing four separate PCDs (one per site) and have used broad 'themes' against which AMP8 scope is assessed for delivery for each site to reiterate the need that this programme of works is interlinked and that the entire scope must be delivered in order for maximum benefits to be realised by customers. Our PCD approach is standardised across both FEO mandated & non-FEO mandated cost schedules to provide consistency across the enhancement programme.

We expect customers to be partly protected against non-delivery of the scope that falls under the DWI's FEOs, as we are already obligated to address these issues against pre-determined timelines (risking large penalties and potentially losing our licence if we fail to do so). We therefore do not consider that we should be penalised twice (i.e. also from the PCD) for failing to deliver against the DWI's FEOs. The FEO's act as sufficient incentive for us to deliver these works on time.

Taking these factors into account, details of the PCD are set out below. We also present the planned delivery schedule for each site to provide additional context on the unit cost calculation.

Table 9: Proposed PCD for our Special Cost Claim

Component	Output
Description	We have developed this investment programme across our four major supply works to both meet the long-term requirements of our customers in terms of providing a safe and resilient supply of water, as well as the issues identified in the DWI's FEOs.
Output measurement and reporting	Performance milestones will be reported and monitored annually through the existing APR process.
Total cost	£318.7m [AMP8 total only, 2022-23 prices]

[12] We will revisit site-specific delivery schedules for AMP9 once allowed revenues for AMP9 have been agreed with Ofwat

Component	Output
Unit cost	£3.187m per percentage point of total programme completion. This is based on assuming full scheme costs (i.e. all 4 sites) are spread over 132 months with 60 (or 45%) of them in AMP8 and that totex sharing will return 50% of the underspend with customers.
Penalty rate	Penalty rates based on non-completion for non-FEO mandated items only, with a maximum value of 45% used to protect customers against us not completing the programme. Per site rates stated below: • [redacted] - £1.2m/% • [redacted] - £1.1m/% • [redacted] - £0.3m/% • [redacted] - £0.6m/%
Late penalty rate	N/A
Scheme delivery date	Before March 2035
Assurance	Independent third-party assessment of completed milestones and activities across the four sites to assure, to the required satisfaction, that the specific conditions have been met and the outputs of the programme have been delivered.

The following pages set out the delivery schedule for each site and the cost schedule items we expect to deliver. Performance milestones will be reported and monitored annually through the existing APR process.

Figure 7: [redacted] Delivery Schedule

Deliverable	Cost schedule items to be delivered
Year 1: 1% Completion	[redacted]
Year 2: 4% Completion	
Year 3: 6% Completion	
Year 4: 9% Completion	
Year 5: 100% Completion	

Note: Percentages are given to the nearest 1%.

Figure 8: [redacted] Delivery Schedule

Deliverable	Cost schedule items to be delivered
Year 1: 3% Completion	[redacted]
Year 2: 11% Completion	
Year 3: 12% Completion	
Year 4: 27% Completion	
Year 5: 100% Completion	

Figure 9: [redacted] Delivery Schedule

Deliverable	Cost schedule items to be delivered
Year 1: 1% Completion	[redacted]
Year 2: 1% Completion	
Year 3: 5% Completion	
Year 4: 5% Completion	
Year 5: 100% Completion	

Figure 10: [redacted] Delivery Schedule

% complete	Cost schedule items to be delivered
Year 1: 1% Completion	[redacted]
Year 2: 1% Completion	
Year 3: 8% Completion	
Year 4: 30% Completion	
Year 5: 100% Completion	

Further details relating to the risks and mitigations relating to delivery can be found in Section 7.

2.4.3. Wider benefits

We have assessed the monetised risk reductions across the four sites through our targeted investments out to 2033. The table below was extracted from our asset risk management (ARM) system. The total score is a relative risk index generated by considering the hazard, likelihood of occurrence, consequence, and severity of impact. The figures below reflect the relative monetised risk (in £ thousands) to both our customers and the business. Thus, the investments are expected to reduce the potential impacts by £231m across the four sites; a significant improvement on the current risks faced. To ensure brevity, only those critical areas where a clear risk benefit is observed are detailed below. Site specific data tables are provided in Sections 3-6.

Table 10: Monetised Risk Profiles - All Four Sites (£ 000s)

	All	Appearance	CRI	Discharge compliance failure	Pollution	Property minutes	Supply demand balance	Unplanned outage
20/05/2023 (Baseline)	260667	5221	12486	11608	79	187034	2314	2024
31/03/2025	-82425	0	-368	0	-27	-73513	-0	-26
31/12/2027	-30665	0	-439	0	0	-29748	-302	-2
31/03/2030	-118304	-5221	-10141	-11608	-46	-64812	-2012	-1948
31/12/2032	-47	0	-47	0	0	0	0	0
01/01/2033 (Future)	29227	0	1492	0	6	18960	0	48
% Improvement	89%	100%	88%	100%	92%	90%	100%	98%

This data shows a clear reduction in the risk profile for the four sites as a result of our proposed investment. However, this is primarily a monetised assessment of wider benefits.

2.5. Affordability

Our proposed solutions will deliver the best long-term value for customers whilst remaining efficient and affordable. The impact on bills has been presented in both our customer engagement programme and through our consultation on the draft WRMP. Evidence from our customer engagement programme stated that customers find their current bills affordable and are willing to pay more for targeted improvements to the resilience and quality of their water supply, especially if these improvements are considered to provide value for money and generate wider social and environmental benefits in the long run. Customer feedback from our June 2023 Water Futures sessions also emphasized that customers were pleased that any bill increase would be phased in over time to maintain intergenerational fairness.

Below we set out the estimated bill impact of our proposed programme of works between AMP7 – AMP9.

Table 11: Estimated Bill Impact (Four Site Investments Only)

Water Bill Impacts	AMP8 YR 1	AMP8 YR 2	AMP8 YR 3	AMP8 YR 4	AMP8 YR 5	**AMP8 Total**	AMP8 Ave/yr	AMP9 Ave/yr	AMP10 Ave/yr
Bill impact (£)	1.1	2.7	3.9	4.3	6.4	**18.3**	3.6	20.9	27.5

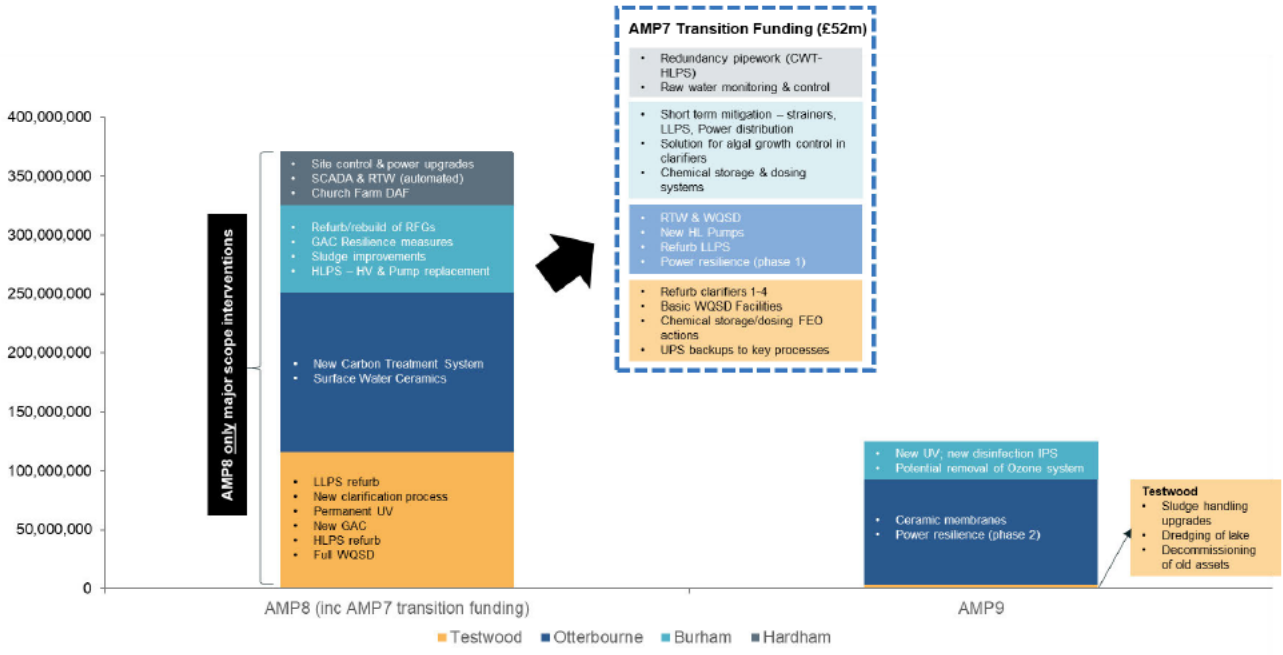
There is an estimated £3.64 annual average impact during AMP8 to customers – this would still equate to less than 1% of average household bills. This can therefore be seen to be a reasonable increase in line with the level of additional performance provided through our investments.

In addition to the customer feedback, each proposed solution from our optioneering process has been externally assured to provide further credibility that our plans are affordable.

2.6. AMP7 Transition Funding

To effectively meet our AMP8 statutory obligations and lay the foundations for our long-term site strategies, we have already invested a significant amount of capital during AMP7 across the four sites and will continue to do so for the remainder of the regulatory period. The total projected spend at each of the sites across AMP7-9 is shown below.[13]

Figure 11: Spend per AMP, per site (detailing significant investment)



[13] The figure above does not show the remainder of the EP23 plan in AMP7, which brings the total investment to £180m for the four sites.

We have assessed each of our planned interventions between 2023-2025 against Ofwat's criteria and guidance for transition funding:

- Our overall transition funding claim is for £52.0m. This is based on the investment allocations at each of the four key sites.
    - [redacted] – £10.8m
    - [redacted] – £13.5m
    - [redacted] – £8.5m
    - [redacted] – £19.0m

Given the level of work we are planning for in AMP8, there are many elements of the scope which must be started in AMP7 to ensure benefits are fully realised. We have apportioned parts of the total enhancement programme cost by working with our engineering and delivery teams to understand which areas which must be completed this AMP to ensure that our programme remains on track. In Appendix G, we set out how specific elements of our scope align to Ofwat's eligibility criteria for transition funding for 2024/25 by meeting either:

- Early statutory deadlines in the next price control period; or
- Early design and planning of large, non-routine investments.

Across the four sites, there is scope that has been mandated for delivery by the DWI, and items which are considered strategic schemes. We have reviewed the scope proposed under non-mandatory terms, as we believe there are specific items which must be delivered in AMP7 to allow for AMP8 delivery of mandated items. Full details of the proposed scope for AMP7 can be found in Appendix G.

2.6.1. [redacted]

[redacted]

2.6.2. [redacted]

[redacted]

3. [redacted]

[redacted] WSW supplies approximately 250,000 customers in Southampton, Winchester, and the surrounding areas. [redacted] abstracts water from two sources: groundwater, and surface water. Surface water is abstracted from the River Itchen [redacted]. The design capacity for [redacted] surface water is [redacted] but the output from the works varies depending on season and demand. [redacted].

The surface water treatment works was originally constructed in 1939 (with extensions in 1949 and 1958) to treat surface water from the River Itchen. In addition to treatment of water from the River Itchen, groundwater is abstracted at the site from a series of adits via chalk wells and boreholes which were constructed from late 1890s into the early 20th century. Due to the different qualities and seasonal characteristics of the two source waters, two separate treatment streams have been operated individually. The design capacity for [redacted] groundwater is [redacted] The site is currently under DWI notice [redacted], to achieve improvements to the overall functioning and resilience of the site.

[redacted]. For the benefits of the RAPID SRO proposal for the Havant Thicket Reservoir to be realised, we must upgrade our existing treatment processes at Otterbourne and Testwood [redacted].

An outline of the existing treatment process is provided below.

Figure 12: [redacted] WSW surface works site schematic

[redacted]

3.1. Overview of Site Strategy

The need for investment at [redacted] is focused on delivering a modern, flexible and efficient water treatment works for the next 25 years. Our WRMP24 states in Section 7.2.3 that "*upgrade of treatment work capacity at [redacted] WSW [redacted] and [redacted] WSW [redacted] will be required in 2031. This applies to all situations under all planning scenarios*". Within the Southampton East zone, [redacted] provides water to be blended with Twyfords WSW, which has a higher nitrate level output, to serve over 187,000 people. [redacted]. It should be noted that this population is anticipated to grow further by over 20% by 2050, [redacted].

The preferred strategic resource option means that [redacted]. In addition, the resilience of specific assets requires enhancing during AMP8 to ensure production targets can be reliably met.

To ensure that the site can handle the Water for Life Hampshire (WfLH) flows to site, and as part of an upgrade to the existing primary treatment process, [redacted] and the redundant units removed. Initially, this will be during AMP8 to cover the surface water stream [redacted] and then in AMP9 the full site flow will be achieved through [redacted]. By selecting [redacted], we will be able to add future capacity in a modular fashion, a benefit relative to more conventional treatment processes.

[redacted]

[redacted].

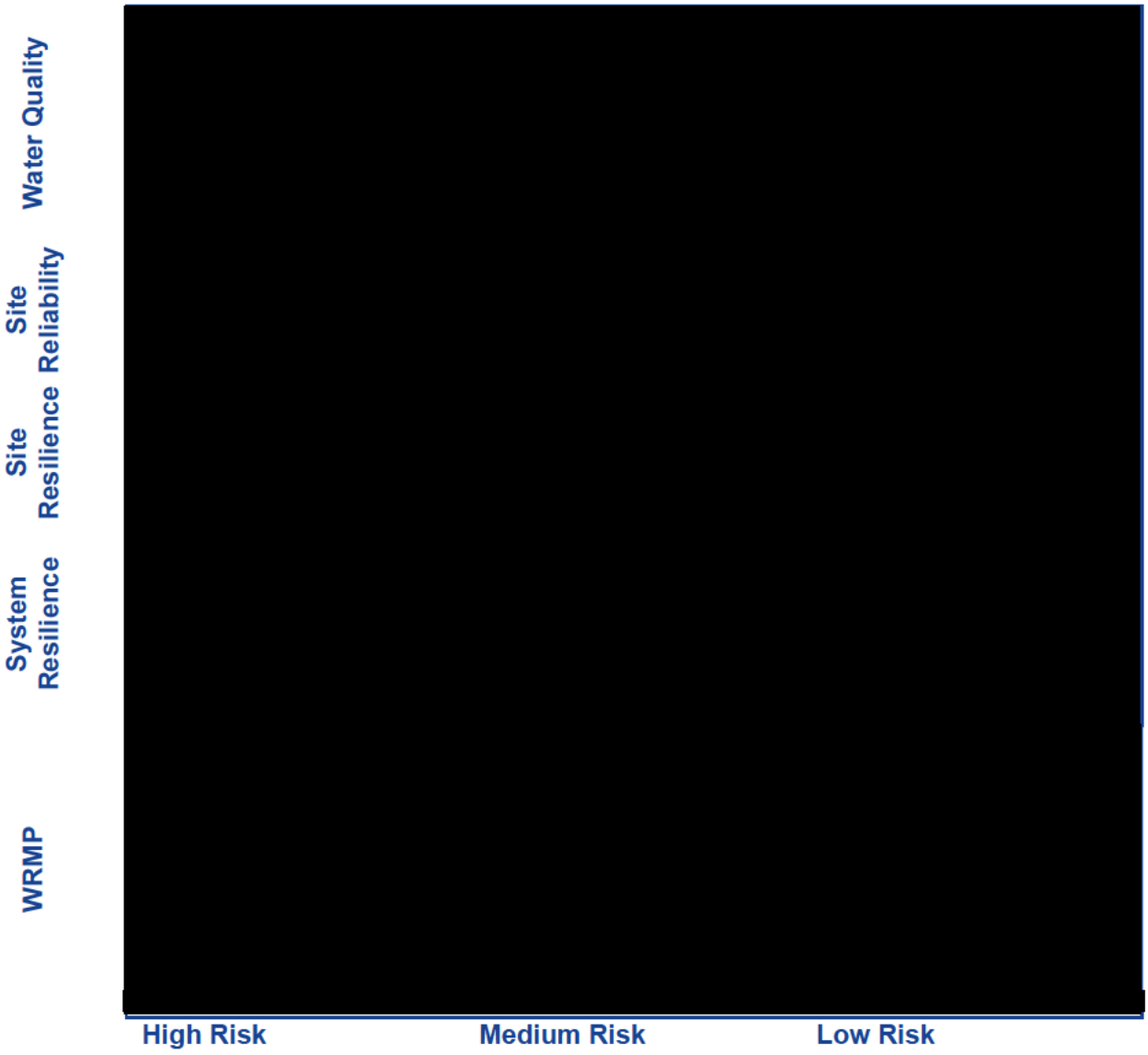
[redacted]

[redacted]

Beyond AMP8, we have identified opportunities to enhance our operational capabilities through more sophisticated levels of automation, such as [redacted]

By proactively upgrading aging components of our infrastructure, we can mitigate the risks associated and safeguard the purity and safety of our water supply.

Table 12: Summary of needs case at [redacted] WSW



We have assessed the monetised risk reductions at [redacted] WSW through these targeted investments out to 2033. The figure below was extracted from our asset risk management system (ARM) and reflects the relative monetised risk to customers and the business. For example, the reduction in CRI impact of 88% represents a £11m reduction in impact by 2033. To ensure brevity, only those areas where a clear risk benefit is observed are detailed below:

Table 13: [redacted] Risk Reduction Profile (£ 000s)

[redacted] WSW	All	CRI	Health and safety	Legal compliance	Pollution	Property minutes	Taste and odour	Unplanned outage
20/05/2023	86113	12452	163	1550	25	59754	9636	2496
31/03/2025	-17990	-5180	-1	-315	-4	-8315	-3385	-790
31/12/2027	-7345	-352	0	-95	0	-3757	-3126	-15
31/03/2030	-11915	-5456	-22	-158	0	-6148	0	-132
31/12/2032	0	0	0	0	0	0	0	0
01/01/2033	48863	1464	140	983	21	41534	3126	1559
% Improvement (2023-2033)	**43%**	**88%**	**14%**	**37%**	**17%**	**30%**	**68%**	**38%**

Below we provide further information on each investment pillar.

3.1.1. Water Quality

Our internal risk assessment reviewed the long-term trend data for [redacted]. By assessing the prescribed concentration or value (PCV) of specific parameters within the raw water system, we have identified which water quality risks are present and require treatment.

Figure 13: Source Risks - [redacted] WSW[14]

[redacted]

[14] The X-axis shows % of Prescribed Concentration or Value (PCV) value from 0-100%, for each parameter within the Raw water system feeding the site. There are items which are considered a risk despite having low PCVs above - this data is supplemented by water quality traces in the technical annexes (Appendix B)

[redacted]. We are already investing heavily in AMP7 in preparation for the longer-term configuration of the site. [redacted] This is also covered by Item 41 of the DWI notice on site.

To control these parameters, we aligned each water quality risk against the current level of treatment provided on site, assessing whether the contaminant was partially or fully treated. This highlighted gaps in the current treatment process and identified where we need to focus our future investment.

Table 14: Water Quality Level of Treatment - [redacted] WSW

"As-is" Partial/Untreated parameters	Key processes in need of upgrade	"To be" treatment position – residual partial treatment concerns	Required new processes
[redacted]	[redacted]	• Manganese	[redacted]

[redacted]

[redacted]

For any resource augmentation from reclaimed water sources, we are confident that the water will be better quality than any currently derived local surface water abstractions, due to the level of treatment that reclaimed water will receive before being discharged into the water course or reservoir. What this means for [redacted] is that there is a need to ensure a higher incoming flow can be reliably treated and distributed.

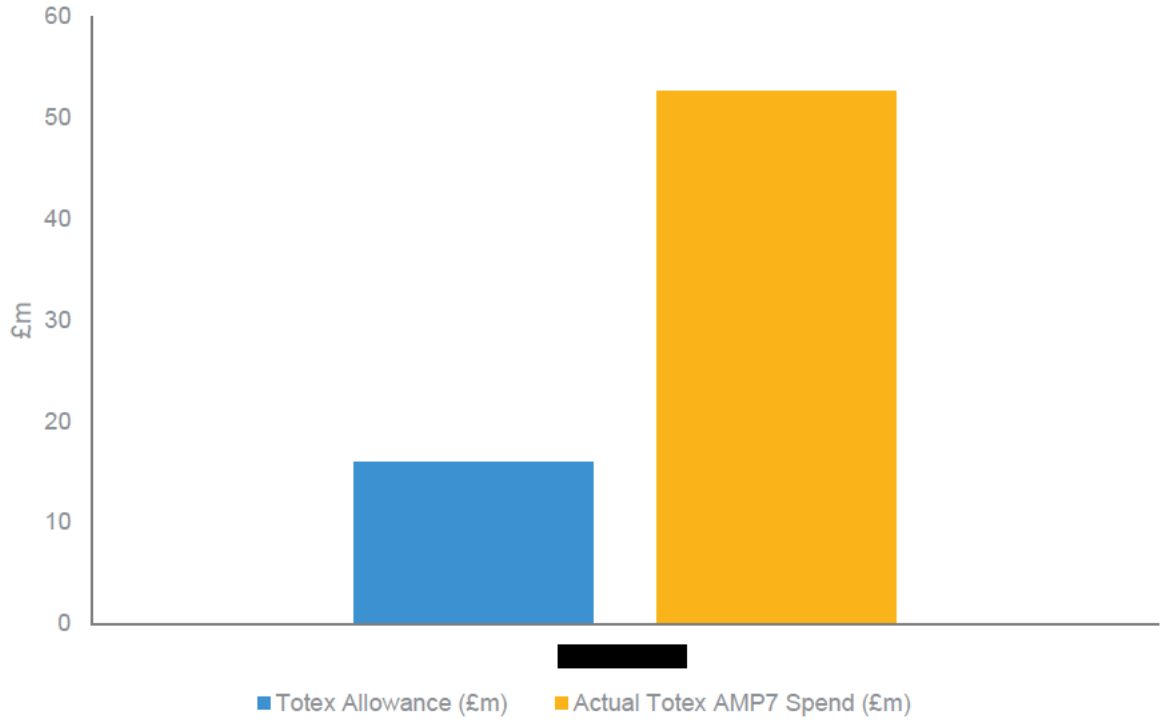
3.1.2. Site Reliability

Assessment of historic expenditure

We have carried out a thorough review of historic expenditure to determine whether previous works undertaken at the site was carried out efficiently. We have also mapped the project scope of these historic works against the scope contained in the recent DWI FEOs to ensure that we are not requesting additional allowances to address the same activity (and hence avoiding customers paying twice to fix the problem). Further information relating to historic spend by projects at each site can be found in Appendix F.

At PR19 we received no enhancement allowances for these treatment works, with funding only via botex allowances. At [redacted], £52.5m has been invested into the site during the first three years of AMP7 (and up to June 2023) - over three times the implicit botex allowance of £15.8m.

Figure 15: AMP7 Implicit Allowance vs Actual Spend to date (£m) - [redacted]



Upgrading the existing treatment processes will ensure that less money will be spent in the long-run on maintaining and operating assets that are reaching the end of their useful life. Below we show the proportion of Totex attributed to both Capex and Opex at the site over the previous two AMPs:

Table 15: [redacted] Totex Split AMP5 - AMP7 (£m)

Combined	[redacted]
AMP7-CAPEX	47.5
AMP7-OPEX	5.0
AMP6-CAPEX	22.2
AMP6-OPEX	6.4
AMP5-CAPEX	2.9
AMP5-OPEX	5.4

Appendix F has a full breakdown of scope and investment at each of the four sites by year. Below is a summary for [redacted] across AMP5-7 of the asset areas where investment has been targeted:

Table 16: [redacted] Scope and Investment (AMP 5-7)

	AMP5 Investment Focus	AMP6 Investment Focus	AMP7 Investment Focus
Scope	Chlorine Dosing Pressure Filtration Telemetry Site Drainage	HV System LV system Booster Pumping Cathodic Protection Clarification modifications Ferric Chloride Dosing Mixing Polyelectrolyte Dosing Sampling Upgrade Sodium Hydroxide Dosing Sulphuric Acid Dosing Site Valving	Control System Monitoring Site Distribution Large Capital Works (multiple)
Total CAPEX (£m)	**2.9**	**22.2**	**47.5**

What is evident from the above is the scale of the investment that has taken place at [redacted] WSW. We have spent more than three times our implicit allowance at AMP7 to date on areas that do not overlap in scope with funding that was awarded at PR19. We need to do this in order to improve the condition of existing assets and ensure that they remain resilient to increasing levels of demand. Where we are continuing to invest in existing processes, we can clearly distinguish between areas where funding was previously made available and what is now to be delivered in AMP8&9.

[redacted] None of these items were funded as enhancements at PR19. In terms of large capital works, we are fundamentally upgrading and enhancing processes that were not considered as targeted spend at the last price review.

3.1.3. Site Resilience

Below is a breakdown to show which assets are past their design life and require replacement / refurbishment. [redacted]

Table 17: [redacted] WSW Asset Age Assessment

Asset	Average of date installed	Average Predicted End of life date
[redacted]		

Each asset is at the end of its life and requires replacement. For all sites, assets were not simply replaced based on age as this is inefficient for customers – where the condition of assets has remained at a high level we have not needed to replace them until the present time. We installed [redacted] on site ten years ago, and in line with their design life, they will need replacing during AMP8. [redacted]. A full list of the power resilience provisions can be found in Appendix B.

3.1.4. System Resilience

Following an internal resilience assessment, we have identified additional interventions which will need to be enacted in AMP8 to mitigate the effects of climate change on our wider network. We will provide [redacted] Additional resilience is to be provided to the zone through the Havant Thicket reservoir scheme, which will send flows from AMP9 onwards.

3.1.5. Alignment with WRMP

We have reviewed [redacted] WSW's interface with the current WRMP to identify opportunities and possible challenges. [redacted]

3.2. Programme Plan for Delivery

3.2.1. Options Assessment

We have conducted a robust optioneering appraisal for the material scope items pertaining to both the DWI FEO's as well as several other enhancement activities that are required to enable the step change improvement in performance delivered across the four sites, aligning to our longer-term strategic plans.

A summary table presenting the needs case, preferred solution, whole life cost estimate and supporting justification for each of the DWI mandated interventions proposed at [redacted] is shown below. The DWI mandated interventions can be considered prescriptive in nature with clearly defined objectives. We have sought to use solutions which are considered innovative and unique, to provide smarter treatment works from 2030.

The detailed options appraisal for each intervention can be found in Appendix C.

Table 18: [redacted] Need Option Assessment Outcome – Mandated Items

Need	Preferred Solution	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]				

Need	Preferred Solution	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]				

We have selected an emerging technology within the sector for this application, as it provides notable innovations on the conventional replacement option. The units have a much smaller footprint than the current process, and thus allow for a higher relative throughput in metres squared terms. They have an inherently lower energy consumption and higher reliability relative to conventional technologies, as have been observed in the initial applications at other companies. These units are constructed with sustainable materials, and no plastics. Current evidence is that these units have long life spans – with more than 20 years of continuous service currently observed without signs of significant deterioration. [redacted] also offer us the opportunity to enact modular builds on site, providing flexibility in future AMPs to add on capacity if required in a far simpler manner than conventional technologies. It is in these ways that [redacted] are unique and offer us greater performance whilst minimising inefficiencies. [redacted].
Elsewhere in the UK, we have seen the benefits of [redacted] being observed. At Mayflower WTW in the South West (90ML/d)[15], a system comprised of an ion exchange process, inline coagulation, and [redacted] now provides "*more water, more efficiently, and at a lower cost*" than the previous Crownhill works in Plymouth. It is stated that the plant will "*cost less to maintain, use less raw materials*" than conventional treatment. This process is also able to remove pesticides, colour, and taste contaminants, to provide high quality drinking water. The estimated outturn cost for these upgrades was £75m.

Bournemouth Water have also seen benefits of this technology at their Knapp Mill works.[16] This works was originally from the early 1900s and required modernisation. The existing sand filtration was "*resource intensive and hard to automate*", but they are using [redacted] for their 86ML/d works to deliver long term benefits to customers.

3.2.2. Cost efficiency

Below we set out a table summarising the findings from our industry benchmarking in relation to the major asset upgrades required at [redacted]. The source of the works cost is the R&V process with delivery partner [redacted]. Further detail on how we undertook our benchmarking analysis can be found in Section 2.2.4.

[15] https://www.southwestwater.co.uk/about-us/Projects-investments/mayflower-water-treatment-works/
[16] https://www.bournemouthwater.co.uk/about-us/projects-and-investments/knapp-mill-water-treatment-works/

Table 19: Otterbourne Benchmarking Analysis (£m)

Asset	Works Cost	Lower Limit	Benchmark	Upper Limit	Supporting Justification
[redacted]	0.4	0.6	0.6	0.6	[redacted] power resilience provision is to be completed for AMP7 and is exempt from consideration at AMP8. The associated costs show that our estimated works can be deemed efficient relative to industry benchmarks.
	20.8	8.1	15.2	22.5	The primary cost driver enabling mid to long-term improvement at [redacted] estimated to cost £98.1m. The costs for the plant have been generated from manufacturer quoted costs to best represent the cost of delivery today for a bespoke item. £29.3m has been apportioned to elements of the scope for [redacted], both of which have been benchmarked.
	8.4	9.1	9.2	9.2	

The [redacted] is within the realms of the midpoint and upper limit and is a common asset for comparison. As such, the benchmark is aligned and comparable. However, the nature of the scope means the definition is much more advanced, and as such there are potential inclusions in the works that are not accounted for in traditional function curves for a [redacted]. This has the potential to push the asset cost towards the upper ends of the benchmark.

Longer-term site redesign focuses on adding [redacted]. This is an additional £100.7m, of which £93.8m (or 94%) is attributed to [redacted]. We obtained a project specific quotation based on raw water quality and site constraints alongside other quotations from suppliers. As with the [redacted], this provides confidence that our cost estimate is robust and efficient.

Considering both the quoted costs for the [redacted] and additional scope items listed in the table above, we were able to benchmark £221m of the £270m cost estimate, or 82%. The benchmark position returned a cost which is 2% lower than our cost estimate. As such, the work appears to be close to the benchmark and deliverable. The costs that were benchmarked represented those that could be benchmarked given the available scope and within the timeframes required. Specialist items with market quotes and no available benchmarking comparators were excluded.

4. [redacted]

[redacted] WSW supplies approximately 327,000 people in the west of Southampton and the Isle of Wight. [redacted]

The site was designed and built in the 1960s and consists of the following principal process stages; clarification (flat bottomed and Accentrifloc), filtration (rapid gravity sand filters) and disinfection (super and de-chlorination). The primary driver for investment at [redacted] focuses on ensuring resilience of supply whilst minimising operator intervention. Many of the assets are currently beyond their expected design lives and no longer meet industry best practice, representing a risk to water quality. The site is currently under DWI notice [redacted], to achieve improvements to the overall functioning and resilience of the site.

[redacted] WSW will need a production capacity of [redacted]. The process will also need to be sufficiently flexible to meet reduced output requirements based on the declining availability of raw water in increasingly more challenging drought conditions. Work has been undertaken to improve the site, with over £50m invested in the site in AMP7 alone, but there is still a need to increase spend further to ensure an uninterrupted service to customers.

Figure 16: [redacted] WSW schematic

[redacted]

4.1. Overview of Site Strategy

[redacted]

The need for investment at [redacted] is focused on the delivery of immediate improvements in water quality and a programme of sustained risk reductions throughout this and future AMPs. Key risks identified include:

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

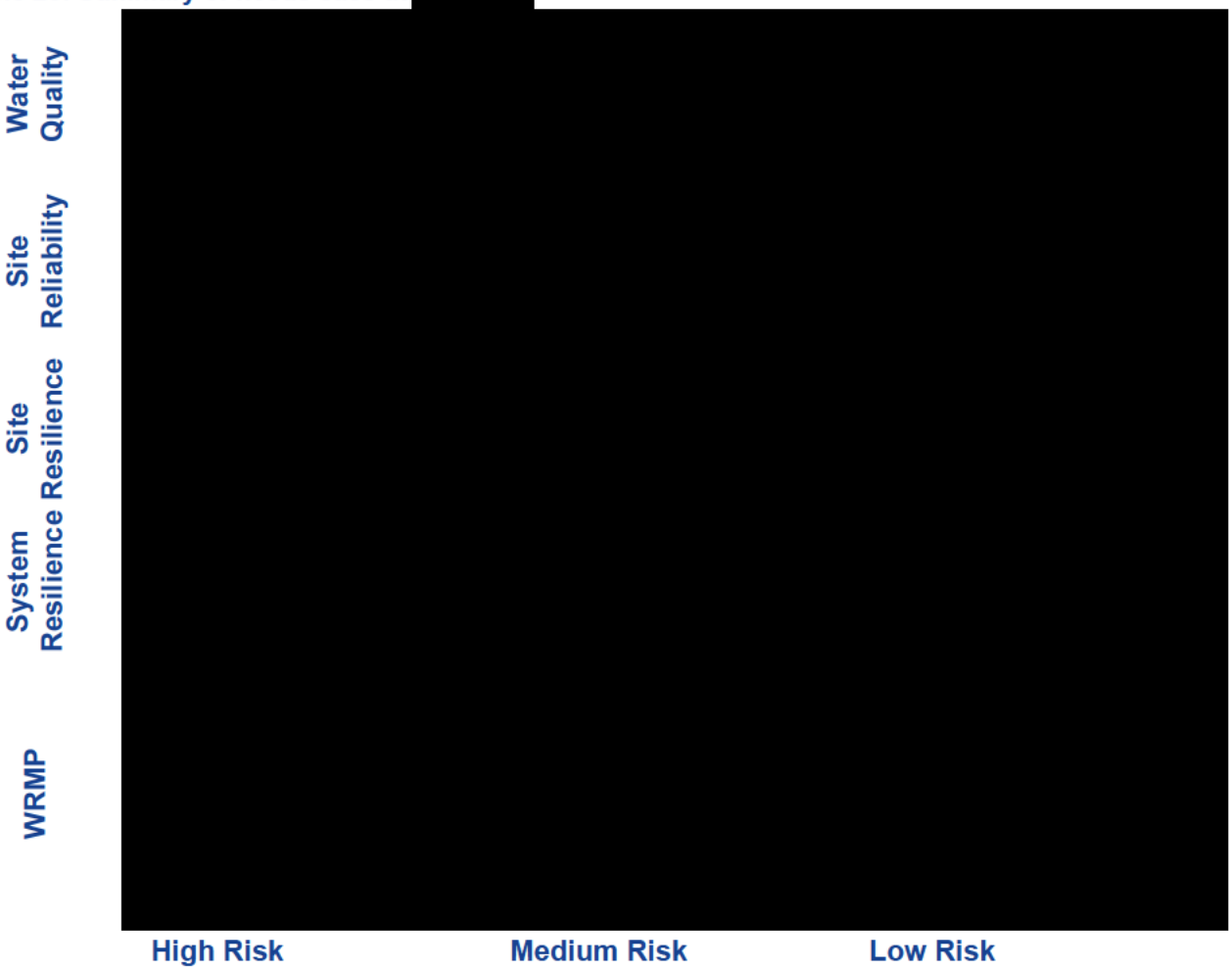
We have already begun to implement measures which provide short-term stabilisation to the site. These include [redacted] are also being implemented during AMP7 to increase the control our operations staff have over the existing process, but also to optimise water use on site.

During AMP8 we plan to meet current and future treatment requirements of the site through [redacted]

[redacted]

We have also considered how a fundamental redesign of the existing works can help to meet these water quality challenges, using innovative technologies. For example, an interface [redacted]

Table 20: Summary of needs case at [redacted]



We have assessed the expected risk reductions at [redacted] WSW through these targeted investments out to 2033. The figure below was extracted from ARM. To ensure brevity, only those areas where a clear risk benefit is observed are detailed below:

Table 21: [redacted] Risk Reduction Profile (£ 000s)

[redacted] WSW	All	Appearance	CRI	Discharge & Compliance Failure	Health & Safety	Legal compliance	Pollution	Property minutes	Supply Demand Balance	Taste and odour	Unplanned outage
20/05/2023	259647	19361	44057	12016	1236	12161	3323	146453	2012	13417	3449
31/03/2025	-34843	-8605	-6009	-10674	-11	-221	-459	0	0	-6725	0
31/12/2027	-116706	-8605	-9532	0	-1098	-151	-362	-90559	0	-3060	-3317
31/03/2030	-31866	0	-23046	0	-62	-1545	-1	-6587	0	-606	-20
31/12/2032	-2310	0	0	0	0	-298	0	0	-2012	0	0
01/01/2033	73921	2151	5470	1341	64	9946	2502	49307	0	3028	111
% Improvement (2023-2033)	**72%**	**89%**	**88%**	**89%**	**95%**	**18%**	**25%**	**66%**	**100%**	**77%**	**97%**

Below we provide further information on each of these investment pillars.

4.1.1. Water Quality

[redacted]

Figure 17: Source Risks - [redacted] WSW[17]

[redacted]

[17] As with [redacted], there are items which are considered a risk despite having low PCVs - this data is supplemented by water quality traces in the technical annex (Appendix B). [redacted]

To control these parameters, we aligned each water quality risk against the current level of treatment provided on site, assessing whether the contaminant was partially or fully treated. [redacted]

Table 22: Water Quality Level of Treatment - [redacted] WSW

"As-is" Partial/Untreated parameters	Key processes in need of upgrade	"To be" treatment position – residual partial treatment concerns	Required new processes
[redacted]			

[redacted]

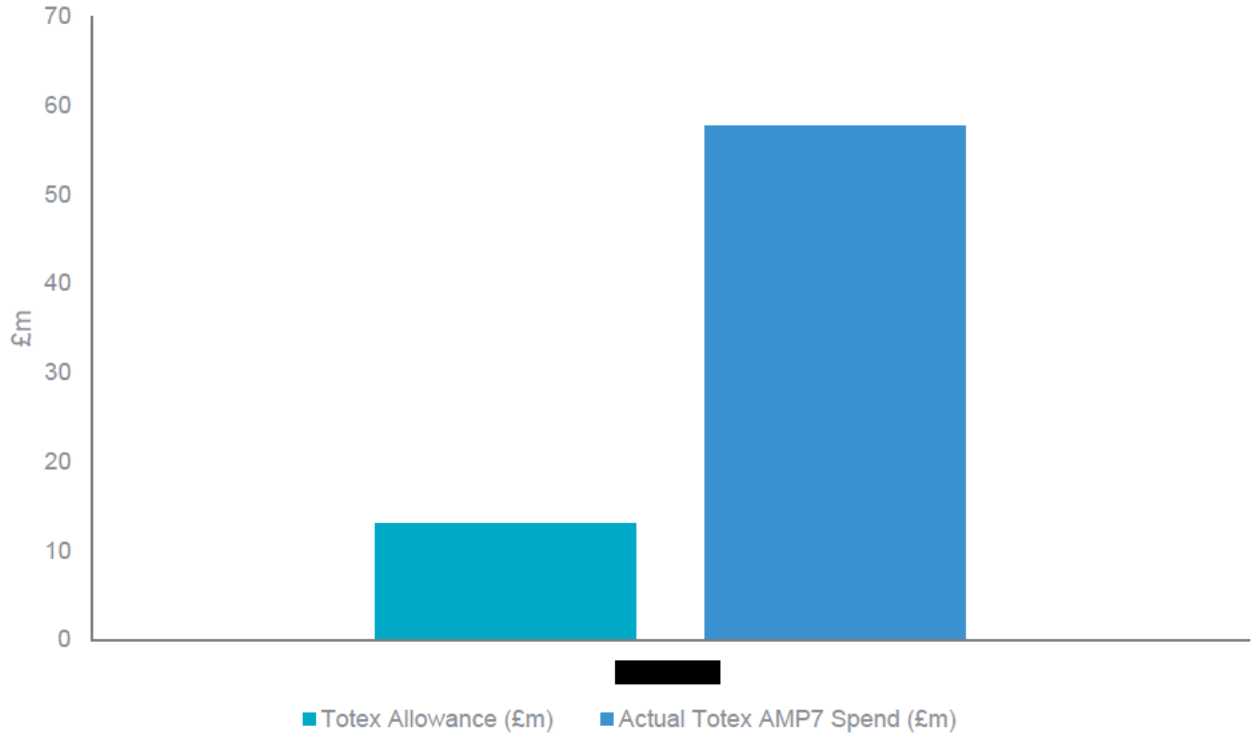
4.1.2. Site Reliability

[redacted]. However, the system now requires further refurbishment to ensure it can continue to serve the large number of customers who depend on [redacted] WSW. Both conventional and innovative futures will be considered, based on trials and a whole life cost analysis.

Assessment of historic expenditure

It is evident from our assessment of historic expenditure at [redacted] relative to the botex allowances of £12.7m provided by Ofwat that a large amount of investment has already taken place in AMP7. However, a significant amount of further work is required during AMP8&9 to secure the site's long-term future.

Figure 18: AMP7 Implicit Allowance vs Actual Spend to date (£m) - [redacted]



Of the £58m spent during the first three years of AMP7, 86% relates to repair work to the existing treatment plant. This implies that many of the current assets are inefficient to keep repairing and require upgrading. As these assets continue to deteriorate, their risk of failure increases, as do the costs to maintain and operate them. The table below shows the proportion of Totex attributed to both Capex and Opex at the site over the previous two AMPs:

Table 23: [redacted] Totex Split AMP5 - AMP7

Combined	[redacted]
AMP7-CAPEX	35.1
AMP7-OPEX	22.6
AMP6-CAPEX	31.2
AMP6-OPEX	12.8
AMP5-CAPEX	2.7
AMP5-OPEX	5.2

Appendix F has a full breakdown of scope and investment at each of the four sites by year. Below is a summary for [redacted] across AMP5-7 of the asset areas where investment has been targeted:

Table 24: [redacted] Scope and Investment (AMP5-7)

	AMP5 Investment Focus	AMP6 Investment Focus	AMP7 Investment Focus
Scope	Washwater System	Pumping Station Upgrades Power Generation Site Distribution HV System	Sand Filtration Telemetry Control System Dissolved Air Flotation Ferric Chloride Dosing Flocculation System Hypochlorite Dosing Monitoring Polyelectrolyte Dosing Powdered Activated Carbon Sampling Upgrade Site Valving Temporary UV installation
Total CAPEX (£m)	**2.7**	**31.2**	**35.1**

As with [redacted], the tables above evidence the magnitude of the investment that has taken place at [redacted] WSW – spending over four times our implicit allowance in AMP7 to date. Our proposed plan of works does not overlap in scope with any areas where funding has previously been awarded at PR19.

Of the items listed under the AMP7 investment focus above, we are continuing to invest in our monitoring systems, but specifically at source. We are [redacted]. Aside from these areas, we are fundamentally upgrading processes to ensure long-term resilience and sustainability of our assets across the site and require additional allowances that were not provided at the PR19 Final Determinations.

4.1.3. Site Resilience

Below is a breakdown to show which assets are past their design life and require replacement /refurbishment within the coming AMPs.

Table 25: [redacted] WSW Asset Age Assessment

Asset	Average of date installed	Average Predicted End of life date
[redacted]		

Asset	Average of date installed	Average Predicted End of life date
[redacted]		

[redacted] and so this has been chosen for priority investment in two phases – one has already begun this AMP. [redacted]

4.1.4. System Resilience

We have conducted extensive system resilience assessments for the Hampshire and Isle of Wight zones. [redacted], in order to ensure that this scope achieves its intended benefits, enabling works are required at both [redacted] and [redacted] WSWs to prepare them for the change in water quality inherent within the additional water sources provided. [redacted]

4.1.5. Alignment with WRMP

[redacted] Our Site Strategy will ensure future treatment can meet this need.

4.2. Programme Plan for Delivery

4.2.1. Options Assessment

A summary table presenting the needs case, preferred solution(s), whole life cost estimate and supporting justification for each of the DWI mandated interventions proposed at [redacted] is shown below. The DWI mandated interventions can be considered prescriptive in nature with clearly defined objectives. The detailed options appraisal for each intervention can be found in Appendix C. All items listed below have been selected.

4.2.1.1. Specific Option Justification: [redacted]

[redacted]

[redacted]

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

[redacted]

[redacted]

4.2.1.2. Specific Option Justification: [redacted]

[redacted]

[redacted]

- [redacted]

[redacted]

[redacted]

Table 26: [redacted] Need Option Assessment Outcome – Mandated Items

Need	Preferred Solution(s)	Level of risk reductio	WLC/TOTEX Estimate (30 year)	Justification
[redacted]		High	-	[redacted]
		-	-	
		High	27.8m	
		-	£24.1m	

Need	Preferred Solution(s)	Level of risk reductio	WLC/TOTEX Estimate (30 year)	Justification
[redacted]				[redacted]
		-	£40.5m	

A summary table presenting the needs case, preferred solution, whole life cost estimate and supporting justification for each of the strategic long-term interventions proposed at [redacted] is shown below. These options have undergone a R&V process to ensure the best outcome is delivered for customers. The detailed options appraisal for these interventions can be found in Appendix C.

Table 27: Testwood Need Option Assessment Outcome – Strategic Items

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]		High	£3.6m	This option is better than no.2 for risk reduction and need fulfilment. Option similar (regarding overall cost, feasibility, and need fulfilment) to option 3. Refurbishing an existing asset will NOT give a large amount of operational longevity.
		High	£8.6m	It is assumed that this would be like option 1 in every sense (risk reduction, need fulfilment and CAPEX) Final decision would require an investigation on whole life costing.
		High	£11.1m	Selected - in combination with option 5. Option 5 covers many sludge handling requirements that option 4 does not. [redacted]

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		High		Selected - scope required to improve washwater handling and sludge treatment. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£7.8m	It fulfils the need better than options 2 and 3. TOTEX is higher.

4.2.2. Cost efficiency

Below we set out a table summarising the findings from our industry benchmarking in relation to the major asset upgrades required at [redacted]. The source of the works cost is R&V process, involving a delivery partner. Further detail on how we undertook our benchmarking analysis can be found in Section 2.2.4.

Table 28: [redacted] Benchmarking Analysis (£m)

Asset	Works Cost	Lower Limit	Benchmark	Upper Limit	Supporting Justification
[redacted]	3.2	1.7	2.0	2.3	Both potential long-term solution options at [redacted] share the same short-term Stabilisation build up and output cost estimate of £27.5m. Of this, the primary costs lie in the [redacted] (£13.4m) and the [redacted] (£5.3m). Amongst the remaining miscellaneous costs, [redacted] have both been benchmarked.
	0.8	2.4	2.4	2.4	
	23.0	16.0	17.0	17.8	We have proposed a more traditional solution at [redacted] (i.e. [redacted] relative to [redacted], and have therefore been able to benchmark each specific scope element in its entirety. The [redacted] consists of £37.9m against a slightly lower benchmark of £32.7m. Despite this, if the quoted [redacted] cost is assumed as the best market representation, this solution would cost £134.3m. By proposing to implement the [redacted] we are ensuring that we have opted for an outcome that provides better value for money for our customers, whilst also meeting the long-term process treatment needs for the site.
	9.0	11.1	12.2	13.3	
	5.8	3.0	3.4	3.7	

The total estimated cost for the scheme is £65.4m, of which £41.9m has been benchmarked (or 64%).

5. [redacted]

[redacted] WSW supplies approximately 246,000 properties in West Sussex and the surrounding areas. [redacted]

An outline of the existing treatment process is provided below.

Figure 19: [redacted] WSW site schematic

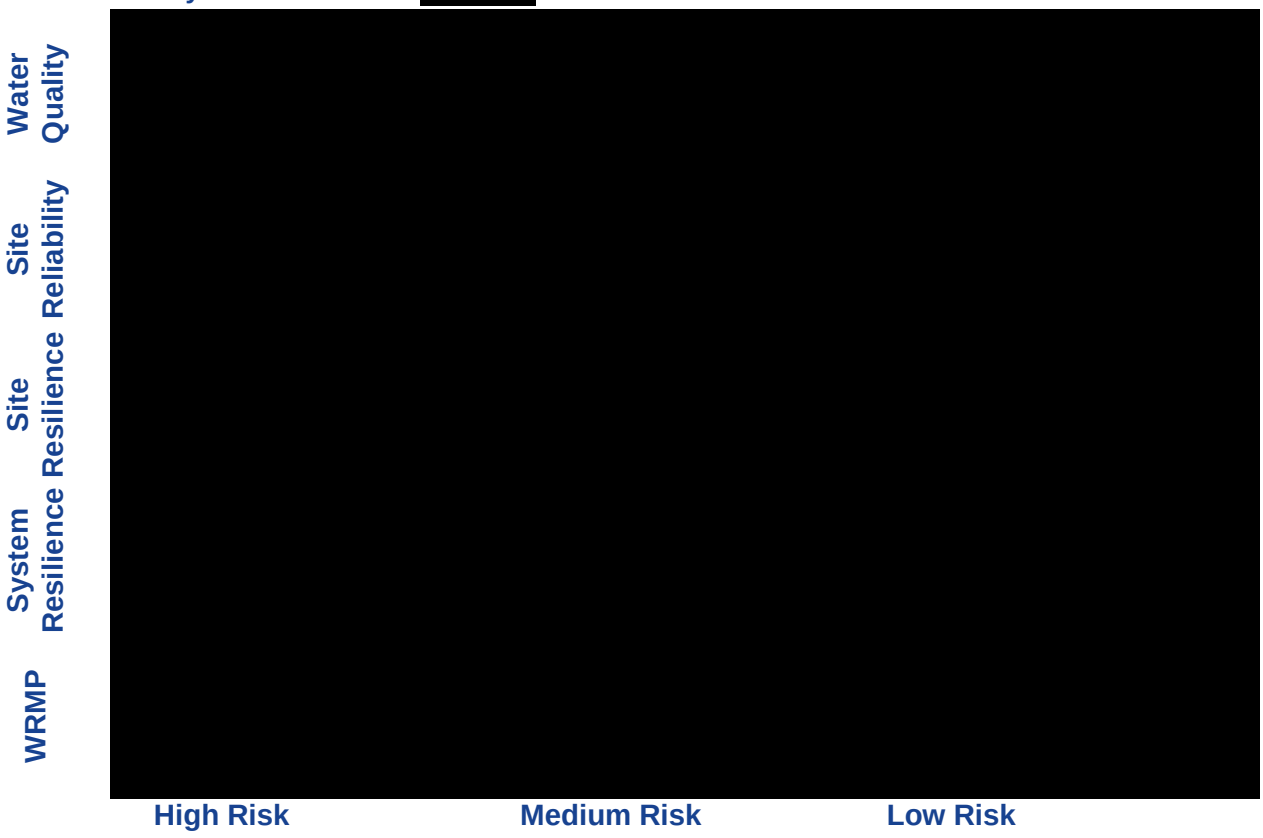
[redacted]

5.1. Overview of Site Strategy

[redacted]

[redacted] Given the loading requirements of the site, we are investigating the suitability of new technologies such as [redacted], to be compared against conventional clarification and filtration to deliver customers with the best value over the whole life of the assets. The exact pathway is to be chosen during AMP8 for implementation during AMP9.

Table 29: Summary of needs case at [redacted]



We have assessed the expected risk reductions at [redacted] WSW through these targeted investments out to 2033. The figure below was extracted from ARM. To ensure brevity, only those areas where a clear risk benefit is observed are detailed below:

Table 30: [redacted] Risk Reduction Profile (£ 000s)

[redacted] WSW	All	Appearance	CRI	Discharge Compliance Failure	Health and safety	Legal compliance	Pollution	Property minutes	Supply Demand Balance	Unplanned outage
20/05/2023	260667	5221	12486	11608	9115	17878	79	187034	2314	2024
31/03/2025	-82425	0	-368	0	-7987	--337	-27	-73513	0	-26
31/12/2027	-30665	0	-439	0	-152	-23	0	-29748	-302	-2
31/03/2030	-118304	-5221	-10141	-11608	-210	-9563	-46	-64812	-2012	-1948
31/12/2032	-47	0	-47	0	0	0	0	0	0	0
01/01/2033	29227	0	1492	0	766	7955	6	18960	0	48
% Improvement (2023-2033)	**89%**	**100%**	**88%**	**100%**	**92%**	**56%**	**92%**	**90%**	**100%**	**98%**

Below we provide further information on each investment pillar.

5.1.1. Water Quality

[redacted]

Figure 20: Source Risks – [redacted] WSW[18]

[redacted]

[redacted]

[18] As with the other sites there are items which are considered a risk despite having low PCVs - this data is supplemented by water quality traces in the technical annex (Appendix B). Similarly, there are parameters which are fully treated through the process or have not been observed through our on-site monitoring to date, and so not deemed a risk to site.

[redacted]

[redacted]

[redacted]

We aligned each of the water quality risks against the current level of treatment provided on site, indicating whether the contaminant was partially or fully treated. This highlighted gaps in the current process and identified where to focus future investment.

Table 31: Water Quality Level of Treatment – [redacted] WSW

"As-is" Partial/Untreated parameters	Key processes in need of upgrade	"To be" treatment position – residual partial treatment concerns	Required new processes
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

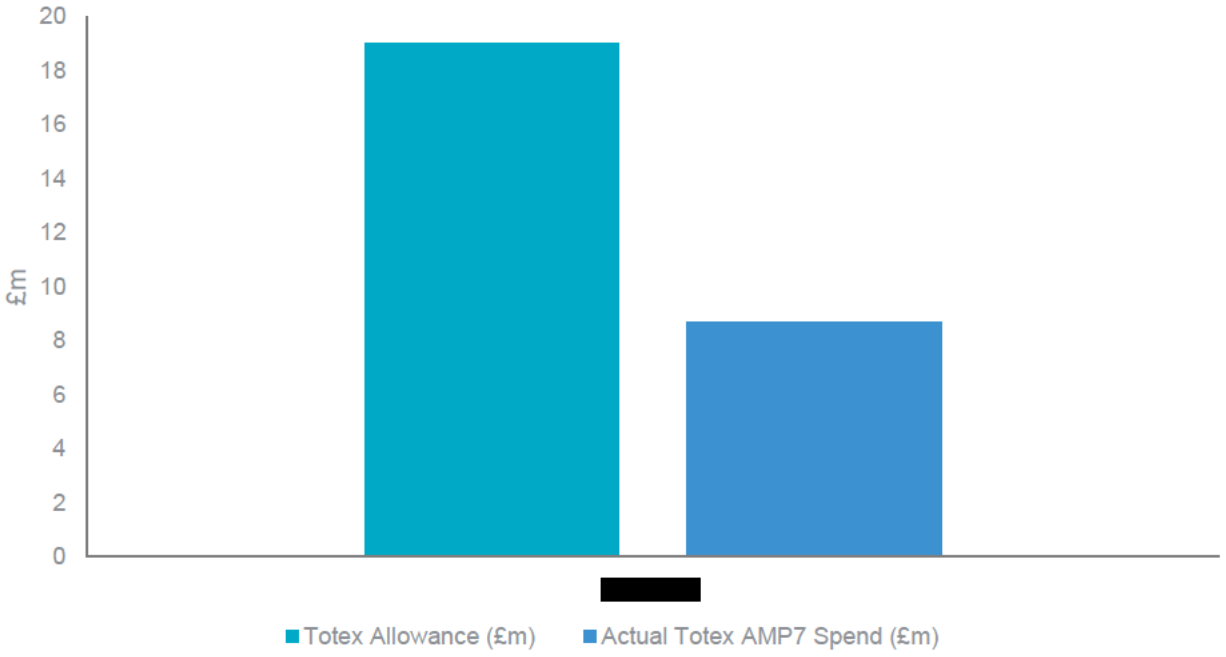
- [redacted]
- [redacted]
- [redacted]
- [redacted]

5.1.2. Site Reliability

Assessment of historic expenditure

Approximately 80% of the investment at [redacted] during AMP7 has been to repair the existing plant. As with the other sites, this indicates that a major upgrade is required in the near-term to enhance the functionality of the treatment works to reduce future costs to customers over the long run.

Figure 21: AMP7 Implicit Allowance vs Actual Spend to date (£m) - [redacted]



The table below shows the proportion of Totex attributed to both Capex and Opex at the site over the previous two AMPs:

Table 32: [redacted] Totex Split AMP5 - AMP7

Combined	[redacted]
AMP7-CAPEX	7.3
AMP7-OPEX	1.4
AMP6-CAPEX	7.3
AMP6-OPEX	1.9
AMP5-CAPEX	4.1
AMP5-OPEX	9.6

Appendix F has a full breakdown of scope and investment at each of the four sites by year. Below is a summary for [redacted] across AMP5-7 of the asset areas where investment has been targeted:

Table 33: [redacted] Scope and Investment (AMP5-7)

	AMP5 Investment Focus	AMP6 Investment Focus	AMP7 Investment Focus
Scope	Site Distribution Sodium Hydroxide Dosing Unthickened Sludge Storage Thickened Sludge Storage Site Valving	Dewatering Flocculation System Lamella Settlement Polyelectrolyte Dosing Pumping Station Upgrades Sodium Bisulphite Dosing Sludge Thickening	Heating/Ventilation Control System Hypochlorite Dosing Monitoring Sampling Upgrade Telemetry Washwater System
Total CAPEX (£m)	**4.1**	**7.3**	**7.3**

Our proposed investment programme at [redacted] WSW does not overlap in scope with any areas where funding was awarded at PR19. [redacted] We are also upgrading the other wastewater systems on site, to align to the AMP7 upgrades to the washwater system. We are upgrading our power and control systems across the site but focusing on high priority emergent risks from AMP7 to be addressed in AMP8. [redacted]

5.1.3. Site Resilience

Below is a breakdown to show which assets are past their design life and required replacement /refurbishment.

Table 34: [redacted] WSW Asset Age Assessment

Asset	Average of date installed	Average Predicted End of life date
[redacted]		

There are several key process areas with end-of-life assets – [redacted]. We will replace these assets with new, more efficient replacements.

[redacted]

[redacted]

5.1.4. System Resilience

[redacted]

5.1.5. Alignment with WRMP

We have reviewed [redacted] WSW's interface with the current WRMP, to identify opportunities and possible challenges. [redacted]

5.2. Programme Plan for Delivery

5.2.1. Options Assessment

A summary table presenting the needs case, preferred solution, whole life cost estimate and supporting justification for each of the DWI mandated interventions proposed at [redacted] is shown below. The DWI mandated interventions can be considered prescriptive in nature with clearly defined objectives. The detailed options appraisal for each intervention can be found in Appendix C. All items listed below have been selected.

Table 35: [redacted] Need Option Assessment Outcome – Mandated Items

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]		High	£1.3m	95% Risk reduction for [redacted], much lower whole life cost than alternatives.
		High	£0.3m	Good reduction in property interruption risk score (75%). High

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]				reduction in pollution risk score (90%) Lowest WLC solution.
		High	£1.1m	High risk reduction, low WLC versus other high risk reduction solutions

A summary table presenting the needs case, preferred solution(s), whole life cost estimate and supporting justification for each of the strategic long-term interventions proposed at [redacted] is shown below. These options have undergone a R&V process to ensure the best outcome is delivered for customers. The detailed options appraisal for these interventions can be found in Appendix C. All items listed below have been selected.

Table 36: [redacted] Need Option Assessment Outcome – Strategic Items

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]		High	£0.9m	This option has lower feasibility risk, affordability risk, and CAPEX than option 4 (And options 1, 2,3). It fulfils the need better and has more value for money than the other options.
		High	£0.4m	Enhanced replacement and will deliver a risk reduction in terms of likelihood of asset failure. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£0.4m	[redacted] This is better than the other options, regarding achieving the need and reducing the business

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
	[redacted]			risk with best value for money and feasibility risk.
		High	£0.1m	This is the only feasible option to prevent risk increasing further, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£0.5m	The [redacted] is the only feasible option to prevent risk increasing further, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£0.1m	This is the only feasible option to prevent risk increasing further, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£0.6m	Enhanced replacement and will deliver a risk reduction in terms of likelihood of asset failure. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£0.2m	This is the only feasible option to prevent risk increasing further, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
		High	£1.5m	This is required to achieve a completely new improvement/infrastructure required to fulfil the need. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
	[redacted]	High	£1.1m	This is required to achieve a completely new improvement/infrastructure required to fulfil the need. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]	[redacted]	High	£4.6m £22.4m	It will improve water quality from all sources on-site. Best value for money option. Risk it is more expensive than the estimated value.
[redacted]	[redacted]	Medium	-	Possible solution, but not preferred due to the risk of disturbing the current turbidity level. [redacted] This option doesn't give the same level of site improvement as option 1 and covers only water from BH source.
[redacted]	[redacted]	High	£15.1m	It has similar feasibility risk and CAPEX as option 2. It fulfils the need more robustly than option 2. It will remove algae from the water. Capex is £6.6m and the total opex is £8.5m
[redacted]	[redacted]	High	[redacted] was £3.9m	It has similar feasibility risk and CAPEX as option 1. It might fulfil the need, pending investigation.

Need	Preferred Solution(s)	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]	[redacted]	High	£11.1m	High cost due to environmental risk of the by product's disposal, but overall, the most appropriate solution to meet the need. Alternative solutions carry high risk of not delivering the intended benefit and are less feasible.

5.2.2. Cost efficiency

Below we set out a table summarising the findings from our industry benchmarking in relation to the major asset upgrades required at [redacted]. Further detail on how we undertook our benchmarking analysis can be found in Section 2.2.4.

Table 37: Hardham Benchmarking Analysis (£m)

Asset	Works Cost	Lower Limit	Benchmark	Upper Limit	Supporting Justification
[redacted]	0.6	0.6	0.8	0.9	[redacted] Over the medium term, £12.1m is accounted for by [redacted], both of which are similar to the benchmarking estimates.
	11.1	9.8	9.8	9.8	
	6.6	5.9	6.1	6.4	The long-term strategic element culminates in a £16.4m cost estimate, of which £12.9m (80%) is used on [redacted]. These works are estimated to be closely aligned to the industry benchmark and as such indicate that they cost efficient.
	1.5	2.3	2.8	3.2	
	4.6	4.6	4.9	5.3	

6. [redacted]

[redacted] WSW supplies approximately 169,000 properties in the Medway and Thanet supply zones in Kent. The WSW provides raw water from the River Medway Scheme which includes Bewl SWR. A bulk supply of treated water leaving [redacted] WSW is also provided to neighbouring water company South East Water (SEW), who receive 11% of Cranbrook zone's total treated water from [redacted]

[redacted]

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

[redacted]

An outline of the existing treatment process is provided below.

[19] [redacted] SEW are obligated to contribute 25% of any spend at [redacted]. This contribution will be worked into the PR24 Business Plan separately. For clarity, total costs for [redacted] throughout this claim are reported in gross terms (i.e., including the 25% that will be funded by SEW). For further information please refer to SEW's letter of support

Figure 22: [redacted] WSW site schematic

6.1. Overview of Site Strategy

[redacted] is one of the oldest sites in the Southern Water estate and [redacted] supporting 169,000 customers in the North Kent zone, and [redacted]. This does not account for the additional customers within the South East Water region, for which [redacted] provides 25% of its output to. Our WRMP24 Section 7.2.5 sets out the ten possible scenarios for bulk export to SEW in all future scenarios, [redacted]. The site must produce [redacted] as driven by these WRMP requirements. This will require major process upgrades to enable more efficient production [redacted]. There is also a more general need for replacement and reconfiguration of the overall existing process train.

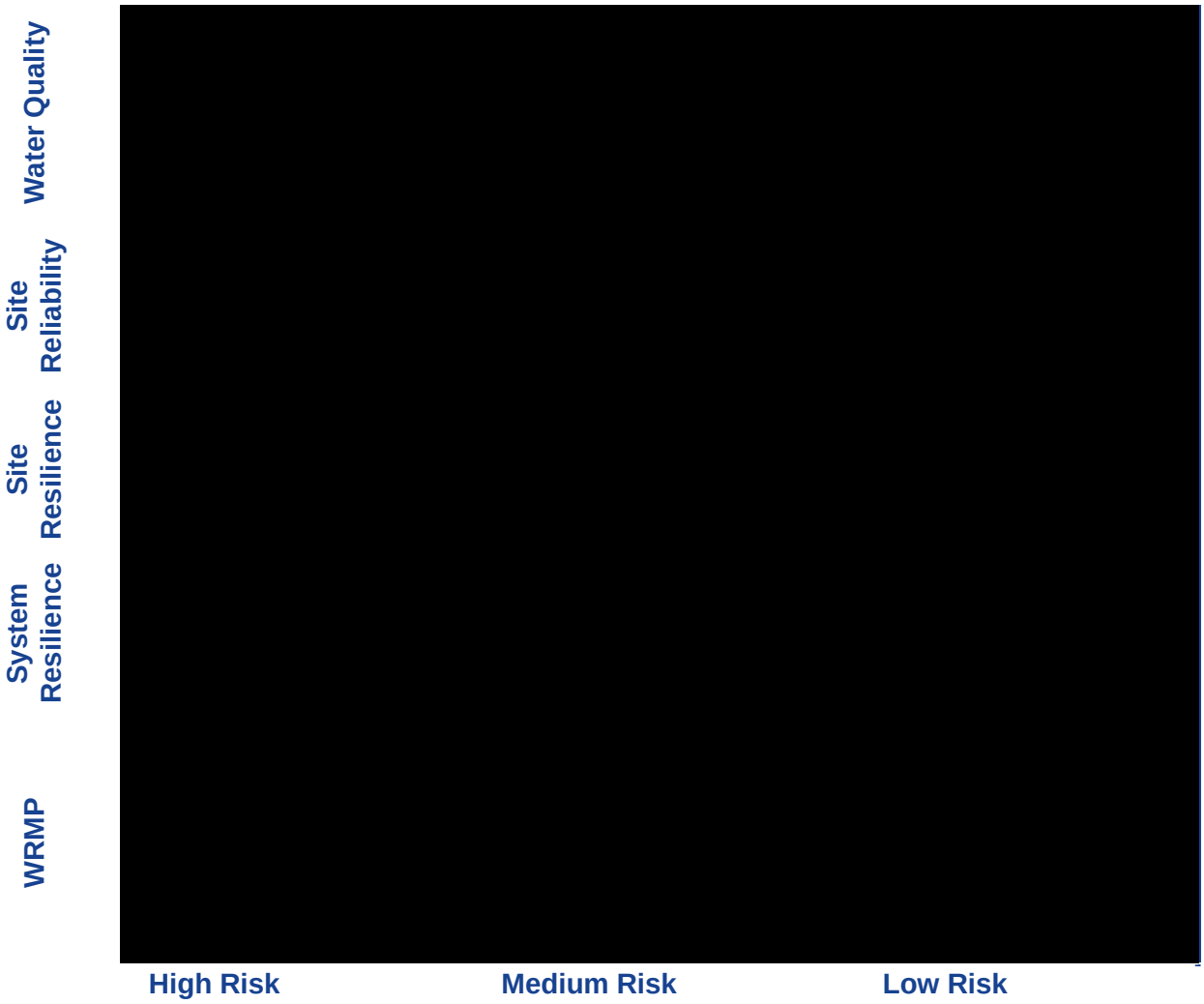
Within the Kent Medway West zone, significant population growth (37%) is forecast by 2050, the highest in our region, [redacted]. Our zonal assessment also showed that our process losses are currently higher than our WRMP assumes, and so this balance must be addressed to remove the risk to our supply demand balance. [redacted]

[redacted]

[redacted]

Looking beyond to AMP9, [redacted]

Table 38: Summary of needs case at [redacted] WSW



We have assessed the expected risk reductions at [redacted] WSW through these targeted investments out to 2033. The figure below was extracted from ARM. To ensure brevity, only those areas where a clear risk benefit is observed are detailed below:

Table 39: [redacted] Risk Reduction Profile (£ 000s)

[redacted] WSW	All	CRI	Health and safety	Legal compliance	Mitigation cost	Pollution	Property minutes	Taste and odour	Unplanned outage
20/05/2023	48470	4598	792	14942	234	249	25749	879	1026
31/03/2025	-2472	-427	-61	0	0	-138	-1776	0	-70
31/12/2027	-28280	-3378	-348	-6293	-34	-110	-16639	-879	-599
31/03/2030	-1774	-84	0	-77	0	0	-1352	0	-261
31/12/2032	0	0	0	0	0	0	0	0	0
01/01/2033	15942	709	383	8572	200	1	5982	0	96
% Improvement (2023-2033)	**67%**	**85%**	**52%**	**43%**	**14%**	**100%**	**77%**	**100%**	**91%**

Below we provide further information on each investment pillar.

6.1.1. Water Quality

We have conducted a full water quality risk assessment for [redacted] WSW. The current treatment processes can mitigate against many of the water quality concerns on site, [redacted]

Figure 23: Source Risks - [redacted] WSW[20]

To control these parameters, we aligned each of the water quality risks against the current level of treatment provided on site, indicating whether the contaminant was partially or fully treated. [redacted]

Table 40: Water Quality Level of Treatment - [redacted] WSW

"As-is" Partial/Untreated parameters	Key processes in need of upgrade	"To be" treatment position – residual partial treatment concerns	Required new processes
[redacted]			

[20] As with the other sites there are items which are considered a risk despite having low PCVs above – this data is supplemented by water quality traces in the technical annex (Appendix B). [redacted]

"As-is" Partial/Untreated parameters	Key processes in need of upgrade	"To be" treatment position – residual partial treatment concerns	Required new processes
	• [redacted]		

To ensure water quality compliance, alongside the process upgrades, [redacted] By 2025 we will have:

- [redacted]

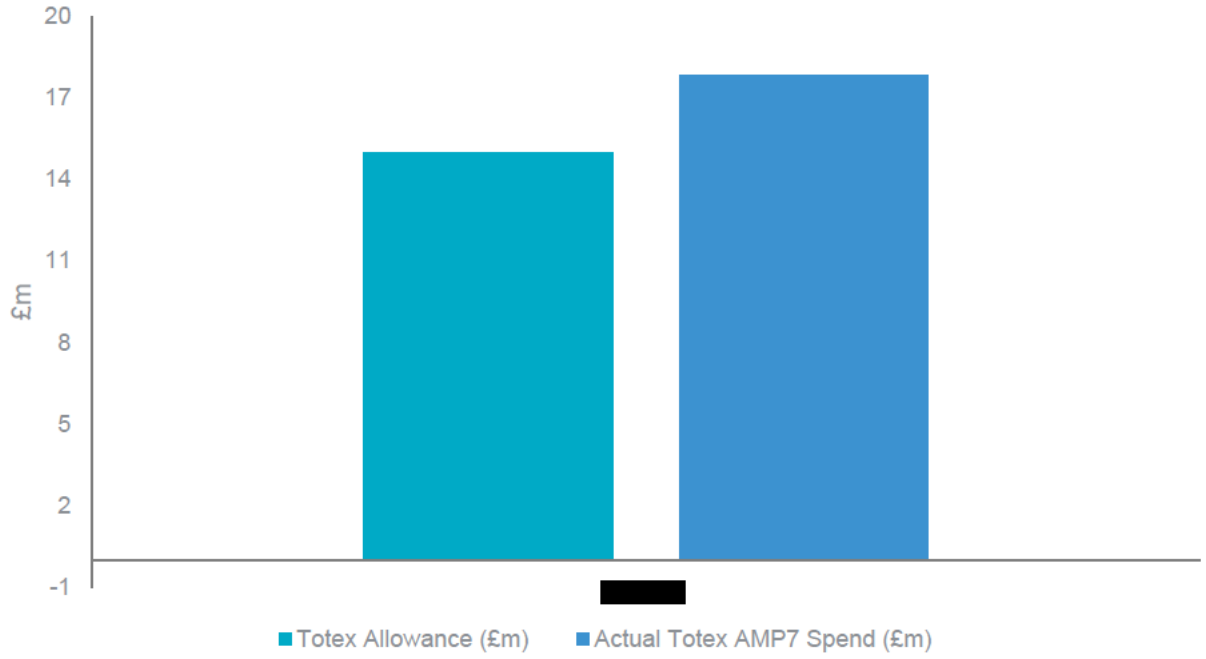
Our chosen conventional future state will see [redacted] on site. During AMP8, we will also consider whether alternative technologies such as [redacted] would be a more cost-effective solution to be implemented in AMP9 and beyond.

6.1.2. Site Reliability

Assessment of historic expenditure

At [redacted] we have invested approximately 10% more than our implicit allowance during AMP7 to date. With a significant proportion of this expenditure relating to reactive repairs to the existing plant, this suggests that the site is in need of major capital renewals – this will prevent higher operating and maintenance costs in the future as assets will be less likely to fail.

Figure 24: AMP7 Implicit Allowance vs Actual Spend (£m) - [redacted]



The table below shows the proportion of Totex attributed to both Capex and Opex at the site over the previous two AMPs:

Table 41: [redacted] Totex Split AMP5 - AMP7

Combined	[redacted]
AMP7-CAPEX	14.8
AMP7-OPEX	3.1
AMP6-CAPEX	6.2
AMP6-OPEX	2.3
AMP5-CAPEX	2.1
AMP5-OPEX	6.5

Appendix F has a full breakdown of scope and investment at each of the four sites by year. Below is a summary for [redacted] across AMP5-7 of the asset areas where investment has been targeted:

Table 42: [redacted] Scope and Investment (AMP5-7)

	AMP5 Investment Focus	AMP6 Investment Focus	AMP7 Investment Focus
Scope	Site Drainage Polyelectrolyte Dosing Sampling Upgrade Telemetry	Ozonation Site Valving Clarification modifications Heating/Ventilation Pumping Station Upgrades	Al Sulphate Dosing Control System Sodium Hydroxide Dosing Booster pumping Monitoring
Total CAPEX (£m)	**2.1**	**6.2**	**14.8**

As with the other three sites, we have ensured that our forward-looking plan does not overlap in scope with any areas where funding was awarded at PR19. The [redacted]) are to be replaced and refurbished, alongside [redacted] which were partially addressed in AMP7. Despite investment in AMP7, [redacted].

6.1.3. Site Resilience

Below is a breakdown to show which assets are past their design life and require replacement or refurbishment.

Table 43: [redacted] WSW Asset Age Assessment

Asset	Average of date installed	Average Predicted End of life date
[redacted]		

[redacted]

[redacted]

6.1.4. System Resilience

[redacted]

[redacted]

6.1.5. Alignment with WRMP

We have reviewed [redacted] WSW's interface with the current WRMP, to identify opportunities and possible challenges. [redacted]

6.2. Programme Plan for Delivery

6.2.1. Options Assessment

A summary table presenting the needs case, preferred solution, whole life cost estimate and supporting justification for each of the DWI mandated interventions proposed at [redacted] is shown below. The DWI mandated interventions can be considered prescriptive in nature with clearly defined objectives. The detailed options appraisal for each intervention can be found in Appendix C. All items listed below have been selected.

Table 44: [redacted] Need Option Assessment Outcome – Mandated Items

Need	Preferred Solution(s)	Level of risk reduction	Justification
[redacted]		High	This solution has higher CAPEX but lower OPEX
		High	Level of risk reduction
		Medium	Single option agreed with DWI
		Medium	Single option agreed with DWI
		Medium	Single option agreed with DWI Limited choice of [redacted] approved instruments and options

A detailed table presenting the options appraisal for each of the strategic long-term interventions proposed at [redacted] can be found in Appendix C.

6.2.2. Cost efficiency

Below we set out a table summarising the findings from our industry benchmarking in relation to the major asset upgrades required at [redacted]. Further detail on how we undertook our benchmarking analysis can be found in Section 2.2.4.

Table 45: [redacted] Benchmarking Analysis (£m)

Asset	Works Cost	Lower Limit	Benchmark	Upper Limit	Supporting Justification
[redacted]	11.2	6.1	6.1	6.1	Across medium-term planned works we have benchmarked 74% of total cost estimate (£37m).
	10.6	13.4	14.5	15.5	
	2.5	1.7	1.7	1.7	
	2.8	2.5	2.8	3.0	
	13.7	10.8	13.8	16.9	Long-term primary cost drivers at [redacted] include the [redacted]. These processes fall well below the industry benchmark estimate deeming our cost estimates efficient and likely to be deliverable to budget.
	18.0	20.1	25.2	30.3	

The advanced nature of the asset scope means there is likely a higher cost incorporated than the benchmark.

7. Conclusion

Throughout this claim we have demonstrated the clear [redacted] needs at each of the four sites which must be addressed to ensure our key treatment works continue to serve the large populations that depend upon them. The longer-term requirements of our WRMP have significantly increased [redacted] upgrade our core treatment processes at each site – [redacted] – in order to maintain industry best practice standards in terms of asset condition and performance. We have demonstrated that our historical expenditure at these sites is insufficient to allow us to make the necessary upgrades required to generate an improvement in delivery that is required by our customers and the DWI.

We have followed structured risk and value processes to ensure that we have selected the right solutions for customers, accounting for wider societal benefits and whole life costs in each proposed intervention. We have benchmarked our estimated costs to ensure that our total claim is representative of the scale of the challenge that we face. By linking together our AMP8 & 9 ambitions for these four sites, we have presented a clear long-term vision for their future that we aim to realise.

We have defined the framework by which we will be held accountable for its delivery, in the form of a bespoke PCD. Customers will therefore only pay for the works that they benefit from. We have engaged with our customers to feed their opinions into the overall claim, with broad agreement that these works are required urgently. Following the submission of this claim, we will follow up with additional engagement with Ofwat to ensure that any wider stakeholder concerns can be raised and addressed through a collaborative approach to ensuring that the improvement in our water supply works is achieved.

7.1. Deliverability during AMP8

We want to deliver our largest ever programme during AMP8 (approximately 2x larger than AMP7) when there is a congested construction market with a capacity challenge. In our region, capability is patchy and needs to improve. To enable an environment that provides the market opportunity to invest to deliver efficiently for us, we must be clear about our pipeline, setting out well-defined programmes of work.

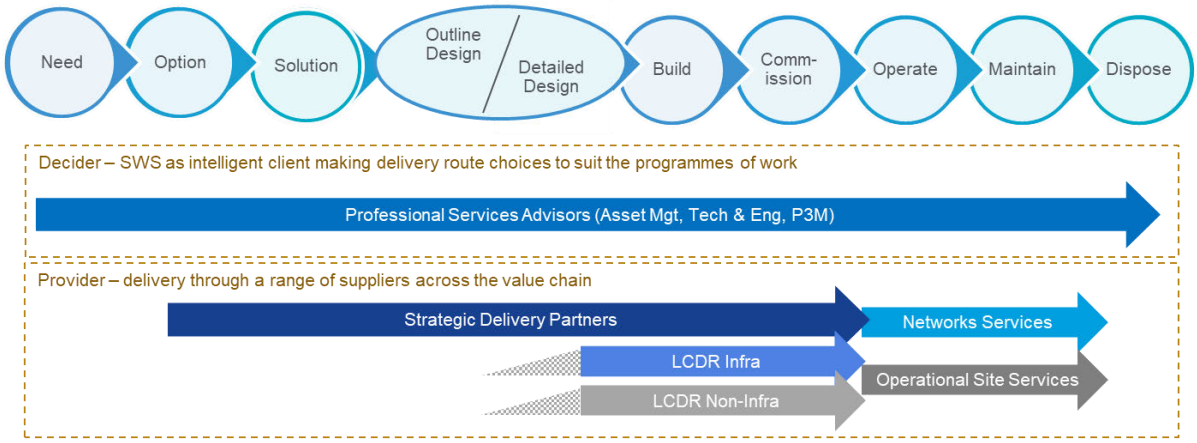
We aim to have the supply chain in place for AMP8 by Q1 2024 through a delivery model that will take us through both AMP8 and AMP9. We have built in resilience by having multiple choices of delivery route and suppliers to safeguard delivery and drive efficiency. We have undertaken extensive market engagement in a variety of ways, including surveys, events and meetings, which has led to more than 50 suppliers competing for each framework. We have listened, learned and adjusted our thinking from market feedback so that we can secure the best value choices for our customers.

We are open to innovation (in both process and technology) to support the step change in performance that we will need for AMP8 in order to deliver the four sites investment programme on time and to budget. We will ensure that we have our key future supply chain partners appointed a year before current arrangements expire, in good time to allow a transition. Our Supplier Enablement programme is preparing the approach to enable us to work more effectively with our supply chain. For example, we are re-letting supporting contracts in AMP7, but now building in the AMP8 thinking to those agreements, so there will be a more coherent approach to contract management.

Finally, our ‘Balanced Scorecard’ of corporate priorities is shaping AMP8 procurement and will drive contract management. This will drive corporate strategy and policy as fixed requirements into the procurement process through providing incentives and performance management linked to maintaining a high standard on KPIs in areas such as safety, customer performance and protecting the environment.

We will deliver the AMP8 and AMP9 scope in this Special Cost Claim by securing outcomes from a more resilient supply chain from a wider more resourceful pool.

Figure 25: Our proposed delivery model for AMP8



The levers to best value are: being clear about the procurement pipeline and programmes of work; Early Contractor Involvement; competitive pressure (including benchmarking); standard NEC4 contract forms; and incentives to achieve corporate priorities through the Balanced Scorecard.

7.1.1. Deliverability risks for the four sites

The undertaking of the proposed works provides us with notable supply chain challenges and requires mitigations to ensure the full value is realised by customers at the end of AMP8. The table below sets out our assessment of these risks. The main challenge we face is competing with companies across the UK for resources – labour, materials, and contractors. There are only a set number of contractors with the expertise required to deliver the work proposed at the four sites. It is critical therefore that we ensure we are attractive to the marketplace. We have done this through extensive market engagement where we have already briefed potential delivery partners on the need to invest in maintaining and enhancing critical infrastructure.

Future partners will need to be able to work on site, supplied with comprehensive knowledge of the assets currently installed. To ensure this outcome we are working now to invest in understanding current assets to prevent delays and additional costs to the AMP8 programme. Asset integrity is a key component of this, and we will ensure that other parts of our supply chain are utilised to promote knowledge transfer. We are currently lotting our professional services framework under Asset Management services, and it is in this area that accurate asset information will be obtained by potential delivery partners.

Within the Hampshire zone specifically, there is an additional risk to customers during delivery posed by our reliance on external parties. At present, Portsmouth Water support the zone with a treated water transfer, and this allows us to take parts of our sites offline. Should this transfer be unavailable during AMP8, it would impact upon our ability to deliver work on site. At [redacted] and [redacted], asset integrity has led to issues during AMP7, but should be mitigated during AMP8 through the measures proposed below.

Table 46: Deliverability Risk Assessment

#	Risk Description	Current Risk Status	Commentary	Southern Water Mitigation
1	**Regional Labour availability**	Medium	Without adequate resources within the UK, it will be difficult to deliver this work & benefits on time.	• We are working to be seen as **an attractive client**, giving the market opportunity to invest to deliver for us. **Key to this is being clear about our pipeline**, setting out clear programmes of work. • We are **seeking outcomes not just resources**; the model aims to take us through AMP8 and 9. We have built in resilience by having **multiple choices of delivery route and suppliers** to safeguard delivery and drive efficiency. • **Extensive market engagement** - in a variety of ways including surveys, events and meetings – has led to more than 50 suppliers competing for each framework. **We have listened and learned**; we have adjusted our thinking from market feedback so that we can secure best value. • We will **be open to innovation** (in process and technology) to support the step change in performance that we will need for AMP8. • We will have **our key future supply chain partners appointed in Q1 2024**, a year before current arrangements expire, in good time to allow a transition. • Our **Supplier Enablement programme** is preparing the approach to enable us to **work more effectively with our supply chain**. • We are re-letting supporting contracts in AMP7, but now building in the AMP8 thinking to those agreements, so **there will be a more coherent approach to contract management**. • **KPIs will ensure partners are incentivised** to deliver best value for customers, inclusive of environmental & social value. • We are working to **become an intelligent client** – this will allow us to understand asset integrity and de-risk projects.
2	**Materials availability**	Medium		
3	**Market capability**	Medium	The complexity of the work proposed at the four sites requires the right partners to deliver this work	
4	**Management of contracts**	Low	To ensure best value for customers, we must provide the right framework for incentivising performance, and managing contractors	
5	**Environment & Social Value**	Medium	We believe it is critical to deliver the wider benefits of the proposed works, and therefore we must ensure partner organisations are responsible for delivering this	
6	**Attractiveness of Southern as a client**	Medium	With a lot of competition and critical scope in the UK, Southern must ensure it appeals to contractors	
7	**Deliverability of the proposed scope in AMP8**	Medium	The size and complexity of the proposed scope requires the right procurement and delivery route be defined by Southern Water	
Residual Status		Through applying the above mitigations, we believe we can effectively deliver the proposed programme of works. Guaranteed funding through this cost claim is crucial to ensuring this, inclusive of transition funding. Specific risks such as labour and materials shortages will remain present, but by securing the right delivery partners ahead of time, we will ensure we are at the front of the queue for these critical resources.		

7.1.2. Delivery arrangements for the four sites

We will look to use a range of suppliers across the value chain, dependent on the size and complexity of the work involved, to align delivery choices based upon outcome requirements. We believe the levers to best value are:

- Being clear about the procurement pipeline and programmes of work – by providing assurance over the timing and scale of the work involved, we will be more attractive to delivery partners.
- Early Contractor Involvement
- Competitive pressure (including benchmarking)
- Where possible, using standard New Engineering Contract 4 (NEC4) forms
- Aligning incentives to achieve corporate priorities through the Balanced Scorecard.

We have considered where DPC may be applicable and deliver better value for customers. We do not believe DPC is appropriate for this type of investment and asset because these assets are highly integrated with our wider operations and therefore don't meet Ofwat's technical discreteness test.

For the four sites specifically, we intend to use our Strategic Delivery Partners (SDPs) procurement route during AMP8. We will utilise a framework of SDPs, delivering these programmes with clearly defined outcomes, suited to higher risk/complexity works. This will involve 1-3 suppliers, with no bidding restrictions, within the Lot for Water interventions. This framework will operate under NEC 4 ECC guidance, with call off options at gates A, C & E. To ensure a ramp-up on site can be quickly achieved, our target to award the wider SDP framework will be February 2024.

[redacted], we want to provide assurance to the market whilst clearly aligning to the required benefits at each site. It is anticipated that given the urgency of this work, a direct award will be enacted to one of the three suppliers within the lot. The chosen partner for these sites will be responsible for leading on the solutions and scope required to achieve the specified outcomes, where not already clearly defined by the Drinking Water Inspectorate. It is our intention that at [redacted] WSW, where the current and future works are more closely linked in terms of risk and integrated timelines, the incumbent will be engaged to provide a detailed handover to the chosen AMP8 SDP. We will look to understand where there may be efficiencies from batching work packages such as at [redacted], but it initially appears logical to group scope together for delivery.

Contract management in AMP8 will be driven by a balanced scorecard approach, with incentives linked to clearly defined KPIs. This will allow us to drive our corporate strategy and policy into the procurement at these works as requirements. This will ensure best value for customers is achieved. Our partners will be incentivised against project budget or target (for emerging needs) at call-off level; and Balanced Scorecard KPIs at framework level.

Across the organisation we are reforming our teams to ensure we can meet the demands of managing and delivering this programme of work. We have reviewed and amended our business model where required, and ensuring we have flexibility in delivery.

The works remaining within AMP7 are to be delivered under our current frameworks & procurement routes. The AMP7-8 Supply chain Transition programme has been created in order to achieve a smooth transition from the AMP7 supply chain to the AMP8 supply chain and beyond, while supporting SWS more widely to ensure that the business meets its broader aims and objectives. We will look at areas where improvements can be made to supplier contracts that are due to expire before the end of AMP7. We will focus on establishing prioritised frameworks to support the delivery of transition into AMP8, using category management to drive opportunities and achieve savings. We will also look at enabling suppliers – this is

integral to the success of both the in AMP7 improvements and opportunities, and the AMP8 and beyond projects.

Evidencing deliverability of large projects: Brighton & Hove wastewater treatment project (2012)

We were required to provide wastewater treatment for the Brighton and Hove urban area to comply with the European Urban Wastewater Treatment Directive (91/271/EEC) and associated Urban Waste Water Treatment (England and Wales) Regulations 1994. An application in 1997 to provide wastewater treatment facilities at Portobello (East Sussex) was refused on appeal in 2001. However, the Secretary of State recognised that there was an urgent need to provide enhanced wastewater treatment works to comply with the Regulations and that such provision was in the national interest.

In 2001 we commenced a fresh assessment process to identify suitable locations for the infrastructure required and to develop a compliant and viable project. Following this process, a project was selected in accordance with existing and emerging planning policy as the Best Practicable Environmental Option (BPEO). A planning application was submitted to Brighton and Hove City Council and East Sussex County Council in April 2005. The application for those parts of the project falling within the administrative area of Brighton and Hove was approved by Brighton and Hove City Council in December 2005.

The project comprised the following elements:

- A Wastewater Treatment Works (WTW) and Sludge Recycling Centre (SRC);
- Transfer infrastructure including pipelines, pumping stations, tunnels, shafts and works to connect to the existing local sewerage infrastructure;
- Friars Bay Long Sea Outfall (LSO).

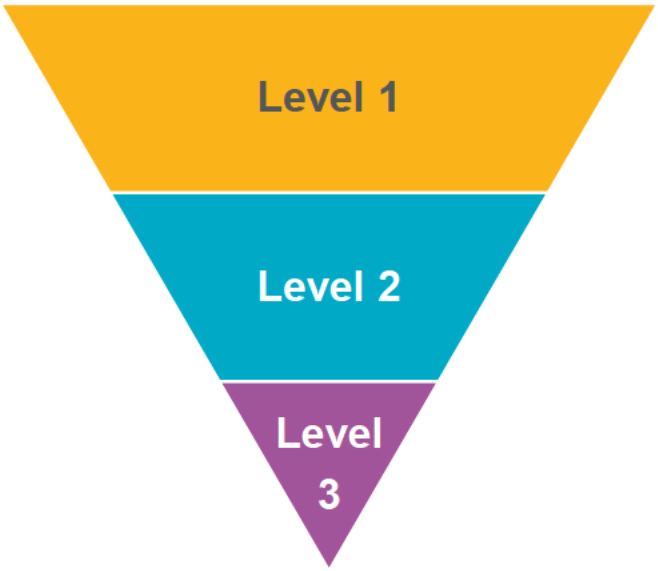
The project included 87 planning conditions with over 9 years to obtain full planning

Appendices

Appendix A – Our PR24 Cost Estimating Methodology

Our approach to deriving costs at PR24 is to establish a methodology based on 'Smart Estimating', where tried and tested estimating practices are utilised and applied in a flexible, intelligent, and prioritised way to maximise cost coverage and quality in the delivery programme.

Utilising a three-level approach throughout the PR24 plan development ensures that the full spectrum of cost needs and optioneering has been considered in the first instance, whilst enhancing cost detail and accuracy throughout the plan development to ensure the best possible cost estimates have been produced.



Level 1 Estimating – Cost triage tools used to develop order of magnitude estimating, allowing for quick optioneering and scenario planning, whilst eliminating non-cost beneficial solutions

Level 2 Estimating – Viable options have cost estimates produced in enhanced detail to allow the development of the PR24 business

Level 3 Estimating – All schemes and programmes taken forward into the business plan submission would have a detailed and benchmarked estimate, scrutiny ready

The level of estimating will be prioritised based on the level of relevance to price determination. Base costs are determined through economic modelling by Ofwat, so that estimating should be limited to Level 1 estimating, other than complex strategically important schemes.

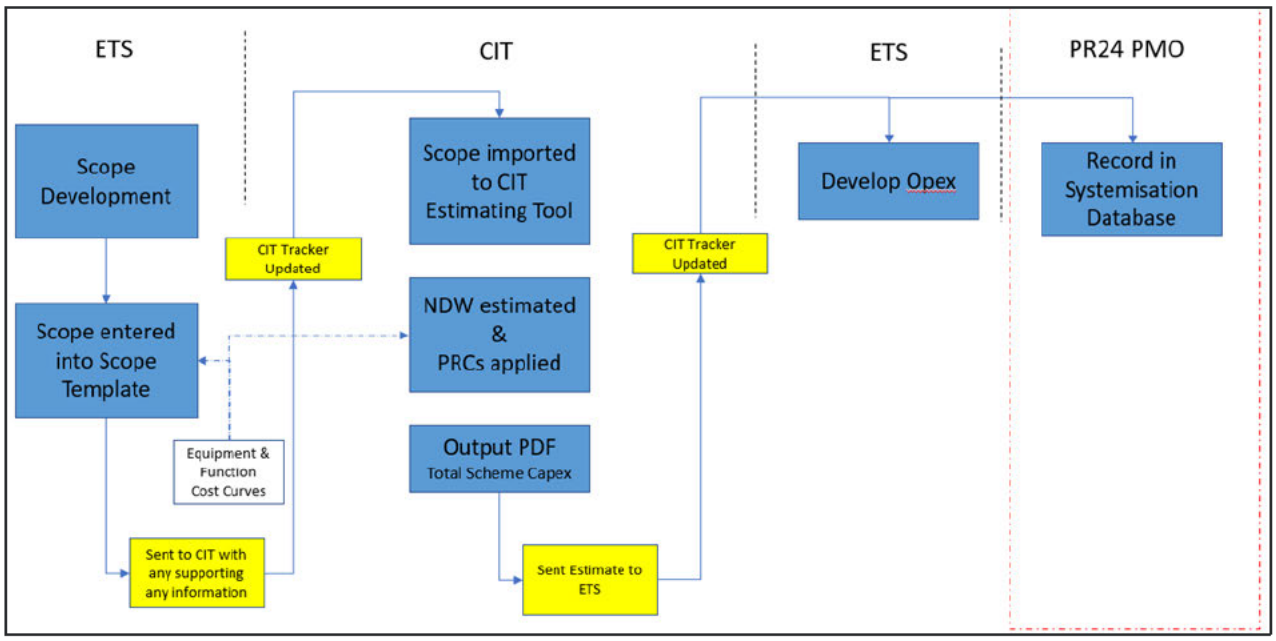
For enhancement costs, firstly triage costs using Level 1 estimating will be used for option comparison with Level 2 Top-Down (Asset and Function Level) estimates for the schemes taken forward. Finally, for complex schemes, we carry out detailed Level 3 (Asset Level Bottom-Up / Top-Down) estimates.

Table 47: Methodology used for Best Value costing approach at PR24

	Base	Enhancements
Level 1 *Using Cost Models*	★	★
Level 2 *Top-Down Function Level Estimates*		★
Level 3 *Detailed Top-Down Asset Level or Bottom-Up Estimates*	Strategic Schemes Only	★

- For Level 1: models have been developed with the Design Engineers. The Design Engineers use these models to determine the cost for various scheme solutions for Optioneering to determine which option is the preferrable option to be taken forward to the next level of estimating (i.e. L2 or L3). L1 models are not intended for Business Plan submission purposes.
- For Level 2 & 3: The Cost Estimating process follows the business-as-usual methodology of estimating, broadly described in the flow diagram below:

Figure 26: Southern Water process flow for cost estimation at PR24



Level 1 Models

Level 1 cost models triage models have been created to allow for quick optioneering, combining Capital, Operational and Carbon estimating of costs. The potential interventions on each site are assessed by our engineering team through a simple 'Yes/No' inclusion choice, with a project, operational and carbon cost

generated. By assessing the needs on a site-by-site basis, this means that a more accurate scope can be developed which in turn leads to a more accurate estimate.

Table 48: Cost estimation example output (£m)

Cost Breakdown				
Direct Costs	Indirect Costs	Risk	Wet Well PS	Methanol Dosing (30m3)
4.8	4.6	0.5	0.2	0.2

The detailed cost breakdown is included within the tool alongside the high-level costs to ensure that the cost audit trail is maintained. All costs used within the Level 1 models are sourced from the cost curve library, ensuring consistent cost data. Once the cost estimates have been prepared by our engineering teams, they will be checked by the CIT team as part of governance process.

Level 2 Asset/Function Level Top-Down Estimating

Our Engineering and Technical Solutions (ETS) teams scope solutions at Function and/or Asset Level, highlighting scope, complexities and site-specific costs outside the standard description, inclusions, and exclusions of the Cost Curves for specialist estimating by the CIT. Cost Curves have been developed through the formation of notional data points, based on actual sites, supported through the blending of historically captured cost data points.

Function curves can be used to provide a quick means of developing scope and estimates but are less granular in detail. A primary benefit of Function Level data points is that they inherently include 'ancillary' or 'support' assets, such as cabling, roads, and analytical instruments, which have been historically difficult to quantify until detail design stage. This means that estimating at outline design stage is more robust and makes appropriate allowances for items which may otherwise be missed within the specification upon which a projects notional solution has been developed.

Level 3 Detailed Asset Level or Top-Down/Bottom-Up Estimating

ETS teams will scope solutions at Asset (Equipment Set) Level, highlighting scope, complexities and site-specific costs outside the standard description, inclusions, and exclusions of the Asset Level Cost Curves for specialist estimating by the CIT. CIT will develop the cost estimate by either Top Down or Bottom-Up method as appropriate.

Appendix B – Supporting Reports

The following documents are contained within this appendix:

- SRN25.1 Appendix B Doc 1 – [redacted] report: List of documentation reviewed for work at [redacted]
- SRN25.1 Appendix B Doc 2 – [redacted] report: Review of supporting evidence for work at [redacted]

Appendix C – Engineering Justification for Options Appraisal

Please note - items highlighted in Green have been selected, as shown in the *Options Assessment* sub-section in each site-specific chapter of the claim.

[redacted]

Need: [redacted]

Table 49: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 - [redacted]	[redacted]	High	-	Assessed to provide lower social value than the preferred solution. Higher CAPEX solution
Option 2 - [redacted]		High	-	Assessed to provide lower social value than the preferred solution. Higher CAPEX solution
Option 3 - [redacted]		High	-	High additional social value benefits assessed. Assessed to be harder to meet maintenance and operational goals. Higher CAPEX solution
Option 4 - [redacted]		**High**	**£92.6m**	The [redacted] solution is preferred as it provides a reliable method of [redacted]. This is a new technology for SWS, therefore pilot trials have taken place to assess and confirm how well solution responds to the raw water challenges at [redacted]. The [redacted] has a smaller footprint which is better suited to the spatially constrained WSW site compared to alternative options.

[redacted]

Need: [redacted]

Table 50: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 - [redacted]	[redacted]	Medium	£27.8m	Higher chemical costs which are the largest OPEX item associated with the three solutions.
Option 2 - [redacted]		**Medium**	**£32.7m**	**This solution provides more benefits from an operational/ process perspective. Greater risk reduction that other solutions.**
Option 3 - [redacted]		High	£27.8m	Lower TOTEX

Need: [redacted]

Table 51: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
[redacted]	[redacted]	-	£18.7m	As per Option 3, but higher residual risk monetised over 30 years (£980k vs £830k)
Option 2 – [redacted]		-	£7.0m	Significantly higher chemical consumption than other solutions. Operator safety is more of an issue with [redacted]
[redacted]		-	£24.0m	[redacted] lower residual process risk than the other solutions, despite higher CAPEX.

Need: [redacted]

Table 52: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 – [redacted]	[redacted]	-	£40.5m	Slightly higher power consumption/ annual OPEX associated with this solution. Lower 30 year WLC. Potential to [redacted] from if investigation can identify root cause of failures Potential to [redacted] – leading to OPEX savings and reduction in carbon footprint.
Option 2 – [redacted]		-	£47.3m	

Need: [redacted]

[redacted]

Table 53: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 - [redacted]	[redacted]	**High**	**£3.6m**	**This option is better than no.2 for risk reduction and need fulfilment. Option similar (regarding overall cost, feasibility, and need fulfilment) to option 3. Refurbishing an existing asset will NOT give a large amount of operational longevity.**
Option 2 - [redacted]		Medium	Not required	The solution does not cover the need as [redacted] is a bespoke solution for the current stages. Exclude this option because it does not cover the need nor minimize the risk like options 1 and 3.
Option 3 - [redacted]		**High**	**£8.6m**	**It is assumed that this would be like option 1 in every sense (risk reduction, need fulfilment and CAPEX) Final decision would require an investigation on whole life costing.**

Need: [redacted]

Table 54: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC	Justification
Option 1 - [redacted]	[redacted]	Low	£0	Discounted. The need, not being fulfilled, is the reason to exclude this option. Base risk will increase with additional sludge discharges to sewage and environment.
Option 2 - [redacted]		Medium	>£0.2m/year	Discounted – This solution is dealing with the consequences rather than addressing the root cause. It could be used to help the need (but not to fully solve it). Not a robust solution . Not as reliable or efficient as options 4 and 5 – more Opex labour required but less power consumption than options 4 and 5. [redacted]. A replacement of sludge thickener would be required as part of this option as well.
Option 3 - [redacted]		Medium	Not required	Discounted - options 4/5 are more reliable. It could be used to assist the need. Would need to be implemented alongside sludge thickener improvements. Not as reliable or efficient as options 4 and 5 – not as good value for money as options 4 and 5.
Option 4 - [redacted]		**High**	**£11.1m***	***Selected - in combination with option 5. Option 5 covers many sludge handling requirements that option 4 does not. [redacted] Further investigation on feasibility required, with WW process team.**

Option Reference	Description	Level of risk reduction	WLC	Justification
Option 5 - [redacted]	[redacted]	High		Selected - scope required to [redacted]. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.

Need: [redacted]

Table 55: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 - [redacted]	[redacted]	High	£7.1m	It fulfils the need better than options 2 and 3. TOTEX is higher.
Option 2 - [redacted]		Low	-	Low risk reduction level compared with option 1. Scope and cost still need to be studied.
Option 3 - [redacted]		Low	£0	It will only postpone the need. The problem will get worse. Shortlisted due to the possibility of [redacted]

[redacted]

Need: [redacted]

Table 56: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 [redacted]	[redacted]	High	£1.3m	95% Risk reduction for [redacted], lower whole life cost.
Option 2 ([redacted]		High	£1.3m	99% Risk reduction for [redacted]
Option 3 [redacted]		High	£5.9m	95% Risk reduction for [redacted], 100% reduction for [redacted], lower residual risk value (monetised)
Option 4 [redacted]		High	£5.9m	99% Risk reduction for [redacted], 100% for [redacted] lower residual risk value (monetised)

Need: [redacted]

Table 57: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 - [redacted]	[redacted]	High	£2.1m	Complex construction, benefits have been eroded by triple validation points – 493m3 of flow may enter contact tank before RTW enacted. Low reduction in property interruption risk score (10%). High reduction in pollution risk score (90%)
Option 2 - [redacted]		**High**	**£0.3m**	**Good reduction in property interruption risk score (75%). High reduction in pollution risk score (90%)**
Option 3 - [redacted]		High	£0.4m	Good reduction in property interruption risk score (75%).High reduction in pollution risk score (90%)
Option 4 [redacted]		High	£4.5m	High reduction in property interruption risk score (85%).High reduction in pollution risk score (90%). Highest OPEX of the four solutions.

Need: [redacted]

Table 58: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	Medium	£1.9m	Higher WLC, lower risk reduction than Option 2A-C
Option 2A		High	£1.6m	Higher WLC than Option 2C
Option 2B		High	£1.6m	Higher WLC than Option 2C
Option 2C		**High**	**£1.1m**	**High risk reduction, low WLC versus other high risk reduction solutions**
Option 3A		Low	£0.4m	Low level of risk reduction
Option 3B		Low	£0.4m	Low level of risk reduction
Option 3C		Low	£0.2m	Low level of risk reduction
Option 4		Low	<£0.1m	Low level of risk reduction

Need: [redacted]

[redacted].

Table 59: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1 [redacted]	[redacted]	Low	Not required	Discounted due to high feasibility risk. This option would require [redacted] to be off for at least a week making more than ~20k properties lose supply of water. Solution 6 is better because it does not have this risk.
Option 2 [redacted]		Low	Not required	Discounted. There is not available [redacted]. Solution 6 is better to clean [redacted] with less risk.
Option 3 - [redacted]		Low	Not required	Discounted. [redacted]. Solution 6 is better [redacted] with less risk.
Option 4 - [redacted]		High	£3.7m	Discounted. High risk that this concept is not feasible given the constraints in the ground / hydraulics in the areas required. Expensive. Solution 6 is better value for money, and it has more manageable risks.
Option 5 - [redacted]		Low	£0	Discounted. The need, not being fulfilled, is the reason to exclude this option.
Option 6 - [redacted]		**High**	**£0.9m**	**This option has lower feasibility risk, affordability risk, and CAPEX than option 4 (And options 1, 2,3). It fulfil the need better and has more value for money than the other options.**

Need: [redacted]

Table 60: Selected Option(s): All

Option Reference	Description	Level of risk reduction	CAPEX	Justification
Option 1 - [redacted]	[redacted]	High	£0.4m	Enhanced replacement and will deliver a risk reduction in terms of likelihood of asset failure. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 2 - [redacted]		High	£0.4m	[redacted]. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 3 - [redacted]		High	£0.1m	This is basically the only option (other than do nothing and keep the risk increasing), regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 4 - [redacted]		High	£0.5m	The [redacted] is basically the only option (other than do nothing and keep the risk increasing), regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 5 - [redacted]		High	£0.1m	This is basically the only option (other than do nothing and keep the risk increasing), regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 6 - [redacted]		High	£0.6m	Enhanced replacement and will deliver a risk reduction in terms of likelihood of asset failure. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 7 - [redacted]		High	£0.2m	This is basically the only option (other than do nothing and keep the risk increasing), regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 8 - [redacted]		High	£1.5m	This is required to achieve a completely new improvement/infrastructure required to fulfil the need. This is better

Option Reference	Description	Level of risk reduction	CAPEX	Justification
	[redacted]			than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.
Option 9 - [redacted]		High	£1.1m	This is required to achieve a completely new improvement/infrastructure required to fulfil the need. This is better than the other options, regarding achieving the need and reducing the business risk with best value for money and feasibility risk.

Need: [redacted]

[redacted]

Table 61: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	High	£4.6m	It will improve water quality from all sources on-site. Best value for money option. Risk it is more expensive than the estimated value.
Option 2		High	Not required	Discounted. CAPEX would be higher than option 1 and [redacted]. Not cost effective. For this, option 1 is better than this.
Option 3		Low	Not required	Discounted. High Risk of Manganese and Iron to clog the filters Makes this solution not suitable. Option 1 is more suitable for not having this risk.
Option 4		Medium	-	Possible solution, but not preferred due to the risk of disturbing the current turbidity level. [redacted] This option doesn't give the same level of

				site improvement as option 1 and covers [redacted].
Option 5	[redacted]	Low	Not required	Discounted. After meeting with the Process Scientist team, [redacted]. The need, not being fulfilled, is the reason to exclude this option.
Option 6		Low	£0	Discounted. The need, not being fulfilled, is the reason to exclude this option.

Need: [redacted]

Table 62: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	High	£15.1m	It has similar feasibility risk and CAPEX as option 2. It fulfils the need more robustly than option 2. It will remove algae from the water. Capex is £6.6 and the total opex is £8.5m
Option 2		High	£3.9m	It has similar feasibility risk and CAPEX as option 1. It might fulfil the need, pending investigation.
Option 3		Medium	-	Discounted due to high risk of not fulfilling the need as well as options 1 and 2. Low chance of providing a resilient solution. [redacted]

Need: [redacted]

Table 63: Selected Option(s): [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	**High**	**£11.1m**	**High cost due to environmental risk of the byproduct's disposal. Option 2 doesn't have this risk**
Option 2		Medium	-	Option discouraged due to environmental risk. Further investigation to be held with environmental advisor. Risk of innovative/new/ solution. No CIT cost but it will be expensive
Option 3		Low	£0	Discounted. This option will enlarge the quantities of sludge are contained in the lagoon [redacted]

[redacted]

Need: [redacted]

Table 64: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	High	-	This solution has lower CAPEX but higher OPEX. This solution entails lower embodied carbon but higher overall lifetime carbon.
Option 2		**High**	**£0.5m**	**This solution has higher CAPEX but lower OPEX**

Need: [redacted]

Table 65: Selected Option: [redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	High	-	-
Option 2		Medium	-	Lower risk reduction than Option 3
Option 3		**High**	**£0.7m**	**High risk reduction**
Option 4		High	-	-

Need: [redacted]

Table 66: Selected Option: Multiple

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
Option 1	[redacted]	Medium	£5.4m	[redacted]
Option 3		Medium		

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
	[redacted]			[redacted]
Option 4		High		[redacted]
Option 5		High		Like for like replacement with improved resilience and dosing control.
Option 6		High		[redacted]
Option 7		Medium		Need to understand cost benefit against risk reduction to choose
Option 8		High		Need to understand cost benefit against risk reduction to choose as well as control system.
Option 9		Medium		Single option - Capital maintenance of failing assets
Option 11		High		[redacted]
Option 12		Medium		High costs and opex against [redacted]
Option 14		Medium		Lower Capital and O&M Cost.
Option 16		Medium		[redacted] Agreed to retain option at this stage to review if better value but may need temporary dosing plant to undertake changes
Option 17		High		[redacted]

Option Reference	Description	Level of risk reduction	WLC/TOTEX Estimate (30 year)	Justification
	[redacted]			
Option 18		Medium		Single option agreed
Option 20		Medium		Single option agreed
Option 22		Medium		Single option agreed. Limited choice of [redacted] approved instruments and options

Appendix D – Benefits assumptions

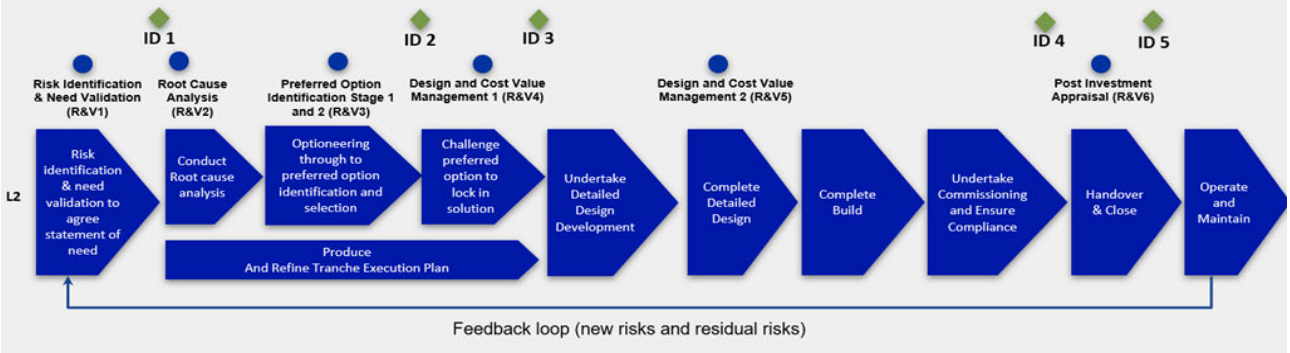
To derive the benefits relating to the proposed interventions across the four sites, the following assumptions were made:

- Data has been derived specifically for the four sites against each of the performance commitments to be used to calculate the overall benefits.
- Pioneer modelling assumed the end year of each AMP is when the benefit is fully realised for each intervention.
- The percentage cumulative benefit is calculated against the projected 2023/24 position for each performance commitment respectively.
- Pioneer assumes a like for like replacement of assets, and so this may underestimate the true benefits of the intervention, for example, where new assets such as GAC/UV are being provided.
- Where cumulative benefits flatline, this is based on the view that other assets will deteriorate between 2025-2055 but will be replaced by base allowances, and so no additional detriment/benefit will be observed in this way.
- Current performance is assumed to be maintained at a minimum out to 2055 – this was used to derive the relative improvement in performance commitment levels.
- For customer contacts, a composite approach was used with Pioneer and observed analytical data. Where new GACs have historically been provided at our large works, we have witnessed improvements through reduced contacts for taste & odour, and appearance. We have used these percentages as a proxy for estimating the benefits of implementation at the four sites, with the rate of benefit decreasing each AMP following the initial benefits realisation.

Appendix E – Risk and Value (R&V) process

Below we set out the risk and value (R&V) process that we have followed in the development of each option to date. Please note, Options presented in this document are up to a maximum progression of R&V3.2.

Figure 27: Risk & Value Process Flowchart



Within the R&V3 stage, there is a distinction between options which are R&V3.1 & R&V3.2. In R&V3.1, all options to address the need or root cause, regardless of cost, feasibility, or other constraints are considered. This creates a long list of potential options. Using an options scorecard, this list is then reduced to a shortlist – the greater the score, the more likely that the option will deliver the best value for money, whilst reducing the greatest risk to the business.

At R&V3.2, the residual risk (monetised) is considered for each of the short-listed options, together with whole life costs and associated benefits to identify the preferred option. A preferred option is agreed at this stage.

The R&V system we use to progress needs through to interventions is highly effective. It draws upon expertise from across the business, to ensure the best value solution is provided for customers. It achieves this by providing an effective internal system of control to determining the best solutions to meet each need, and to effectively quantify the benefits and risks inherent therein.

Appendix F – Historic Spend Data Tables

Table 67: Statutory costs per site (£m) (2010-2015)

Site	Cost type	2010	2011	2012	2013	2014	2015
[redacted]	Capital delivery	0.6	0.9	0.3	0.2	0.5	0.3
[redacted]	Overhead	0.1	0.1	0.1	0.1	0.1	0.1
[redacted]	Capital delivery	0.8	0.8	2.2	0.9	3.7	1.0
[redacted]	Overhead	0.1	0.1	0.3	0.1	0.5	0.2
[redacted]	Capital delivery	0.8	0.6	0.1	1.7	0.1	0.1
[redacted]	Overhead	0.1	0.1	0.1	0.2	0.1	0.1
[redacted]	Capital delivery	1.0	1.0	1.1	0.6	0.1	0.1
[redacted]	Overhead	0.1	0.1	0.2	0.1	0.1	0.1
Grand Total		**3.5**	**3.6**	**4.4**	**3.9**	**4.8**	**1.6**

Table 68: Statutory costs per site (£m) (2016-Present)

Site	Cost type	2016	2017	2018	2019	2020	2021	2022	Grand Total (2009-Present)
[redacted]	Capital delivery	1.9	0.7	1.8	4.0	3.4	7.7	5.5	**27.9**
[redacted]	Overhead	0.4	0.1	0.4	0.5	0.5	0.7	0.4	**3.4**
[redacted]	Capital delivery	1.9	5.4	3.5	2.9	2.9	1.2	2.4	**29.5**
[redacted]	Overhead	0.4	0.8	0.6	0.4	0.4	0.1	0.2	**4.2**
[redacted]	Capital delivery	0.3	4.5	7.5	6.2	3.3	23.3	19.6	**67.9**
[redacted]	Overhead	0.1	0.7	1.3	0.8	0.4	2.2	1.4	**7.2**
[redacted]	Capital delivery	0.4	1.9	6.3	15.7	11.7	11.4	8.2	**59.3**
[redacted]	Overhead	0.1	0.3	1.0	2.1	1.6	1.1	0.6	**7.2**
Grand Total		**5.3**	**14.6**	**22.3**	**32.6**	**24.1**	**47.8**	**38.1**	**206.5**

Table 69: CAPEX Summary (£m) - Four Sites (2010-Present)

CAPEX				
Year	[redacted]	[redacted]	[redacted]	[redacted]
2010	0.2	1.1	1.0	1.1
2011	1.4	1.1	1.1	0.7
2012	-	0.8	0.3	0.1
2013	0.3	1.0	0.8	0.3
2014	0.6	0.2	-	0.5
2015	0.5	0.5	1.2	1.4
2016	1.0	0.3	0.5	1.6
2017	0.6	0.7	5.4	4.9
2018	1.4	3.1	8.5	8.0
2019	2.7	2.7	6.7	15.4
2020	3.7	2.6	2.4	12.9
2021	7.3	1.7	19.9	12.1
2022	5.7	3.0	24.5	8.8
2023	-	0.1	0.7	1.3
AMP5	**2.1**	**4.1**	**2.9**	**2.7**
AMP6	**6.2**	**7.3**	**22.2**	**31.2**
AMP7 (To date)	**14.8**	**7.3**	**47.5**	**35.0**

Table 70: OPEX Summary (£m) - Four Sites (2010-Present)

OPEX				
Year	[redacted]	[redacted]	[redacted]	[redacted]
2010	0.7	-	0.6	0.4
2011	1.5	2.5	1.1	1.1
2012	1.4	2.5	1.1	1.2
2013	1.5	2.8	1.3	1.3
2014	1.6	2.3	1.3	1.3
2015	0.5	0.6	1.3	1.8

OPEX				
2016	0.1	0.7	0.9	2.5
2017	0.4	0.1	1.1	2.8
2018	0.3	0.1	1.8	2.9
2019	0.9	0.3	1.3	2.9
2020	0.8	0.6	1.6	3.1
2021	1.0	1.5	1.7	2.8
2022	0.9	-	1.2	15.5
2023	0.4	0.3	0.6	1.2
AMP5	**6.5**	**9.6**	**5.4**	**5.2**
AMP6	**2.3**	**1.9**	**6.4**	**12.8**
AMP7 (To date)	**3.1**	**1.4**	**5.0**	**22.6**

Table 71: TOTEX Summary (£m) - Four Sites (2015-Present)

TOTEX				
Year	[redacted]	[redacted]	[redacted]	[redacted]
2015	1.0	1.1	2.5	3.1
2016	1.1	1.0	1.4	4.1
2017	1.0	0.8	6.5	7.7
2018	1.7	3.2	10.2	10.9
2019	3.6	2.9	7.9	18.3
2020	4.4	3.2	4.0	16.0
2021	8.3	3.2	21.5	15.0
2022	6.6	2.0	25.7	24.2
2023	-	0.3	1.3	2.5
AMP7 (To date)	**17.8**	**8.7**	**52.5**	**57.8**
AMP6	**8.5**	**9.1**	**28.6**	**44.1**

Historic Interventions (All Sites)

Our Pioneer database has been used to summarise the interventions by process area for each site under this claim. This data clearly shows the significant investment already undertaken to maintain the current performance. Please note, there are projects in flight at each site which have yet to lead to updates within Pioneer. This data continues back prior to AMP5 and can be provided if required.

AMP4	
AMP5	
AMP6	
AMP7	

Table 72: Pioneer Data - Install Dates Per Site (AMP5-Present)(Most Recent Intervention)

Process Area	[redacted]	[redacted]	[redacted]	[redacted]
ALUMINIUM SULPHATE DOSING	16/10/2020			
BOOSTER PUMPING			01/05/2005	31/03/2007
BUILDING (FUNC)	15/12/2021	01/11/2006	08/02/2019	08/04/2008
CATHODIC PROTECTION SYSTEM (FUNC)	01/11/2005		17/05/2019	30/03/2018
CHLORINE DOSING			08/08/2019	
CLARIFICATION (WSW) (FUNC)			14/02/2011	
COMMON CONTROL	28/11/2018		08/08/2019	01/01/2005
DEWATERING	19/11/2020	13/05/2021	09/01/2020	18/06/2021
DISSOLVED AIR FLOTATION (WSW)	01/04/2006	13/09/2017		
ELECTRICAL HIGH VOLTAGE				18/06/2021
ELECTRICAL LOW VOLTAGE	01/11/2005		28/12/2017	16/09/2019
FERRIC CHLORIDE DOSING		01/01/2005	03/09/2018	
FLOCCULATION			16/10/2019	18/06/2021
HEAT/VENT/AIR CON		13/09/2017	01/01/2005	11/10/2021
HYPOCHLORITE DOSING		01/01/2005		01/01/2005
LAMELLA SETTLEMENT (FUNC)	28/11/2018	14/02/2020	01/05/2006	31/03/2007
MIXING			01/06/2008	
MOBILE PLANT (FUNC)	05/03/2008	13/05/2021	10/03/2016	30/04/2021
MONITORING		13/09/2017		
OZONATION	25/07/2005	25/07/2005	25/07/2005	25/07/2005
PLUMBING & DRAINAGE	01/04/2006			

Process Area	[redacted]	[redacted]	[redacted]	[redacted]
POLYELECTROLYTE DOSING		24/04/2007	08/08/2019	
POWDERED ACTIVATED CARBON DOSING	21/03/2013	21/03/2013	07/08/2014	01/10/2010
POWER GENERATION	15/12/2021	24/12/2021	30/03/2020	04/11/2021
PRESSURE FILTRATION	07/07/2016	01/01/2005		
PUMPING	01/01/2005	01/01/2009	01/01/2005	01/01/2005
SAFETY EQUIPMENT	12/05/2011	19/01/2005	08/12/2014	01/03/2006
SAMPLING	01/01/2011	13/09/2017	16/10/2019	13/10/2021
SAND FILTRATION (WSW)				11/10/2021
SECURITY EQUIPMENT	01/02/2007	31/01/2008	01/01/2007	09/10/2017
SITE DISTRIBUTION			01/01/2011	
SITE SUPPORT	28/11/2018	13/09/2017		02/06/2016
SODIUM BISULPHITE DOSING	19/06/2020	08/12/2014	14/11/2018	18/06/2021
SODIUM HYDROXIDE DOSING	12/05/2011	13/05/2021	08/08/2019	18/06/2021
STRUCTURES	01/04/2006		10/04/2008	20/03/2020
SULPHURIC ACID DOSING	29/07/2019	25/10/2019	14/11/2018	28/10/2019
TELEMETRY (FUNC)		02/07/2014	09/01/2020	30/04/2018
THICKENED SLUDGE STORAGE	01/07/2010	31/01/2008	01/01/2006	01/01/2006
THICKENING	01/04/2006	01/03/2013		
UNTHICKENED SLUDGE STORAGE	27/08/2020	02/07/2014	30/10/2019	
VALVING (FUNC)	14/05/2020	19/01/2005	16/10/2019	18/06/2021
WASHWATER SYSTEM (FUNC)			30/10/2019	

Table 73: AMP5 Investments per site, per year (£m)

	Site	2010	2011	2012	2013	2014
Investment (Projects)	[redacted]	0.6	1.0	0.3	0.3	0.6
	[redacted]	0.9	0.9	2.6	1.0	4.1
	[redacted]	0.9	0.6	0.1	1.9	0.1
	Testwood	1.1	1.1	1.3	0.6	0.1
Scope (based on Pioneer data)	[redacted]		Site Drainage Polyelectrolyte Dosing Sampling Upgrade Telemetry			

	Site	2010	2011	2012	2013	2014
	[redacted]					Site Distribution Sodium Hydroxide Dosing Unthickened Sludge Storage Thickened Sludge Storage Site Valving
	[redacted]		Chlorine Dosing Pressure Filtration Telemetry			Site Drainage
	[redacted]					Washwater System

Table 74: AMP6 Investments per site, per year (£m)

	Site	2015	2016	2017	2018	2019
Investment (Projects)	[redacted]	0.4	2.3	0.8	2.2	4.5
	[redacted]	1.1	2.3	6.3	4.1	3.3
	[redacted]	0.1	0.3	5.3	8.7	7.0
	[redacted]	0.1	0.4	2.2	7.3	17.7
Scope (based on Pioneer data)	[redacted]		Ozonation		Clarification modifications Heating/Ventilation Pumping Station Upgrades	Site valving
	[redacted]	Sludge Thickening	Sodium Bisulphite Dosing	Dewatering Flocculation System Lamella Settlement Polyelectrolyte Dosing Pumping Station Upgrades		
	[redacted]			HV System	LV System	Booster Pumping Cathodic Protection Clarification modifications Ferric Chloride Dosing Mixing

	Site	2015	2016	2017	2018	2019
						Polyelectrolyte Dosing Sampling Upgrade Sodium Hydroxide Dosing Sulphuric Acid Dosing Site Valving
	[redacted]		Pumping Station Upgrades	Power Generation	Site Distribution	HV System

Table 75: AMP7 Investments per site, per year (excluding current works) (£m)

	Site	2020	2021	2022
Investment (Projects)	[redacted]	3.9	8.5	5.8
	[redacted]	3.3	1.3	2.5
	[redacted]	3.7	25.5	21.0
	[redacted]	13.2	12.5	8.8
Scope (based on Pioneer data)	[redacted]	Al Sulphate Dosing Control System Sodium Hydroxide Dosing	Booster Pumping Monitoring	
	[redacted]	Heating/Ventilation	Control System Hypochlorite Dosing Monitoring Sampling Upgrade Telemetry Washwater System	
	[redacted]	Control System Monitoring Site Distribution		
	[redacted]	Sand Filtration Telemetry	Control System Dissolved Air Flotation Ferric Chloride Dosing Flocculation System Hypochlorite Dosing Monitoring Polyelectrolyte Dosing	

	Site	2020	2021	2022
			Powdered Activated Carbon Sampling Upgrade Site Valving	

Appendix G – Transition Funding Eligibility Assessment

Table 76: Transition Funding (2024-25) expenditure request against Ofwat criteria

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
[redacted]	[redacted]	a) early statutory deadlines in the next price control period	4.2	Early design and maybe procurement required.
		a) early statutory deadlines in the next price control period	0.1	AMP8 commitment being delivered early.
		a) early statutory deadlines in the next price control period	0.2	Early design and procurement required. Full spend required in AMP7 to ensure regulatory date is met.
		a) early statutory deadlines in the next price control period	1.1	AMP8 commitment being delivered early. Full spend required in AMP7 to ensure regulatory date met.
		a) early statutory deadlines in the next price control period	2.5	AMP8 commitment being delivered early.
		b) early design and planning of large, non-routine investments	0.7	Early design and procurement required (approx 40% of total cost).
		a) early statutory deadlines in the next price control period	0.1	AMP8 commitment being delivered early. Full spend required in AMP7 to ensure regulatory date met.
		a) early statutory deadlines in the next price control period	0.0	AMP8 commitment being delivered early. Full spend required in AMP7 to ensure regulatory date met.

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
	[redacted]	b) early design and planning of large, non-routine investments	2.0	Early design and procurement required
[redacted]		a) early statutory deadlines in the next price control period	0.3	Early design and procurement required.
		b) early design and planning of large, non-routine investments	3.0	Early design required.
		a) early statutory deadlines in the next price control period	1.0	Early design and procurement required.
		b) early design and planning of large, non-routine investments	1.3	Early design and procurement required.
		b) early design and planning of large, non-routine investments	2.5	Early design and procurement required.
		b) early design and planning of large, non-routine investments	0.1	Early design and procurement required.
		a) early statutory deadlines in the next price control period	4.3	Early delivery required to ensure WQ compliance and delivery by deadline.
		b) early design and planning of large, non-routine investments	0.1	Power monitoring to be delivered early to inform later programme of works
		b) early design and planning of large, non-routine investments	1.2	Early design and procurement required to align with FEO scope.
[redacted]		b) early design and planning of large, non-routine investments	0.2	AMP8 commitment being delivered early. Budget estimate.
		a) early statutory deadlines in the next price control period	0.2	AMP8 commitment being delivered early. - Cost

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
	[redacted]			estimate of 10% of first year of AMP 8
		b) early design and planning of large, non-routine investments	0.2	Early design may be required. - Already in contract.
		b) early design and planning of large, non-routine investments	0.2	Early design may be required. - Inspections being carried out. Cost estimate of 10% of first year of AMP 8
		a) early statutory deadlines in the next price control period	1.5	AMP8 commitment being delivered early.
		a) early statutory deadlines in the next price control period	0.3	Enough AMP8 time to design and procure.
		a) early statutory deadlines in the next price control period	0.3	AMP8 commitment being delivered early. - In contract almost complete - cost spent in year 3&4.
		b) early design and planning of large, non-routine investments	0.4	AMP8 commitment being delivered early. - In contract
		b) early design and planning of large, non-routine investments	0.9	Early design may be required. In contract to be delivered this AMP
		a) early statutory deadlines in the next price control period	0.3	AMP8 commitment being delivered early. In contract to be delivered this AMP
		a) early statutory deadlines in the next price control period	0.4	AMP8 commitment being delivered early. In contract to be delivered this AMP
		a) early statutory deadlines in the next price control period	0.7	AMP8 commitment being delivered early. In

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
	[redacted]			contract to be delivered this AMP
		a) early statutory deadlines in the next price control period	-	AMP8 commitment being delivered early. In contract to be delivered this AMP
		a) early statutory deadlines in the next price control period	0.4	AMP8 commitment being delivered early. - Design element has been completed, tender for construction expected in next couple of months. We will need full funding for this in this AMP
		a) early statutory deadlines in the next price control period	0.2	Cost estimate of 10% of first year of AMP 8
		a) early statutory deadlines in the next price control period	0.2	Early design and maybe procurement required. In contract expected to be completed this AMP
		b) early design and planning of large, non-routine investments	0.9	Early design required. Cost estimate 10% of total of AMP 8 budget
		b) early design and planning of large, non-routine investments	0.9	Early design required to allow integration with AMP8 assets. Cost estimate 10% of total of AMP 8 budget
		b) early design and planning of large, non-routine investments	0.2	Early design and maybe procurement required. - Cost estimate 10% of first year AMP 8 budget
		b) early design and planning of large, non-routine investments	0.2	Early design may be required. Cost estimate

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
	[redacted]			10% of first year AMP 8 budget
		b) early design and planning of large, non-routine investments	0.2	Early investigation may be required. Cost estimate 10% of first year AMP 8 budget
		a) early statutory deadlines in the next price control period	1.7	AMP8 commitment being delivered early
		a) early statutory deadlines in the next price control period	0.2	AMP8 commitment being delivered early
		a) early statutory deadlines in the next price control period	1.0	AMP8 commitment being delivered early
		b) early design and planning of large, non-routine investments	1.1	Early outline design, planning permission and associated surveys, early surveys and early enabling works required.
		a) early statutory deadlines in the next price control period	2.5	AMP8 commitment being delivered early.
[redacted]		b) early design and planning of large, non-routine investments	6.6	Early design and procurement required, temporary works to improve resilience and commence build to meet regulatory date (1 GAC at a time, extended programme). Est. 50% spend AMP7.
		a) early statutory deadlines in the next price control period	2.4	AMP8 commitment being delivered early for resilience (est. 40% spend in AMP 7).

Site	Scope Element	Eligibility Criteria	Transition Funding Estimate (£m)	Supporting Commentary
	[redacted]	a) early statutory deadlines in the next price control period	0.6	AMP8 commitment being delivered early.
		b) early design and planning of large, non-routine investments	0.1	Early design required.
		b) early design and planning of large, non-routine investments	3.4	AMP8 commitment being delivered early.
		b) early design and planning of large, non-routine investments	1.1	Transformer C, Site Mains Quality Monitoring and ESB LV Panel in AMP 7

Appendix H - Population Data

Site	Properties Served*	Average annual production capacity 2022/23 (Ml/d)	Peak Week Production Capacity 2022/23 (Ml/d)
[redacted]**	187,442	51.77	79.37
[redacted]**	177,635	37.41	80
[redacted]	246,354	55.84	75
[redacted]+	169,443	41.30	54
Total	780,874		

*Estimated from SWS Contingency pack

Assumptions:

**68,240 of the '[redacted]' properties are also supplied by '[redacted]'.

+SEW customers supplied from [redacted] are excluded from these figures

Some properties will have a blend of water from multiple sites, but loss of supply at these major works will have an impact on all the properties counted here

780,874 – 68,240 = 712,634 properties supplied by the 4 sites.

Appendix I – Full Scope & Delivery Schedule

[redacted]

Table 77: Scope and delivery schedule [redacted]

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		35		AMP8	a) early statutory deadlines in the next price control period	4.3	N/A	4.5	N/A
		38		AMP8		N/A		0.3	N/A
		42	e	AMP8	a) early statutory deadlines in the next price control period	0.2	N/A	0.1	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		44	d	AMP8		N/A	[redacted]	16.9	0.1
		48	b	AMP8		N/A	[redacted]	3.9	N/A
		48	c	AMP8	N/A	N/A	Incl in 48a	Incl in 48a	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		50	b	AMP8	b) early design and planning of large, non-routine investments	0.7	N/A	1.6	N/A
		50	c	AMP8	N/A	N/A	Incl in 50b	Incl in 50b	N/A
		51		AMP8		N/A	N/A	0.3	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		57		AMP8	b) early design and planning of large, non-routine investments	1.9	[redacted]	92.6	0.3
		58		AMP8	N/A	N/A	Incl in 58	Incl in 58	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		50	d	AMP9	N/A	N/A	N/A	0.8	N/A
		50	e	AMP9	N/A	N/A	Incl in 50d	Incl in 50d	N/A
		N/A	N/A	AMP9	N/A	N/A	Expansion of AMP8 scope	83.4	N/A

[redacted]

Table 78: Scope and delivery schedule [redacted]

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		19	b	AMP8	a) early statutory deadlines in the next price control period	0.3	[redacted]	0.7	N/A
		19	c	AMP8	N/A	N/A	Incl in 19b	Incl in 19b	N/A
		19	e	AMP8		N/A	[redacted]	2.8	N/A
		19	f	AMP8		N/A	[redacted]	0.5	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		19	g	AMP8	N/A	N/A	Incl in 19e/f	Incl in 19e/f	N/A
		20	d	AMP8	b) early design and planning of large, non-routine investments	3.0	[redacted]	20.3	0.3
		20	e	AMP8	N/A	N/A	Incl in 20d	Incl in 20d	N/A
		21	e	AMP8		N/A	Incl in 25b	Incl in 25b	N/A
		21	l	AMP8	a) early statutory deadlines in the next price control period	1.0	[redacted]	2.5	N/A
		21	m	AMP8	N/A	N/A	Incl in 21l	Incl in 21l	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		23	b	AMP8	b) early design and planning of large, non-routine investments	0.9	[redacted]	5.1	N/A
		23	c	AMP8	N/A	N/A	Incl in 23b	Incl in 23b	N/A
		24	c	AMP8	N/A	N/A	Incl in 24b	Incl in 24b	N/A
		25	b	AMP8	b) early design and planning of large, non-routine investments	2.5	[redacted]	22.0	0.5
		25	c	AMP8	N/A	N/A	Incl in 25b	Incl in 25b	N/A
		27	a	AMP8	b) early design and planning of large, non-routine investments	0.1	[redacted]	16.5	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]							[redacted]		
		27	b	AMP8	N/A	N/A	Incl in 27a	Incl in 27a	N/A
		28	a	AMP8	a) early statutory deadlines in the next price control period	4.3	[redacted].	4.3	N/A
		28	b	AMP8	N/A	N/A	Incl in 28b	Incl in 28b	N/A
		29	b	AMP8	b) early design and planning of large, non-routine investments	0.1	[redacted]	13.9	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]							[redacted]		
		29	c	AMP8	N/A	N/A	Incl in 29c	Incl in 29c	N/A
				AMP8	N/A		[redacted]	0.1	N/A
			a	AMP8	N/A	N/A	[redacted]	0.3	N/A
			a	AMP8	N/A	N/A	[redacted]	4.0	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		1-	a	AMP8	b) early design and planning of large, non-routine investments	1.2	[redacted]	11.1	N/A
				AMP8	N/A	N/A	[redacted]	7.1	N/A
		21	f	AMP9	N/A		N/A	Incl in 30	N/A
		30		AMP9	N/A	N/A	N/A - dictated by other line items.	3.3	N/A

[redacted]

Table 79: Scope and delivery schedule [redacted]

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		29	e	AMP8	N/A		N/A			N/A
		29	f	AMP8	N/A	N/A	N/A	Incl in 29e	Incl in 29e	N/A
		31	f	AMP8	N/A	b) early design and planning of large, non-routine investments	0.2	TBC (remedial actions)		N/A
		31	g	AMP8	N/A	N/A	N/A	Incl in 31f	Incl in 31f	N/A
		32	d	AMP8	N/A		0.3	[redacted]	0.3	N/A
		32	e	AMP8	N/A	N/A	N/A	Incl in 32 lines	Incl in 32 lines	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		32	j	AMP8	N/A		N/A	TBC (remedial actions)		N/A
		32	l	AMP8	N/A		N/A	TBC (remedial actions)		N/A
		33	b	AMP8	N/A	b) early design and planning of large, non-routine investments	0.9	[redacted]	0.7	12.9
		36	b	AMP8	N/A	a) early statutory deadlines in the next price control period	[redacted]	N/A - report/plan	N/A - report/plan	N/A
		36	c	AMP8	N/A		N/A	TBC (remedial actions)		N/A
		36	d	AMP8	N/A	N/A	0.2	Incl in 36c	Incl in 36c	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		37		AMP8	N/A	a) early statutory deadlines in the next price control period	0.2	[redacted]	0.1	N/A
		38		AMP8	N/A	N/A	N/A	Incl in 37	Incl in 37	N/A
		39	a	AMP8	N/A	b) early design and planning of large, non-routine investments	0.9	[redacted]	0.5	0.1
		39	b	AMP8	N/A	N/A	N/A	Incl in 39a	Incl in 39a	N/A
		41		AMP8	N/A	b) early design and planning of large, non-routine investments	0.8	TBC (being scoped)		N/A
		42		AMP8	N/A	N/A	N/A	Incl in 41	Incl in 41	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		45	b	AMP8	N/A	b) early design and planning of large, non-routine investments	0.2	[redacted]	1.4	N/A
		45	c	AMP8	N/A	N/A	N/A	Incl in 45b	Incl in 45b	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A	a	AMP8	N/A	b) early design and planning of large, non-routine investments	0.2	[redacted]	4.9	N/A
		N/A		AMP8	N/A		N/A	[redacted]	0.5	N/A
		N/A		AMP8	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
		N/A		AMP8	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
		N/A		AMP8	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
		N/A	a	AMP8	N/A		N/A	[redacted]	0.9	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A	a	AMP8	N/A		N/A	[redacted]	N/A	N/A
		N/A		AMP8	N/A		N/A	See requirement	0.6	N/A
		N/A		AMP8	N/A	b) early design and planning of large, non-routine investments	0.2		3.4	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	Incl in X112	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.4	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.2	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.1	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.2	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.1	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	1.2	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.4	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.1	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.4	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.5	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]										
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.1	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.2	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	AMP8 Early Start (Design/ Procurement) Required	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		N/A		AMP8	N/A		N/A	[redacted]	9.4	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.3	N/A
		N/A		AMP8	N/A		N/A	Assumed scope based on requirement	0.9	N/A

[redacted]

Table 80: Scope and delivery schedule [redacted]

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		21	b	30 September 2029	AMP8	N/A		N/A	Scope prescribed by condition assessment	1.5	N/A
		21	c	31 March 2030	AMP8	N/A	N/A	N/A	Incl in 21b	Incl in 21b	N/A
		24	e	31 December 2025	AMP8	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
		24	f	31 March 2030	AMP8	N/A		N/A	[redacted]	2.2	N/A
		24	g	31 March 2031	AMP8	N/A	N/A	N/A	Incl in 24f	Incl in 24f	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]											
		27	c	30 September 2029	AMP8	N/A	b) early design and planning of large, non-routine investments	1.2	[redacted]	23.8	0.1
		27	d	30 June 2030	AMP8	N/A	N/A	N/A	incl in 27c	incl in 27c	N/A
		27	e	30 June 2031	AMP8	N/A	N/A	N/A	incl in 27c	incl in 27c	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]											
		29	d	30 September 2028	AMP8	N/A	b) early design and planning of large, non-routine investments	5.2	Assumed scope.	10.3	N/A
		33	d	30 September 2029	AMP8	N/A		N/A	Assumed scope.	5.5	N/A
		33	e	31 March 2030	AMP8	N/A	N/A	N/A	Incl in 33e	Incl in 33e	N/A
		34	d	31 March 2027	AMP8	N/A	a) early statutory deadlines in the next price control period		N/A	Complete	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]											
		34	e	31 December 2027	AMP8	N/A	N/A	N/A	Incl in 34e	Incl in 34e	N/A
		35	d	30 June 2026	AMP8	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
		35	e	31 March 2028	AMP8	N/A	b) early design and planning of large, non-routine investments	0.1	Scope prescribed by assessment	2.7	N/A
		35	f	30 September 2028	AMP8	N/A	N/A	N/A	Incl in 35e	Incl in 35e	N/A
		36	b	30 September 2027	AMP8	N/A	b) early design and planning of large, non-routine investments	3.5	Scoped in AMP6	3.5	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		36	c	30 September 2028	AMP8	N/A	N/A	N/A	Incl in 36b	Incl in 36b	N/A
		37	b	31 December 2027	AMP8	N/A	b) early design and planning of large, non-routine investments	1.6	Scope prescribed by assessment	0.8	N/A
		37	c	31 December 2028	AMP8	N/A	N/A	N/A	Incl in 37b	Incl in 37b	N/A
			b		AMP8	N/A		N/A	N/A	0.8	N/A
			a		AMP8	N/A		N/A	Assumed scope.	1.2	N/A
			a		AMP8	N/A		N/A	N/A	N/A	N/A
			a		AMP8	N/A		N/A	[redacted]	0.5	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]											
					AMP8	N/A		N/A	N/A	N/A	N/A
					AMP8	N/A		N/A	Assumed scope.	0.3	N/A
					AMP8	N/A		N/A	N/A	N/A	N/A
					AMP8	N/A		N/A	New panel	0.1	N/A
					AMP8	N/A	N/A	N/A	Scope prescribed by condition assessment	4.6	N/A
		35	c	30 September 2032	AMP9	N/A	N/A	N/A	Assumed scope.	0.4	N/A
		35	g	30 September 2032	AMP9	N/A	N/A	N/A	Scope prescribed by assessment	1.3	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]		35	h	30 September 2033	AMP9	N/A	N/A	N/A	Incl in 35g	Incl in 35g	N/A
			a		AMP9	N/A		N/A	N/A	3.2	N/A
					AMP9	N/A	N/A	N/A	Assumed scope.	14.0	N/A
					AMP9	N/A	N/A	N/A	Assumed scope.	Incl in X120	N/A
					AMP9	N/A	N/A	N/A	Assumed scope.	16.2	N/A
					AMP9	N/A	N/A	N/A	N/A	N/A	N/A
					AMP9	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A

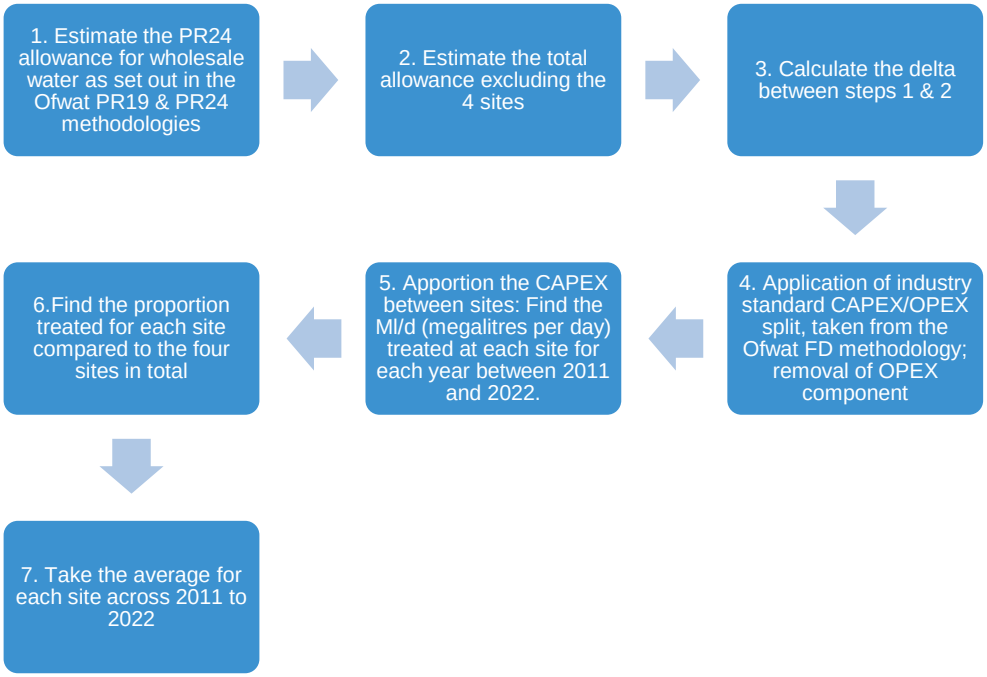
Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]											
					AMP9	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A
					AMP9	N/A	N/A	N/A	Assumed scope.	1.2	N/A

Process	Requirement	FEO Ref	FEO & non-FEO Sub Ref	FEO Date	Delivery AMP	AMP7 Year 4/5 Work to Enable AMP8 Work Required	Transition Funding Eligibility	Transition Funding Estimate (£m)	Preferred Option	Preferred Option Cost Estimate (£m)	Additional Opex estimate (£m)
[redacted]					AMP9	N/A	N/A	N/A	N/A - report/plan	N/A - report/plan	N/A

Appendix J – Calculation of Implicit Allowances

The implicit allowance for each site has been calculated using Ofwat's PR19 feeder model 4, adapted for PR24 using the final methodology and relevant consultation documents. The CAPEX/OPEX split applied is the same as at PR19, with cost driver information sourced from feeder model 3 (shifted forwards one AMP using the methods prescribed in the PR19 final methodology document, found within the feeder model itself).

Figure 28: Determination of Implicit Allowances



The apportioned splits calculated are as follows:

Table 81: CAPEX apportioned by each site

Site	% of capex apportioned
[redacted]	25%
[redacted]	20%
[redacted]	24%
[redacted]	30%

Appendix K – Letters of support

Please see below the final Decision Letter from the DWI evidencing their support for this proposed programme of works and a letter of support from South East Water.

SRN02030405
Decision letter from D