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# COST CHANGE **PROCESS**

**NORTHUMBRIAN**  
**WATER** *living water*

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**WATER** *living water*

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## **ASSET HEALTH INVESTMENT CASE – CIVIL ASSETS AT WWTWS**



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## **1. EXECUTIVE SUMMARY**

1. In our PR24 business plan, we set out our concern that there is insufficient investment in asset maintenance and replacement across the sector<sup>1</sup>. We also recognised that this was a complex problem and that there was a clear need to understand the issues and challenges better and consistently at a sector level through a common framework for assessing and independently verifying levels of asset health. At PR24, we put forward investment proposals focused on “no regrets” activities where we did not think we could wait for that new framework to be in place.
2. Since 2024, Ofwat has taken steps to gain greater insight about asset condition in the water sector – to identify priority assets and to deliver a robust asset condition and workload dataset for these priority assets. Ofwat has discussed the findings and solutions with the sector and has proposed an in-period adjustment process to reflect the need for greater investment in the AMP8 period. This document contains our evidence for that process.
3. We acknowledge that this complex problem has not yet been solved, and that doing so also requires some of the changes recommended in the Independent Water Commission report on asset health (such as asset health standards and forward-looking metrics). We welcome the roadmap process as an important first step and we understand why this is limited to the priority asset groups in 2026. However, we also welcome the commitment from Ofwat to consult on the inclusion of wider asset classes and how these might be funded.
4. For the 2026 process, we have put forward all investments that meet two criteria:
  - Investments that were already identified as priorities in our PR24 business plan; and
  - Investments that are limited to those priority assets in Ofwat’s roadmap process (and therefore are eligible for the 2026 process).
5. In addition to this, we have put forward a programme to replace gravity sewers, where we have historically replaced significantly more than the sector average (see our separate case on this). Since the 2023 business plan, we have also inspected boreholes and so put forward a programme to replace some of these.
6. This means that we are proposing four programmes of work beginning from 2027/28 (and including some base expenditure that has already started):
  - An £95.5m programme for replacing **service reservoirs** and refurbishing **water towers** (as set out in our DD24 representations in [NES35A](#));
  - An £84.2m programme for replacing and refurbishing **specific civil assets at wastewater treatment works** (as set out in our PR24 business plan, and presented in this case).
  - A £53.9m programme for replacing **boreholes**; and

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<sup>1</sup> A3-21 Asset health investment – enhancement case ([NES35](#))

- A £146.3m programme for rehabilitating and replacing more **gravity sewers**.
7. In this document, we set out the business case for this expenditure at **wastewater treatment works**, including: why this is needed; how we have identified the right options; how we know our costs are robust and efficient; how customers will be protected; and how this will be delivered.
  8. We note that we have included our investments for two asset classes in this single document: that is, for **settlement tanks** and **trickling filters**. The evidence for these is closely linked in many cases – such as our long-term strategy, customer research, and deliverability. In each section, we have addressed these separately where this is appropriate (such as for what base buys, optioneering, and costs) and have clearly stated where these are separate.
  9. Our proposed additional investment in AMP8 is smaller than the case we put forward at PR24 and the subsequent CMA redetermination, because we have removed asset classes which are not priorities under the cost change process for 2026. In summary:

**FIGURE 1 - SUMMARY OF PROPOSED ADDITIONAL INVESTMENT**

<b>Asset Type</b>	<b>No. of interventions</b>	<b>Total Cost (£m)</b>
Settlement Tanks	45	32.0
Trickling Filters	55	50.9
<b>Total</b>	<b>100</b>	<b>82.8</b>
AMP8 base plan	-	13.1
Implicit allowance (subtract)	-	11.7
<b>Total request</b>	<b>-</b>	<b>84.2</b>

**2. NEED FOR STEP CHANGE IN INVESTMENT**

10. The water sector delivers critical essential services to customers through a large and complex asset base which requires effective maintenance. Without effectively maintaining our assets, the critical essential services we provide to customers are put at risk.
11. Our asset base underpins delivery of critical essential services to customers, and its performance is highly dependent on effective, sustained maintenance and investment. In our PR24 business case, we identified that over 10% of our treatment of civil assets are already in poor or bad condition, which represents a current and growing threat to service. This is not a static risk, the number of assets entering poor condition is accelerating with the need for investment to stabilise the deterioration trajectory. Without investment, the proportion of failing assets will continue to rise increasing the likelihood of service interruptions, compliance breaches, and operational failures will escalate correspondingly.

12. There is compelling and evidence-based justification for a step-change in investment in our civil assets for AMP8. The need for a step-change in investment is reinforced by asset lifecycle evidence. Applying the established 'bathtub curve' principle, our civil assets are now entering the end-of-life phase in significant numbers. Site surveys and condition assessments demonstrate that deterioration is accelerating, and many assets now require structural intervention, consisting of refurbishments and full replacements to prevent further failures.
13. To understand the consequences of delaying investment, we undertook a deep-dive analysis into asset deterioration and whole-life cost impacts on our priority water and wastewater civil assets. Our analysis concluded that reinforced concrete structures deteriorate non-linearly; once corrosion and cracking progress into the propagation phase, deterioration accelerates sharply, driving up both the complexity and cost of repairs.
14. Investment in AMP8 ensures that interventions occur while assets remain in a manageable phase. If action is delayed until AMP9, many assets will progress into the failure phase, where full replacement, rather than rehabilitation becomes unavoidable. This shift significantly increases both cost and risk, creating a disproportionate financial and operational burden.
15. To strengthen our current asset health enhancement case, we carried out a comprehensive risk assessment for two priority groups (Settlement Tanks and Trickling Filters) focusing specifically on civil assets in condition grade 4. The purpose of this assessment was to understand the scale, timing, and nature of risk across these groups and to demonstrate the criticality of intervention at condition grade 4. Our assessment considered risks across a 20-year horizon, identifying the most critical period for intervention is within the first four years, our analysis indicates that the optimal intervention window is now. This reinforces the importance of acting at condition grade 4 rather than waiting for further deterioration to occur. Of the two priority asset groups, we currently have two tertiary filters in condition grade 5, these two assets have been non-operational and since 2019. This comprehensive risk assessment is elaborated further in section 2.3.
16. Our statistical asset health modelling projections in section 2.4 illustrate that without timely intervention, a growing proportion of assets will fall into condition grade 4 and 5 by the end of AMP8 and continue to deteriorate in subsequent AMPs. This reinforces the need for investment now to prevent escalating performance risks, regulatory noncompliance, and higher long-term replacement costs. Delaying intervention significantly heightens risks to environmental compliance, operational resilience, and the continuity of essential services. As structural failures become more frequent, the company faces greater exposure to service interruptions, pollution incidents, and increased regulatory scrutiny — each carrying both operational and reputational impacts. In section 2.3.2, we explain that we estimated this to cost about £34m more to defer our civil asset investments to AMP9 (this includes *all* settlement tanks and trickling filters in the PR24 cases).
17. Collectively, the deterioration evidence, risk assessment, cost analysis, and lifecycle modelling all point to the same conclusion, that the future risk profile is materially worse than it is today, and without a step-change in investment the company will be unable to mitigate these risks.

**2.1. HISTORICAL INVESTMENT AND CHANGE OVER TIME**

- 18. We have a well-established framework for assessing asset condition. This is based on industry standards and best practice and supported by an up-to-date set of survey results for our civil assets collected during 2020-23. Our framework used a condition grading system based on the criteria set out by Ofwat in its asset inventory guidance from PR09, with the addition of sub-categories to support a more granular analysis.
- 19. The surveys, undertaken by Atkins' expert civil engineers, were based on detailed visual inspection. Access to all areas was via existing infrastructure and all assets were operational during the survey (for example, tanks were not drained). Any issues were noted and a condition grade assigned, based on the condition grading system for civil structures. Before PR24, we provided Ofwat with an example survey report and explained our assessment in more detail, as part of our response to Ofwat's operational resilience discussion paper.
- 20. Analysis of the outputs of these surveys showed the number and percentage of civil assets against each condition grade at the WWTWs where condition surveys were carried out. It shows that the majority of almost 88% (1,053 of 1,197) of trickling filters and settlement tank assets are in average or better than average condition. However, that still leaves more than 12% (144) trickling filters and settlement tank assets in condition grade 4. This means that there is an urgent need for investment to refurbish or replace within the short to medium term. This is slightly worse than average for civil assets at WWTWs (as can be seen in Figure 2 below).

**FIGURE 2 - PRIORITY ASSET CLASSES BY GRADE**

Grade	All WWTW civil structures	Settlement tanks	Trickling filters
1	109	12	1
2	2396	435	212
3a	552	113	54
3b	526	131	95
4a	142	28	22
4b	180	41	53
5	23	0	0
<b>Total</b>	<b>3928</b>	<b>760</b>	<b>437</b>

Note: although there were 144 assets in condition grade 4 at the time of the surveys between 2020 and 2023, six of these assets have since been repaired or refurbished (so are not taken forward for assessment in this case).

**2.1.1. Historical investment in these asset classes**

- 21. We have invested more than the implicit allowance from base in each of these asset classes in AMP6 and AMP7. Figure 3 shows the implicit allowances using a simple sector average % of base spend on capital maintenance of each of these asset classes. We note that Figure 3 uses **total** capital maintenance, not just refurbishments and

replacements. This seeks to show the total comparison (we calculate the implicit allowance for this case specifically in 2.2).

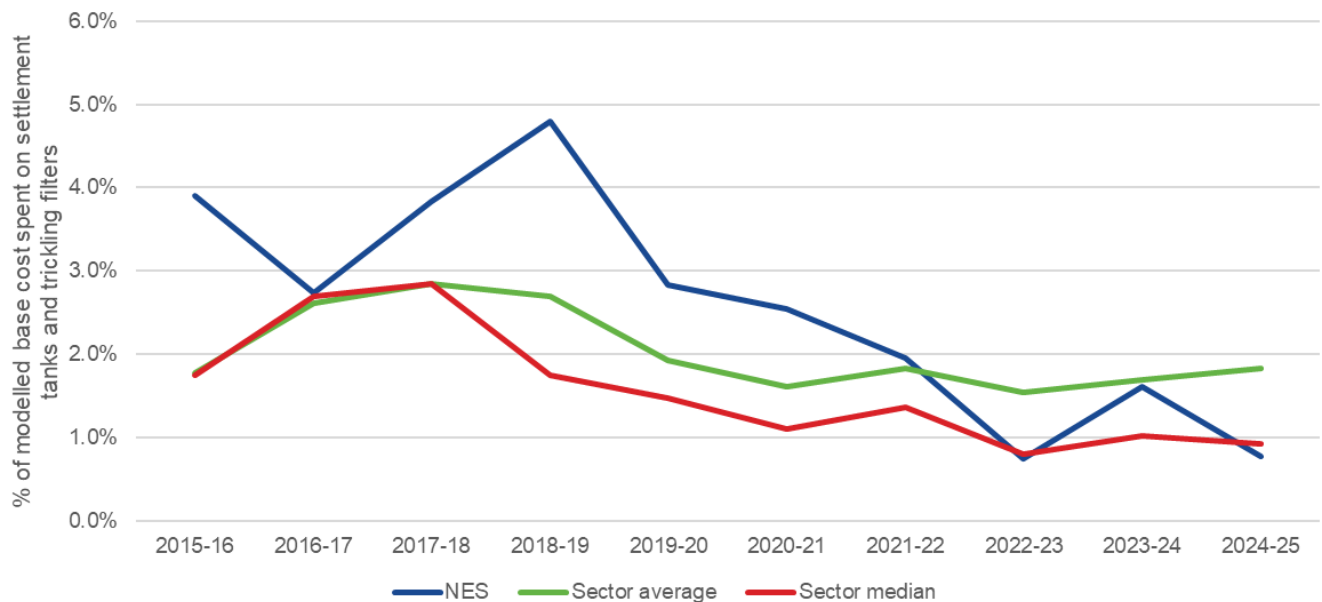
**FIGURE 3 - COMPARISON OF AMP6 AND AMP7 SPEND WITH IMPLICIT ALLOWANCES (£M, 2022/23 PRICES)**

Asset class	AMP6 spend	AMP7 spend	Implicit AMP8 allowance based on ten-year sector average
Settlement tanks	38.805	29.729	20.945
Trickling filters	19.379	12.267	5.598
<b>Total</b>	<b>58.184</b>	<b>41.996</b>	<b>26.543</b>

Source: Ofwat asset health dataset

22. With the sector-wide dataset now available, it is evident that our expenditure on maintaining and replacing these assets has been significantly higher than the sector average over the past decade. As can be seen in Figure 4, this trend is consistent across the full dataset period from 2015–16 onwards.

**FIGURE 4 - NES VS SECTOR SPEND ON SETTLEMENT TANKS AND TRICKLING FILTERS (%)**



Source: NWL analysis of workload and expenditure dataset. The data used for the chart is for replacement and refurbishment only.

23. In section 2.1 above, we outlined our established and industry aligned framework for assessing asset condition. Over the past decade, our opex investment in maintaining wastewater civil assets has fluctuated in response to operational pressures, asset needs, and programme priorities. Although patterns differ between asset groups, a consistent theme is that regular opex maintenance is not enough to prevent civil assets from deteriorating and the condition grade 4 assets and above now require intervention.

24. For settling tanks, our opex spending also fluctuated, with clear peaks in 2016, 2019, and again in 2024 during AMP7, driven by the need to maintain service performance and mitigate compliance risks. For trickling filters, our opex spend varied significantly across AMP7 and into AMP8. After a drop in 2022, expenditure rose sharply in subsequent years as assets required more reactive intervention.
25. Our workload and expenditure analysis (Appendices 1 and 2) illustrates our investment trends over the past 10 years for the two priority civil asset groups. This demonstrates that sustained OPEX activity has been effective in mitigating immediate risks, preventing service failures, and maintaining compliance. However, the evidence also shows that routine OPEX maintenance alone is no longer sufficient to maintain or extend the life of assets that have deteriorated to condition grade 4. At this stage of deterioration, assets require refurbishment or replacement to reduce escalating risk and avoid significantly higher future costs.
26. Over the last 10 years, our capital maintenance expenditure across wastewater has followed a clear, risk-driven pattern, with investment targeted where deterioration, service risk and compliance pressures were greatest. As confirmed by our workload and expenditure asset health roadmap return to Ofwat, repairs have remained relatively stable year-on-year across settlement tanks and trickling filters, reflecting the routine work required to maintain baseline serviceability. Alongside this, we have delivered periodic waves of refurbishment and replacement, most notably for settlement tanks and trickling filters in the early years of the ten-year period. These intervention campaigns addressed escalating structural and mechanical risks and helped maintain compliance with increasingly stringent treatment standards.
27. Across the two priority wastewater assets, investment over the last 10 years has delivered meaningful and sustained improvements. Refurbishment of settlement tanks and trickling filters has reinforced regulatory compliance, extended asset life, and significantly reduced the likelihood of service failures. Together, these targeted upgrades and rehabilitation programmes have strengthened treatment reliability, reduced further pollution risks, and sustained environmental performance.
28. An example of delivering meaningful investments over the last 10 years is the refurbishment of Hexham WWTW which delivered clear benefits by preventing the assets from reaching the final failure stage. Investing at the propagation phase resulted in avoiding far higher costs of full replacement and extending the life of critical settlement assets. The work stabilised their structural condition, reduced the risk of treatment failures and consent breaches, ensuring more reliable primary settlement performance through automation of desludging and storm tank emptying. By acting early, the intervention also minimised the likelihood of unplanned outages, emergency repairs and pollution incidents, supporting both operational resilience and long-term value for customers.
29. Over time, asset health across the wastewater system has changed in response to both deterioration and external pressures. Condition grades and risk profiles have shifted as assets aged. Condition inspections, such as those at Hexham WWTW, showed that long life assets built in the 1970s had moved from stable condition into the propagation phase. External factors such as climate change, population growth, tightening permit and regulatory

requirements have also placed additional strain on assets, increasing mechanical wear and reducing operational resilience. Targeted refurbishment and rehabilitation programmes have halted or reversed these negative trends, improving structural integrity, restoring process performance, and lowering the overall risk of failure, pollution incidents or noncompliance. These interventions demonstrate how timely investment can stabilise or improve asset health, prolonging asset life in the face of increasing external pressures.

## **2.2. WHAT BASE BUYS**

30. In our PR24 submission (NES35), the assessment of 'what base buys' was derived from the most granular data available at the time—namely, our own disaggregated cost information and the published sector-wide data on wastewater treatment non-infrastructure capital maintenance. This represented the highest level of detail accessible to both us and Ofwat prior to the development of the Asset Health Roadmap. The methodology and findings from this analysis are set out in Section 2.2.1 below.
31. With the asset health roadmap workload and expenditure data now available, we are able to directly disaggregate expenditure across each asset class. Drawing on proposals discussed during industry workshops and Ofwat's accompanying guidance, we have applied a range of models to estimate 'what base buys'. We set out in section 6 the "Northumbrian Water - cost change submission" document our approach to what base buys and why we prefer the method that calculates a historical percentage of base cost budgets (Section 2.2.2). This is primarily because the approach removing costs from the econometric models produces negative estimates of what base buys, which clearly cannot be right. We therefore discard the method in its entirety as it is evidently not a robust method.
32. Our preference for the historical percentage of base costs is strengthened by the CMA's updated base models which significantly limit the applicability of econometric modelling to derive implicit allowances. As there is no longer a single, sector-wide modelling framework that we could reference, any such analysis would need to be undertaken separately for each company whose base allowances have been determined by the CMA. The Government's [Water White Paper](#) (in January 2026) also indicates that Ofwat should move away from economic modelling. For these reasons, we think the approach using historical outturn spend is a more appropriate approach to use – and so have used this as our single method.
33. There is a reasonable case for triangulating with other models using historical outturn spend:
  - Using a **sector median** rather than average – because the median can tackle outliers more effectively. For example, we can see that Southern Water is a clear outlier for settlement tanks. Excluding Southern Water would drop the sector average for ten years from 1.6% of base cost budgets to 1.1%; this has much less effect on the median. This may help to mitigate the concerns raised in workshops that different companies will necessarily focus their expenditure on different assets (this would not be an issue if all asset classes were included, but is with just the subset priority asset classes).

- Using a **five-year** rather than **ten-year** window – although we agree in principle that base expenditure should be set using long-term trends, it is increasingly clear from the Ofwat dataset that there has been a squeeze on capital maintenance budgets in AMP7 and this trend is likely to continue. In our response to the CMA provisional determination, we noted that there was no evidence that a similar reduction for mains renewals had been driven exclusively by temporary or cyclical factors; indeed, we also noted that just 2% of the industry-wide base expenditure over AMP7 could be attributed to “unexpected energy price increases” arising from exceptional events, and that the industry-level overspend would reduce only marginally from 14% to 12% once this is accounted for. We explained some of the pressures on our own base budgets that would arise from this.

34. These models could be triangulated together to avoid these risks – that is, of placing too much weight on outliers by using averages not median; and that there is an increasing (rather than constant) pressure on base capital maintenance over the period from 2015 to 2025. Our proposed approach is to use the average of the 10-year and 5-year UQ period estimates calculated using an industry median (see results in Figure 5). This does not make much difference for Northumbrian Water for Trickling Filters but does address the particular issue of Southern Water’s outlier Settlement Tank expenditure in AMP8 distorting the calculation of the average.

**FIGURE 5 - IMPLICIT ALLOWANCES FOR THIS INVESTMENT**

<b>Asset class</b>	<b>Implicit allowance (£m, 2022-23 prices)</b>
Settlement tanks	10.005
Trickling filters	1.736

**2.2.1. Our PR24 assessment**

35. In our NES35 enhancement case, we explained that there was no separate and consistent reporting of either levels of expenditure or activity across companies for these asset classes – so we used our own historical cost and activity report information to identify what has been spent on these assets previously to be able to deduct these values from our base allowances<sup>2</sup>.

36. We analysed our Fixed Asset Register (FAR) to identify long-term historic expenditure levels and undertook a project-level review of recent activity to isolate directly comparable expenditure for establishing an implicit allowance. The FAR analysis indicated that £75.3m had been spent over the seven years from 2015 to 2021 (equivalent to £53.8m on a whole-AMP basis). Following the project-level review, this estimate reduced to £17.9m. The purpose of this exercise was to isolate expenditure driven specifically by the poor condition of civil structures, rather than to

<sup>2</sup> [NES35](#), section 5.2

quantify total spend on these assets. To achieve this, the project-level review excluded approximately 63.9% of the initial FAR-derived expenditure.

37. This method for assessing the implicit allowance is inherently weaker than using consistently reported expenditure and activity data across the sector. Moreover, it seeks to derive an implicit allowance for all WWTW civil structures solely where poor asset condition was the driver. As such, this approach is no longer appropriate.

**2.2.2. Implicit allowance using historical outturn spend**

38. The workload and expenditure dataset includes capital maintenance spend for each asset class. For each company, we calculated the historical percentage share of expenditure attributable to each asset class, using several methods as outlined in Figure 6 below. These percentages were calculated as a proportion of actual base-modelled costs, in line with the Final Determination model definitions, and therefore include only replacement and refurbishment expenditure.

**FIGURE 6 - APPROACHES TO CALCULATING INDUSTRY HISTORICAL PERCENTAGE SHARES**

<b>Approach</b>	<b>Data Used</b>	<b>Rationale</b>
Method 2a (10-year)	2015/16 to 2024/25 industry data	Uses full length of workload and expenditure data
Method 2b (9-year)	2015/16 to 2023/24 industry data	Only uses data that overlaps with PR24 FD models
Method 2c (5-year)	2019/20 to 2023/24 industry data	Only uses data that overlaps with PR24 FD UQ period

39. Across the sector, our calculations show that for wastewater assets in this case (Settlement Tanks and Trickling Filters) these are similar – with the largest differences reflecting the change from median to average, particularly for Settlement Tanks.

**FIGURE 7 - PROPORTIONS OF BASE COST SPENT ON SETTLEMENT TANKS UNDER EACH METHOD 2A TO 2C**

<b>Company</b>	<b>2a (10 years)</b>	<b>2b (9 years)</b>	<b>2c (5 years)</b>
ANH	0.4%	0.4%	0.2%
NES	2.2%	2.4%	1.7%
SRN	6.0%	5.9%	6.4%
SVH	2.0%	2.1%	1.8%
SWB	1.2%	1.0%	1.1%
TMS	1.3%	1.4%	1.0%
UUW	1.6%	1.8%	0.6%
WSH	1.9%	1.9%	1.2%

Company	2a (10 years)	2b (9 years)	2c (5 years)
WSX	0.3%	0.2%	0.4%
YKY	0.5%	0.6%	0.4%
<b>Sector median</b>	<b>1.5%</b>	<b>1.6%</b>	<b>1.0%</b>
<b>Sector average</b>	<b>1.7%</b>	<b>1.8%</b>	<b>1.5%</b>

**FIGURE 8 - PROPORTIONS OF BASE COST SPENT ON TRICKLING FILTERS UNDER EACH METHOD 2A TO 2C**

Company	2a (10 years)	2b (9 years)	2c (5 years)
ANH	0.0%	0.0%	0.1%
NES	0.4%	0.4%	0.2%
SRN	0.4%	0.4%	0.5%
SVH	0.9%	0.9%	0.7%
SWB	0.2%	0.2%	0.1%
TMS	0.3%	0.3%	0.3%
UUW	0.3%	0.3%	0.1%
WSH	0.1%	0.1%	0.1%
WSX	0.4%	0.4%	0.4%
YKY	0.0%	0.0%	0.0%
<b>Sector median</b>	<b>0.3%</b>	<b>0.3%</b>	<b>0.2%</b>
<b>Sector average</b>	<b>0.3%</b>	<b>0.3%</b>	<b>0.2%</b>

40. We set out further details on our approach to what base buys in section 6 of the "Northumbrian Water - cost change submission" document.

### **2.2.3. Our AMP8 base plans for capital maintenance**

41. Our base plan includes a total of £13.1m of expenditure across the two priority asset groups. These are our programmes of minor and reactive works, which are shown in Figure 9. These are budgets allocated to capital maintenance, rather than including specific plans – this is required to retain the flexibility to invest in response to issues arising throughout AMP8. This includes no proactive or larger “named projects”.

**FIGURE 9 - AMP8 BASE PLAN FOR SETTLEMENT TANKS AND TRICKING FILTERS**

	<b>Costs (£, 2022/23 prices)</b>	<b>Comments</b>
<b>Buildings and Civils</b>		
Trickling Filters	100,927	Sub programme delivering planned and reactive low complexity capital maintenance fixes for these assets.
Settlement Tanks	152,495	
<b>EMI Reactive</b>		
Trickling Filters	1,489,177	Sub programme of reactive replacement to Electrical Mechanical and Instrumentation elements on these assets.
Settlement Tanks	5,661,302	
<b>STW Minor works</b>		
Trickling Filters	2,935,538	Sub programme of low and medium complexity solutions to assets identified as being a compliance risk identified from risk based analysis.
Settlement Tanks	2,728,943	
<b>Total Trickling Filters</b>	<b>4,525,641</b>	
<b>Total Settlement Tanks</b>	<b>8,542,740</b>	

42. A comprehensive review of AMP7 delivery records and AMP8 programme allocations, supported by subject matter experts and Tactical Planning have confirmed that the assets put forward in this case are absent from all AMP8 base maintenance and associated sub-programmes. This verification was completed before finalising the asset list to ensure the proposed interventions represent genuinely unfunded needs and avoid any duplication of existing commitments. So, we do not include a list of planned “named schemes” as we do for boreholes and service reservoirs – because we do not have any.
43. Our analysis of historical workload and expenditure from 2015–2025 demonstrates that base expenditure covers only the essential, ongoing repair and like for like replacement activity needed to maintain current service levels. Base does not provide sufficient funding to address the heightened risks, growing asset deterioration, or emerging system needs that underpin our request for additional investment. Across both priority asset groups, the historical data shows that base expenditure is dominated by recurring repair activity, with very limited flexibility for larger interventions.
44. Below is a summary of our report on historical workload and expenditure for asset repair, refurbishment and replacement. This information was submitted to OFWAT in November 2025 in response to the request for data covering the period 2015–2025:
- Settlement tanks repair costs increased gradually over time and capitalised replacement spend raised sharply in certain years. Overall TOTEX for settlement tanks grows from just over £2m at the start of the period (2015), with slight dips to more than £3m by 2024–25. The spend profile is predictable compared with other assets, with almost all expenditure being capitalised rather than expensed.
  - Investment in trickling filters is stable with OPEX repairs around £0.8–£1.2m annually. Refurbishment and replacement costs vary but stay small in scale, though the “Other” category with occasional spikes, creating

noticeable volatility in some years. Despite this, trickling filters represent a much smaller financial burden compared with settlement tanks.

45. Across both asset categories, OPEX is minimal except within repair lines, therefore most investment is recorded as capitalised CAPEX. A clear overall trend emerges after 2021, where spending increases across multiple asset types, likely reflecting a wider uplift in post COVID infrastructure investment and the need to address accumulated maintenance backlogs. These pressures have increased baseline risk exposure without a corresponding uplift in base funding. Conclusions can also be drawn that base funding is not designed to handle deteriorating asset conditions, new obligations, or material shifts in operating risk.
46. Based on our 2015–2025 historical evidence, base expenditure covers only the essential day-to-day maintenance needed to keep assets in their existing condition and does not fund the scale of investment required to address growing risks from ageing and deterioration, emerging compliance and resilience obligations, the step up in maintenance demand seen after 2021, or the volatility and cost spikes observed particularly in trickling filter assets. The additional investment we are requesting is therefore clearly beyond the scope of base, and is needed to reduce risks that routine repairs cannot manage, address critical maintenance backlogs, mitigate the increasing likelihood of asset failures, and ensure that assets remain resilient and compliant over the long term.

**2.2.4. Conclusion on WBB**

47. We have explored different approaches to estimating what base buys. We know that Ofwat will have additional information from water company submissions, but we have provided our analysis of the complete workload and expenditure dataset which we have used to help inform our assessment.
48. In section 2.2.3, we explain our AMP8 capital maintenance plan in these areas and show we are already planning to spend more than the implicit allowance for refurbishment and replacement of trickling filters and settlement tanks.
49. So, we calculate the total costs as follows. This calculation includes the additional expenditure of £50.9m for trickling filters and £32.0m for settlement tanks from Figure 19 (see section 4 for cost build-up) and the base plan from Figure 5. This then deducts the implicit allowance (see Figure 5).

**FIGURE 10 - OUR TOTAL REQUEST (£M, 2022/23 PRICES)**

<b>Expenditure line</b>	<b>Total (£m)</b>
Settlement Tanks	32.0
Trickling Filters	50.9
<b>Total</b>	<b>82.8</b>
AMP8 base plan	13.1
Implicit allowance (subtract)	11.7
<b>Total request</b>	<b>84.2</b>

## 2.3. CURRENT RISKS

### 2.3.1. Our PR24 enhancement case

50. In our PR24 enhancement case ([NES35](#)), we described two key assessments for looking at current risk. These were:

- Assessment of the **criticality and health of specific asset classes**. This considered the stability of assessment, asset criticality, and our ability to defer investment into the future. This showed that of all our wastewater assets, the “civil assets at sewage treatment works” class was where we did “not expect stable investment to maintain service and risk”.<sup>3</sup>
- Assessment of **asset condition**. We explained our assessment of current asset health using surveys carried out by expert civil engineers from Atkins (based on visual inspection). We carried out an analysis of the asset inspection data to both forecast the deterioration rate of these assets over the next 15 years, and to quantify the number of assets reaching condition grade 4 in the AMP8 and AMP9 periods.<sup>4</sup>

51. This analysis showed a clear link between age of assets and condition grade, allowing us to confirm that visual inspections were a good representation of observed condition distributions for specific groups of assets. We were able to show, for example, that for tanks across water and wastewater assets “every year for the next six years, there will typically be one asset reaching condition grade 5; and seven assets reaching condition grade 4”.<sup>5</sup>

52. Ofwat’s assessment at DD24 and FD24 did not raise any concerns about current risk – instead, focusing on whether or not base expenditure was sufficient to meet this risk.

### 2.3.2. Our additional assessment at the CMA

53. Following Ofwat’s rejection of our investment case for civil structures and service reservoirs at final determinations, we worked with Aqua Consultants to develop additional evidence on the importance of timely intervention to manage long-term risk relating to asset condition deterioration over time. This focused on concrete structures (including those now in this asset health case).

54. This additional work generated the following key insights:

- **Key Insight 1: Escalating repair costs**. As concrete structures age, the nature of faults or defects that could materialise become progressively more severe and the cost of repair increases significantly. As these structures deteriorate, eventually full structural replacement is the only viable option to restore functionality and ensure safety. The report stresses that additional expenditure in the early stages of deterioration cannot materially extend the asset life as there are no faults that can be addressed.

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<sup>3</sup> [nes35.pdf](#), p46

<sup>4</sup> [nes35.pdf](#), section 4.2.2

<sup>5</sup> [nes35.pdf](#), p55

- **Key insight 2: Timing of intervention and cost consequences.** It is important to intervene at the correct time to avoid unnecessary costs. The deterioration of concrete structures over time can be split into three phases: the initiation phase during which low-cost repairs may be needed, the propagation phase during which timely intervention can extend asset life and reduce whole-life maintenance costs, and a final failure phase with high risk of catastrophic failure with consequent impacts on service, environment and safety. Well-timed interventions during the propagation phase will lead to longer-lived assets, lower costs over the longer term and reduced risk of catastrophic failure.
  - **Key Insight 3: Our deterioration modelling underpins the case for asset investment.** Our analysis shows that the rate of structural deterioration of its civil structures is increasing, which means that a proactive investment strategy is now required. Aqua’s assessment is that our approach to deterioration modelling demonstrates a strong understanding of the factors driving asset deterioration, reinforcing confidence in our asset management strategy. Our interactive modelling tool enhances our predictive capability, which allows us to justify our long-term investment plans effectively.
55. We attach our post CMA hearing submission and workbook for the consequence of delay (as provided to the CMA and Ofwat in 2025) as Appendix 3, which explains this assessment in more detail. This analysis looked at the impact of delaying these investments across wastewater treatment works to AMP9 – and estimated that it could be £34m more expensive to defer these investments to AMP9 rather than AMP8<sup>6</sup>.
56. In Ofwat’s response to our evidence at the CMA, it said that:
- It was not always clear that investments in the civil assets was needed (it provided a list of examples drawn from inspection reports).
  - The corrosion rates used in our modelling (in Appendix 4) were too high – and if more appropriate categories for corrosivity were used, the time to repair the asset increases from 10 years to 18-30 years from the start of propagation phase.
  - The deterioration model has some limitations (using a single inspection; sensitivity to the sample of asset used and the company’s operating conditions and maintenance history; and correlation with the observed data).
57. We replied briefly to these points (within the limited space for response requested by the CMA). This addressed Ofwat’s concerns about the deterioration modelling (that is, why we used a single inspection; correcting the assumption that we had used a sample; explaining why the graphs would not necessarily visually show correlation; and discussion of the overprediction of older assets).

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<sup>6</sup> This is for all settlement tanks and trickling filters

58. The CMA accepted that the analysis was sensitive to the underlying assumptions on corrosion rates in its Provisional Determinations<sup>7</sup>; and we provided further evidence in response. We explained that:

“Many of our concrete and steel structures operate in environments far more aggressive than the generic C3 or C4 examples cited by Ofwat. Water and wastewater treatment works routinely experience conditions at the upper end of the classification scale C4/5. Many assets operate in constantly damp or saturated environments, with high humidity, splash zones, and limited ventilation. Final settlement tanks, inlet works, sludge treatment, and chemical dosing area are regularly exposed to a combination of moisture, condensation and chemicals like hydrogen sulphide and ammonia. These exposure conditions match the examples listed under C5 – very high in ISO 12944-2 - and justify adopting that classification when assessing deterioration.”

59. We also explained that our investment case was not solely based on this type of modelling. Instead, it was based on civil engineer-led individual site inspection surveys which identified assets that were in Condition Grade 4 and concluded that they would need to be fixed during AMP8 to manage failure risk associated with those assets. We said then that it would simply be wrong to overwrite these independent engineering conclusions (based on inspections of those assets in question) with a change in modelling parameters to “alternative plausible assumptions”. We also noted one example of a collapse, at sludge holding tank number 7 at our Bran Sands WWTW (due to corroded steel beams), during 2025 – demonstrating that the assumptions in our modelling were likely valid and underscoring the clear risk of failure in the near-term unless we take action in AMP8.<sup>8</sup>

### **2.3.3. Additional risk assessment since CMA**

60. Since our CMA submission, we have explored alternative ways to assess risk for those assets in Condition Grade 4 – that could be used in addition to the independent engineering surveys and deterioration modelling to describe the current risks and likely outcomes in the near future.

61. We created a new assessment method based on a risk model. This assessment focused on civil assets in condition grade 4 across our two wastewater priority groups. The findings clearly demonstrate that intervention at grade 4 is essential to prevent accelerated deterioration, increased likelihood of failure, and escalating service and compliance risks – we explain our method and conclusions below.

62. Under this assessment, we generated a total risk score for each individual asset in our two priority asset groups (for civil assets at wastewater treatment works) by running these through our risk model. We separated these scores into the seven categories of the Asset Risk Management Framework (ARMF), enabling us to compare risk consistently across different asset types (Safety, Environmental, Quality, Regulatory, Cost, Supply, and Reputation). This ARMF

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<sup>7</sup> [Volume 1: Background chapters and base costs](#), para 4.289

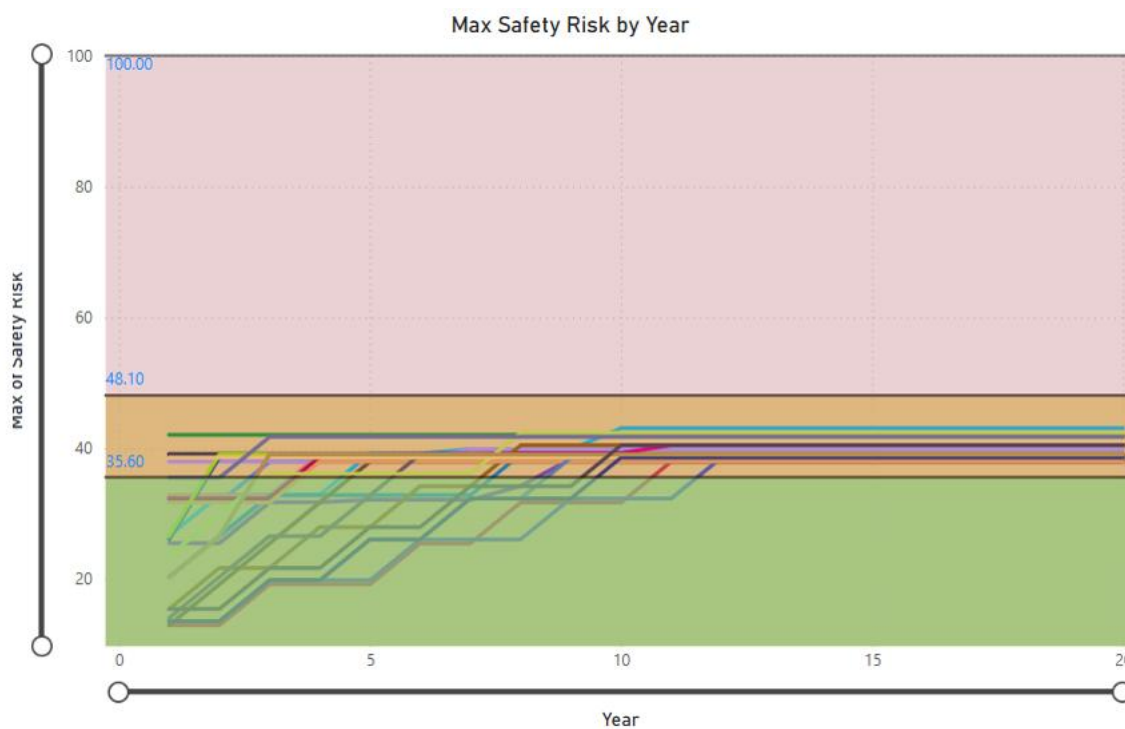
<sup>8</sup> [Northumbrian - PD Response.pdf](#), section 3.2.3

groups assets into Asset Risk Groups (ARGs) based on their function. Since Settling Tanks and Trickling Filters both play similar roles within wastewater treatment and share aligned risk pathways, the same risk modelling approach could be reliably applied to both asset types.

63. The score for each asset reflects two main components: the likelihood of failure; and the consequence of failure. Likelihood is determined by the asset's Remaining Useful Life (RUL). As RUL decreases and an asset nears the end of life, the likelihood of failure increases (as we demonstrated with our modelling in the CMA case). This causes assets to move through the ARMF risk thresholds from green to amber, then red. As Grade 4 assets have already deteriorated significantly, they typically have a lower RUL and so enter the amber threshold far earlier than assets in better condition grades.
64. Once we calculated likelihood, we then assessed consequence across the seven ARMF categories, with each asset receiving a score that reflects how severe the impact would be if the asset could no longer perform its function.
65. Our risk assessment model projects these risks over a 20-year period, allowing us to see: how risk changes over time; when assets move into higher risk thresholds; and how condition grade 4 assets compare with hypothetical condition grade 3 and condition grade 5 equivalents. This comparison shows that intervention at condition grade 4 is critical: assets in condition grade 5 are already at the highest likelihood of failure and already pose substantial risks to service, environmental performance and safety. The analysis clearly indicates that delaying intervention past condition grade 4 results in rapidly rising risk and increased exposure to compliance failures, customer disruption, and environmental incidents
66. The remaining useful life (RUL) plays a central role in this model. It represents how long an asset is expected to continue performing before reaching a point where failure becomes likely. RUL is influenced by several factors including condition grade, where condition grade 3 assets may still have significant RUL, while condition grade 4 assets have reduced RUL reflecting faster deterioration, and condition grade 5 assets have almost none. It is also shaped by industry life expectancy, asset age, site specific stresses such as corrosive environments or operational intensity, and level 3 asset characteristics such as construction materials, size, redundancy, and design configuration. To convert this into measurable likelihood, RUL is divided into percentage bands (e.g., >80%, 60–80%, 40–60%, 20–40%, <20%), with lower RUL bands assigned higher likelihood scores. This means assets can move into higher likelihood categories even before visible deterioration is present on site. The model also applies a criticality weighing so that two assets with identical RUL can have different likelihood scores if one plays a more important functional or operational role. The criticality weighing is on the functional or operational requirement of the asset, separate to likelihood scores. This ensures that high criticality grade 4 assets move into amber sooner than lower criticality ones.
67. We then assign each asset group a consequence score in all seven risk categories (as described in paragraph 62), representing the severity of impact if the asset were to fail. While individual sites may have additional variation, this assessment focuses on a consistent, like for like comparison across all assets within the priority groups.

68. Figure 11 below shows an example of safety risk trends across the 32 settlement tanks sites. Each line in the figure represents a site and illustrates how its safety risk increased over time within the priority group. Of the 32 sites, 8 begin the modelling period already in the “amber” threshold (signalling increased risks to service delivery and regulatory compliance), while the remaining 24 start in “green” but all transition into “amber” by year 12. Figure 11 provides a detailed timeline for when each site enters amber. Overall, this risk assessment shows that within the next five years, most of these assets will reach an “amber” safety risk – and within ten years, almost all assets will. This is consistent with our PR24 enhancement case and CMA modelling approaches, which suggested that these assets would need to be tackled within the next ten years.

**FIGURE 11 - SAFETY RISK - SETTLEMENT TANKS (32 SITES)**



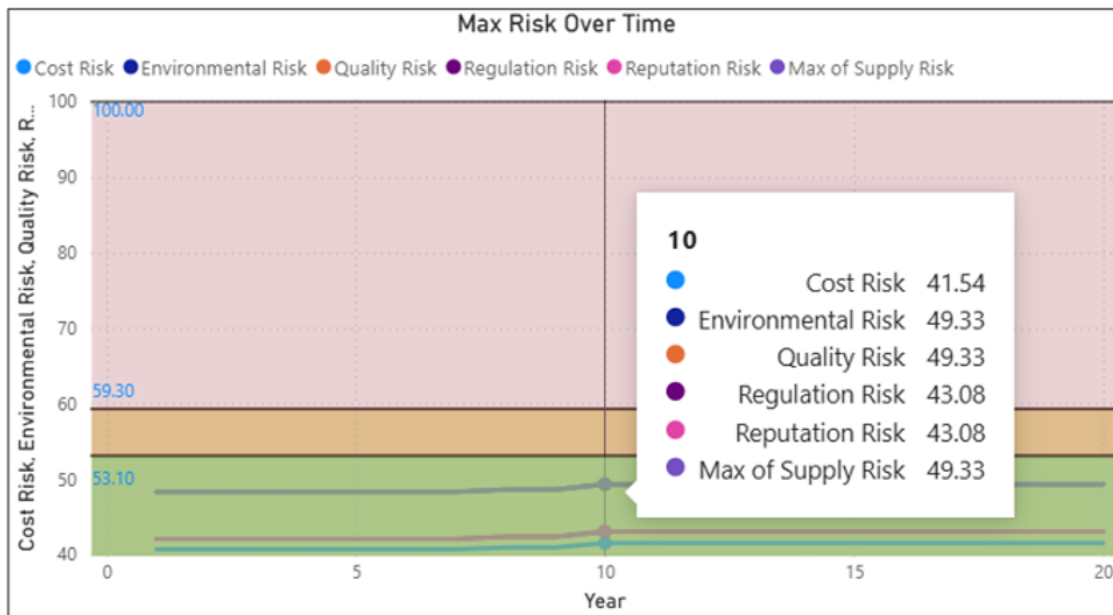
69. We note that some lines appear to plateau part-way through the period. This does not mean the safety risk has stopped increasing. Instead, the plateau occurs because of how the model calculates RUL. Once RUL reaches its lowest permitted value (before becoming negative), it is forced to level off. When this happens, the likelihood score also flattens because the asset has already entered the highest likelihood band (failure). The banding system reinforces this effect. Despite the plateau occurring, the risks will continue to increase as the assets will continue to fail. The figure above shows the safety risk plateaus in amber because that is where the risks for this model has been set. The point of intervention is when risks are at amber, if left in amber, the assets will continue to deteriorate.

70. In reality, a condition grade 4 or 5 asset would continue to deteriorate, and so its risk would continue to rise accordingly. If ongoing deterioration were included in the model, many of the sites that appear to plateau would

continue progressing into the red risk threshold over time. The flat lines are therefore a mathematical artefact of the model, not a reflection of stabilising or reduced risk – these cannot move into “red”.

71. Figure 12 below shows the corresponding risk scores for all *other* categories within the Settlement Tank group, using the same 32 sites. In Figure 12, we do not show individual sites; instead, each line represents the maximum risk score across all sites for each risk category, providing a clearer view of whether any site is projected to enter the amber threshold. The three lines shown cover all six risk types, although Environmental, Quality, and Supply risks appear as a single line because their values are identical. Cost is shown separately, as its values differ from the other categories.

**FIGURE 12 - MAXIMUM ALL RISK, EXCLUDING SAFETY**



72. Using the methodology described above, we calculated risk scores for all assets that need interventions across both priority groups and projected these scores over a 20-year period for each of the seven ARMF risk categories. In this version of the model, time is the only factor that changes. Asset conditions are held constant, meaning no additional deterioration curve has been applied. As a result, risk increases solely because an asset’s RUL decreases over time. This approach shows how risk escalates as assets age, even without modelling further decline in physical condition.

73. Each graph displays the ARMF thresholds (green, amber, and red) that are aligned with our corporate risk register and represent acceptable, action-required, and intolerable levels of risk respectively. Because safety risk has more sensitive thresholds, it is plotted separately to make year-on-year changes easier to interpret.

74. Our recent risk assessment strongly highlights both the scale of risk across our civil assets and the urgency of intervening before failures occur. Across both priority groups, a significant proportion of assets are rapidly approaching condition grade 5, the point at which service failure and environmental harm become highly likely. Figure 13 below shows how quickly assets are deteriorating into the amber risk threshold, with Settlement Tanks and Trickling Filters already nearing threequarters amber, underscoring the pressing need for timely investment and action.

**FIGURE 13 - % OF ASSETS DETERIORATING TO AMBER BY YEAR 5 (FROM NOW TO 2029-30)**

<b>Asset class</b>	<b>% moving to amber</b>
Settlement tanks	71.9%
Trickling filters	74.4%
Combined	74.4%

75. This type of risk assessment analysis, in addition to condition inspections and deterioration modelling, shows that the key risk from these assets is reaching the deterioration point at the end of the “propagation phase” – that is, there is a tipping point in the near future that means that assets become an unacceptable risk and must be addressed. It is possible to apply different assumptions in deterioration modelling, or approach this in different ways to achieve different results. However, when condition inspections and risk analysis also align to indicate that these assets are already close to (or in some cases, already at) an unacceptable level of risk and must be replaced, it seems very risky to take comfort in changes in modelling assumptions. It seems clear that these assets need replacing now.

76. We note that serious asset failures that occur while we wait for PR29 are likely to lead to adverse impacts on our compliance with statutory and regulatory obligations – if these risks are not mitigated with temporary alternative measures. These are likely to lead to additional maintenance costs, both to deal with asset failures in-period and potentially to replace the asset instead of making timely repairs (we do not think Ofwat has disagreed with the impact of this, just the timing). These pose a risk to customers, the environment, and the safety of our colleagues.

**2.4. FORECAST OF FUTURE ASSET HEALTH AND RISKS**

77. At PR24, we used deterioration modelling to forecast changes in asset condition over time, including predicting the deterioration of individual and groups of assets; quantifying the number of assets reaching condition grade 4 up to 2050; and apportioning defect location between grades 3 and 4<sup>9</sup>. At the CMA, we tested this model further for environmental factors (such as sulphate exposure) and found that there were no significant factors that could be used in the final model. We also developed an interactive Excel tool that enables the dynamic analysis of condition probabilities across asset types – which showed that the number of assets entering condition grade 4/5 is increasing above what has been observed historically. Finally, we developed an “individual frailty factor” which personalizes the

<sup>9</sup> [nes35.pdf](#), p54

deterioration based on actual inspection data. We summarise our approach and findings from deterioration modelling below.

78. To understand the future deterioration of asset health, we carried out statistical analysis based on a multi-state survival transitional model. This model focuses on studying the time it takes for an event of interest to occur, such as the time for individual assets to deteriorate to the next condition grade or the time to failure.
79. This type of “survival analysis” provides information about the distribution and probability of an event occurring at (or beyond) a certain point in time. It also assesses the impact of time-dependent covariates and the inherent uncertainty in the data which makes for a more realistic analysis. This approach is particularly useful where the event of interest, in this case asset deterioration, can have multiple outcomes.
80. These models are more complex which can make the analysis and interpretation of results more challenging and generally requires a larger sample size to be reliable. The main benefits of the survival model are:
  - We can forecast deterioration rates based on current actual condition – that is, we can model across all condition grades.
  - It can account for fixed (such as the materials used) and increasing (such as the impact of increasing temperatures) hazards.
  - It uses “probabilistic distribution”, that is, modelling the probability of an asset moving to the next condition grade.
  - It can combine multiple parameters, such as material and usage, however for this business case, the model was specifically applied to wastewater only structures and took into consideration material, installation year, and asset type (Trickling Filters or Settlement Tanks).
  - It does not rely on age groupings and can take into account individual assets and also use longitudinal data where available to determine asset specific frailty.
  - The framework allows for individual uncertainties to be applied.
81. This is a well-established methodology, which has been successfully used to model condition on long-life assets.
82. Our asset health specialists used this method to assess how quickly our civil structures are deteriorating. Multiple modelling scenarios were tested to build a more comprehensive view of deterioration rates for both concrete and brick assets which account for 65% and 18% of all civil assets respectively.
83. We modelled the condition of concrete and brick structures across both of the priority asset types. Although we modelled using condition grades 1 to 5, these were consolidated into three categories for analysis: Good: CG1–CG2, Average: CG3 and Bad: CG4-CG5

84. The model shows that brick structures, including Tricking Filter and Settlement Tank assets, will require substantial investment in the coming years. Our risk assessment supports this, indicating that 71.9% of Settlement Tanks and 74.4% of Tricking Filters are on track to move into the amber condition trajectory (see section 2.2.3).
85. By the end of AMP8, the modelling further shows that an additional 12 Settlement Tanks, and 16 Tricking Filters are expected to fall into poor condition, an issue that will continue to escalate with each AMP cycle unless proactive intervention takes place.

**FIGURE 14 - EVOLUTION OF CONDITION FOR SETTLEMENT TANKS AND TRICKLING FILTERS**



86. The modelling shows a steady and significant decline in structural condition over time for both asset groups. The number of assets in good condition consistently reduces as we move towards 2050, while both the average and poor condition categories grow year on year.
87. Tricking Filter assets show a particularly sharp reduction in good condition units, with a gradual erosion of good condition assets and a sustained rise in poorer grades. Settlement Tanks, being the largest asset group, experience the most substantial numerical increase in average and poor condition assets, highlighting a significant long-term deterioration trend.
88. Overall, the analysis indicates that without targeted investment and timely intervention, both asset classes will experience a progressive decline in structural integrity. This trend not only increases future renewal costs but also heightens operational and compliance risks as a larger proportion of critical assets enter the poor condition category.
89. If we do not address these assets now, the list of assets requiring intervention will continue to grow – while, at the same time, the cost of doing so and the operational and compliance risks will continue to increase. We do not think

this is sustainable. There is both an immediate risk that should be addressed (see 2.3) and an increasing future risk (2.4).

## **2.5. SUMMARY OF LONG-TERM ASSET CLASS STRATEGY**

90. Several of our Asset Group Strategies (set out under ISO 55001) include these asset classes, though this is divided slightly differently to the Ofwat asset classes – into Primary Treatment and Tricking Filters. We describe each strategy below.

### **2.5.1. Primary treatment**

91. This Asset Group Strategy mostly covers primary settlement tanks, along with scum removal, chemical, and pumpset assets. This includes 687 primary settlement tanks. We measure performance for these assets by looking at the number of pollution incidents (78% had no pollution incidents during 2020-24) and discharge permit compliance (98.5% of numeric permit sites were compliant).

92. Our strategy sets out that primary treatment assets are in a relatively good condition, but with little investment, asset health is expected to decline, leading to asset failures. Our strategy includes our minimum consequence value for primary treatment asset failure at £33.18m, based on our 2022/23 assessment of asset health and predictions of subsequent deterioration. This review provides good evidence that our investment in this area is targeted and proportionate to our asset base.

93. The strategy also explores the contribution of sewage treatment works to pollution incidents and discharge compliance (we do not yet have this breakdown for the specific priority asset groups). This goes on to say that we should focus our efforts at WWTWs on mitigating pollution incidents through tackling power resilience (and other measures set out in our PIRP); and improving discharge permit compliance through increasing monitoring, modelling, and operational interventions. Both recommend targeted capital maintenance activities as part of this, which aligns with our approach set out in this business case which focuses on those assets already identified as in poor condition and at risk.

94. Finally, the strategy describes dynamic condition monitoring devices that we are installing during AMP8 on pumpsets, aerators, blowers, and gearboxes within this asset group (through base expenditure). This does not apply to civil assets such as primary settlement tanks.

### **2.5.2. Trickling filters**

95. In this strategy, we note that trickling filters are highly critical on WWTWs – with 86% of the assets falling into the highest criticality, “grade 4 and 5”. However, these currently perform well against our metrics of the number of pollution incidents (90.4% had no pollution incidents during 2020-24) and discharge permit compliance (99.6% of numeric permit sites were compliant).

96. Like primary treatment assets, our trickling filter assets are in relatively good condition but with little investment asset health is generally expected to decline, leading to asset failures. The strategy notes that base investment in trickling filters has limited forecast benefits (as these are already high performing) but will instead provide asset reliability and maintain current performance.

### **2.5.3. Our long-term delivery strategy**

97. Our long-term strategy<sup>10</sup> sets out our view of the lowest necessary investment to shift us towards a sustainable level of asset health maintenance expenditure – with “no regrets” investments selected for 2025-30. We noted that there was evidence of increasing risk in the asset base that had been managed through operational interventions to date, but sooner or later this would need to be stabilised through additional investment. For our core pathway, we used an assumption of a 40% increase in investment from 2020-25 levels starting in 2030 (our “minimum no regrets increase”). We considered two further point estimates for increases in our scenarios, of 80% and 123% , which included some discussion of alternative climate change scenarios (with no easy way to model asset health needs).

98. We set a decision point of 2028 and a trigger point of 2030 for determining this uplift. We also said that we would expect our understanding of assets to mature over time and so would expect further evidence to be generated. The Ofwat asset health roadmap has helped to provide some of this understanding and evidence, and water sector reform has highlighted an increased need to invest now.

99. We note that our DWMP will consider climate change scenarios including the impact on asset health. In our LTDS, we could not do this, instead noting simply that this could exacerbate deterioration over time – but the replacement of assets could also lead to improved performance.

## **2.6. ENGAGEMENT WITH STAKEHOLDERS AND CUSTOMERS**

100. The Water (Special Measures) Act 2025 places a statutory obligation on water companies to produce and deliver Pollution Incident Reduction Plans (PIRPs). Developed in partnership with the Environment Agency and aligned with its guidance, PIRPs set out the actions that will be taken to reduce the likelihood of pollution incidents and to continuously improve environmental performance.

101. Northumbrian Water had already embedded this approach on a voluntary basis for several years, with the most recent update issued in April 2026. This document therefore builds on an established programme of continuous improvement and sets out our strategic approach to reducing pollution incidents and delivering improved environmental outcomes across our operations.

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<sup>10</sup> [nesltds.pdf](#), p63

102. As demonstrated throughout this plan, stakeholder and customer expectations in this area continue to increase, with a clear emphasis on transparency, proactive risk management, and sustained environmental performance improvement:

- Our customers consider reducing pollution incidents to be one of the most important indicators of our performance, and continued pollution reduction received the largest support of any service area through our PR24 customer engagement work.
- Our performance commitment for pollution incidents (set by Ofwat at PR24) requires an 18% improvement from current performance
- The EA and Natural England set out environmental performance requirements in their jointly published Water Industry Strategic Environment Requirements (WISER) This includes at least a 30% reduction of all pollution incidents by 2030 on current 2025 targets. To achieve this, Northumbrian Water (and other companies with relatively few pollution incidents) will need to further push the frontier for the sector.
- The Water Forum noted that our 30% reduction in pollution incidents would be a substantial challenge because NWL was the most efficient company and has good performance in this area. They considered if greater levels of ambition could be achieved without further driving bills up – and concluded that it could not without further investment raiding customer bills.<sup>11</sup>
- Our Catchment Partners and Blueprint for Water continue to challenge us to become more ambitious and stop all pollutions of our waters by addressing issues at its source.

103. There is very strong support for avoiding pollution incidents. As part of developing this case, we asked the EA to provide its view in a letter supporting our investment claim. However, while the EA is content that we are proposing further investment, it does not feel it is its role to endorse individual cases or comment on specifics.

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<sup>11</sup> [nes47.pdf](#), p17

## **2.7. WHAT IS NOT INCLUDED HERE?**

104. In our PR24 enhancement case, we included some additional civil assets at WWTWs. These are out of scope for the 2026 cost change process, but these are also important and we would like to see Ofwat include these for 2027. In particular, this includes sludge tanks and rising mains where we have identified similar risks to asset health. We are now more than two years behind the plan we set out in 2023, and although we understand why the asset health roadmap has taken the time to collect information and has selected priority asset classes, these issues are still pressing.

105. Our PR24 enhancement case noted the highest risks in other asset classes outside the priority asset classes:

- **Other civils at WWTWs**, including those set out in our PR24 case (such as sludge tanks).
- We said that we might experience similar issues with **sewage pumping stations** to those we have observed with WWTWs – and although we currently expect our maintenance strategy and expenditure to remain broadly the same in future AMPs, we are currently undertaking a similar programme of inspections for our SPS sites to support a more detailed and robust view of this risk in future.

### **3. BEST OPTION FOR CUSTOMERS**

106. Our strategy is to maintain service risk through a structured, condition-based approach to intervention on our civil assets. Our condition grade 5 assets will continue to be addressed as soon as it is safe, practical and efficient to do so.

107. However, in the remainder of AMP8 we propose to proactively remediate condition grade 4 assets to bring them between condition grades 1 to 3. We have identified the need for addressing these specific assets, and the benefits of doing so now (in section 2). This step is essential to:

- Secure long-term value for customers by intervening early, when assets can still be economically repaired and life-extended, avoiding significantly higher future replacement costs.
- Reduce the probability and consequence of asset failure, thereby preventing service interruption, environmental non-compliance and the increased operational and financial burden associated with reactive, end-of-life interventions.
- Deliver well planned and structured activity in a controlled manner, ensuring that required interventions are delivered efficiently and effectively, without creating pressures elsewhere in the maintenance portfolio or compromising the optimisation of other investment commitments.

108. In this section, we explain how we have used our solutions hierarchy to consider a full range of options, to help us to make sure we selected the appropriate approach to manage cost, service, and the wider social impact over the long term. In practice, this is not as straight forward as it would be for meeting a new investment need, as we would with an enhancement case – because for asset health, we are often constrained by the existing assets (that is, refurbishment doesn't allow for a new design or innovative process) or where these fit into a treatment process.

#### **3.1. OPTIONEERING**

109. Our aim is to remediate all condition grade 4 assets within the two categories - trickling filters and settlement tanks that meet the defined criteria for the reopener. Our full list of all assets, within both categories, which were assessed as condition grade 4 is presented in Appendix 5, supported by detailed survey reports for each asset. Remedial interventions will be selected to provide the most long-term, cost-efficient extension of asset life.

110. To ensure the credibility and robustness of our proposals, we commissioned Mott MacDonald, Stantec and Aqua Consultants to work collaboratively with our asset health specialists to develop a suite of unconstrained intervention options aligned to the needs. Mott MacDonald and Stantec took a consistent top-down methodology and Aqua approached a bottom-up methodology to determine the most effective solution. Both approaches resulted in a similar conclusion on proposed interventions and costs.

111. Following this analysis, and in line with our statutory and regulatory obligations, we concluded that the preferred approach is to repair and, where required, replace existing assets, providing the optimum balance of cost efficiency,

risk reduction and service resilience. Refurbishment can be effective where deterioration is localised and required standards can be achieved without fundamental change; however, in a number of cases full or partial replacement is preferable because underlying assets have reached a point where structural condition, layout constraints or compliance gaps cannot be efficiently addressed through incremental intervention. Assets exhibiting systemic issues—such as inadequate hydraulics, poor access, non-compliant electrical or safety arrangements, or severely constrained sites—present a risk that refurbishment would perpetuate legacy limitations and drive repeated short-cycle investment. Replacement enables modern design standards, improved resilience and safer operation to be embedded from the outset, often delivering clearer whole-life performance benefits and greater certainty of outcome, particularly where works can be delivered offline or with simplified interfaces. We also recognise that further investigation may reveal deterioration not fully captured by visual inspection; the proposed plan allows for interventions to be refined accordingly. Conversely, where structural issues are minor and low-complexity interventions can deliver a robust extension of asset life, targeted refurbishment may represent a more proportionate and sustainable solution from both a capital expenditure and whole-life carbon perspective.

112. While conversion to pumping stations has been considered as part of the strategic optioneering process, no schemes are currently being taken forward on this basis. In the context of the sites assessed, transfer solutions would require significant investment in new rising mains, network reinforcement and resilience measures, resulting in disproportionately high capital and operational costs. As a result, pumping station conversion has not been identified as a viable solution within the current programme, with preferred options instead focused on proportionate refurbishment or replacement that meets regulatory, resilience and performance requirements without driving undue customer cost. This position will be kept under review and reconsidered as part of outline and detailed design, should site specific information or cost assumptions materially change.
113. Building on this approach, and particularly where replacement or significant intervention is proposed, there is scope across the two asset categories (Trickling Filters and Settlement Tanks) to consider modernised and innovative solutions. During the design stage of the project, opportunities will be assessed to incorporate standardised modular solutions, improved monitoring and control systems, energy-efficient equipment, and layouts that reduce confined space entry and manual intervention. For treatment and transfer assets, increased use of condition-based monitoring and simplified process configurations will be considered to improve reliability and reduce whole-life cost. Innovation in this context is not limited to novel technology; it also includes the smarter application of proven solutions, standardisation, and designing for maintainability and adaptability. Any adoption will be proportionate to asset criticality and aligned with operational capability, ensuring that innovation delivers tangible performance, resilience and cost benefits without introducing unnecessary complexity.

## 3.2. DECISION MAKING

### 3.2.1. Optioneering at PR24

114. At PR24, we noted that often the most effective and efficient solution would be to refurbish the existing asset. This is usually cheaper than replacement and can often restore an asset to a condition that extends its life. We said that although condition assessments would provide a reasonably accurate view of condition based on inspection, in many cases it would not be possible to determine the full extent or exact cause of each issue until the project started.

115. We explained that our condition grading surveys (conducted by Atkins) provided an initial assessment of asset condition based on visual surveys. While these surveys offer a reliable indication of the likely intervention required, they cannot fully determine the extent or root cause of deterioration in all cases. More intrusive inspections, such as draining tanks or accessing confined structures would be necessary to establish the exact scope of remediation. However:

- Intrusive inspections cannot be practically undertaken across the entire asset base in advance, due to operational, safety and cost constraints.
- Even if full intrusive inspections were completed, assets may continue to deteriorate between now and the point of intervention.

116. For example, it would be impractical to take a settlement tank out of service and drain this down for a further inspection and then return it to service – simply to have a better idea of scope. This would require considerable costs and service risks (for example, providing over pumping or other temporary measures, as well as design and concept work) with no actual improvement to the assets involved. In some cases, it would be risky (or prohibited) to put assets back into service if issues were found.

117. We addressed this at PR24 by estimating three possible scopes for each asset – a “worst case”, “expected”, and “best case” requirement. We adopted a structured and evidence-led costing methodology comprising the following steps:

- **Three Point Scope Estimation** - for each civil asset in condition grade 4 requiring intervention in AMP8, we developed three scope scenarios:
  - **Worst-case scenario:**  
Detailed inspection reveals the condition is worse than anticipated, requiring full refurbishment or replacement.
  - **Likely scenario:**  
Detailed inspection confirms the asset’s condition is consistent with initial surveys and the expected intervention is required.

- **Best-case scenario:**

The asset is in better condition than anticipated, allowing a lower-cost intervention to achieve the required life extension.

118. For each scenario, we produced:

- A defined scope of work.
- A corresponding cost estimate.
- A probability weighting reflecting the likelihood that this scenario will apply when the work is undertaken.

119. The scoping and costing of civil asset remedial programme included within our enhancement case was a four-stage process. This process was designed to account for the uncertainty inherent in the rate of deterioration of these civil assets between the date of survey and the date they are remediated in AMP8. We explained that as a cohort of assets, we could have more confidence in the overall impact of deterioration but for an individual asset the rate is still subject to many hard to observe factors. Our remedial programme process included four distinct groups of experts to both account for the range of skills required and to create a culture of challenge and review which helps improve the robustness of scope and cost estimates.

**FIGURE 15 - SUMMARY OF THE COSTING PROCESS AT PR24**

Stage	1 – Civils inspection team	2 – Engineering design team	3 – Quantity surveyors	4 – Asset management & statistical analyst
<b>1 – Three-point scope estimate</b>	Produce inspection reports from which scope is estimated.	Produce a three-point scope estimate for each asset in scope of the programme	Receive scopes and ensure clarity in instructions for cost estimation.	
<b>2 – Cost estimates from cost models</b>			Apply PR24 costing methodology to produce cost estimates.	Provide an initial light touch review and challenge.
<b>3 – Review, challenge, update and assessment of likelihood</b>	Review and challenge the scope and costs produced against the site knowledge. Collaborate to produce a likelihood.	Respond to challenge and update scope as required. Collaborate to produce a likelihood.	Respond to challenge and update cost estimates as required.	
<b>4 – Monte Carlo modelling to produce programme level cost estimate</b>		Validate the uncertainty assessments around estimates.	Validate the uncertainty assessments around estimates.	Design and run a Monte Carlo analysis.

120. In scoping and costing of the civil asset health case, we followed a four-stage process designed specifically to:

- Reflect uncertainty in deterioration rates between survey and intervention.
- Incorporate expert challenge and cross functional review.
- Ensure robust and defensible programme level estimates.

121. We then used this probability to determine the likely overall programme costs (“a programme level stochastic estimate”). This aimed to develop the most realistic cost and manage the uncertainty of not knowing exactly what work would be required. This would share the risk between company and customers appropriately, because this would be a “most likely” cost (that is, a P50 estimate with a symmetric distribution) – rather than simply putting forward the most expensive options.

122. This approach combines the likelihood and cost of each intervention scenario to produce a distribution of potential programme costs, recognising that the exact scope of work for each civil asset could not be confirmed until intrusive inspection takes place at the point of delivery. While this programme-level estimate could be apportioned across individual assets, we noted that this was no longer a direct cost estimate for any one asset. Instead, it reflected the aggregated and probabilistic nature of the programme as a whole.

123. We think this method created some confusion during PR24. In its letter to us on 11 December 2025, Ofwat set out two remaining concerns with our evidence that relate to this method:

- “It was not clear what will be delivered with the investment and clear actions that are needed to be undertaken. This reduces confidence in the understanding of the issues that need to be addressed and it makes it challenging to protect customers in the event of non-delivery for specific outcomes.”
- “The methodology used to produce the cost estimates lacked clarity, and the estimates were not presented with sufficient granularity. In addition, the estimates were subject to significant uncertainty, creating a risk of windfall gains or losses for the company. For example, the proposed solution had not yet been selected, resulting in a wide potential cost range.”

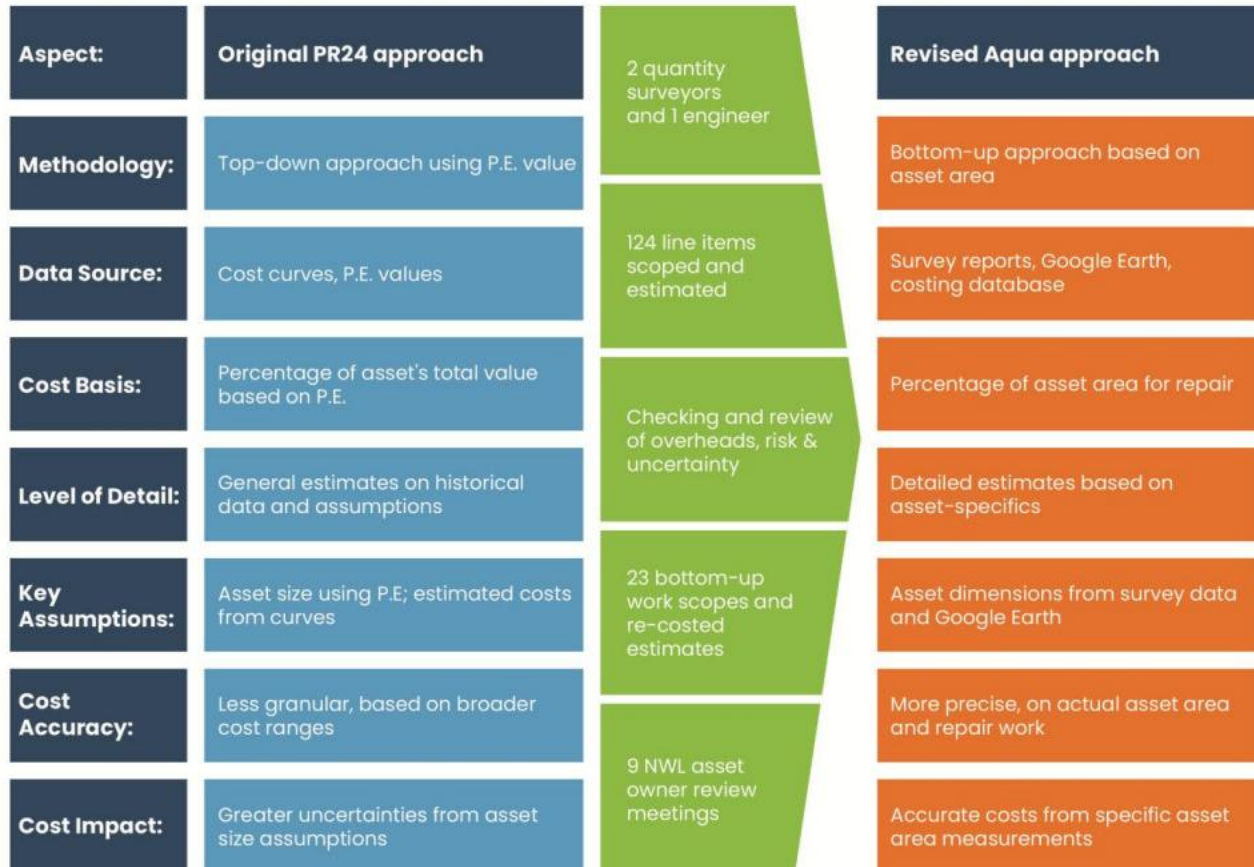
### **3.2.2. Changes at DD and CMA**

124. We acknowledged that our PR24 cost estimates for water and wastewater treatment civil assets were subject to uncertainty in the required scope of intervention. We explained that we had attempted to deal with the practical challenge of different interventions likely being required once assets were taken out of service for work to commence. Many of these assets are partially underground, operationally constrained, or difficult to access, making it inherently challenging to determine the precise nature and extent of deterioration and therefore the intervention.

125. Although our Monte Carlo method is a widely accepted approach to cost estimation, we acknowledged that this is more difficult to use for setting totex allowances – and it was not clear exactly what project will be delivered for each asset.
126. In our CMA case, we took a different approach – with a single preferred option identified for each asset. We recognised that a relatively small number of higher-value schemes accounted for the majority of total programme cost. To enhance the robustness of our estimates, we undertook bespoke bottom-up scoping and re-costing for these schemes. This work provides greater definition of the required interventions and strengthens confidence in the associated costs.
127. We commissioned Aqua to independently scope and re-cost our higher-value schemes using a bottom-up methodology. At the time of commissioning Aqua, 23 of our assets were of higher value, which were re-costed and rescoped by Aqua. This scoping and re-costing work was undertaken in response to Ofwat’s FD24 feedback. Aqua’s independent review was designed to ensure that the cost estimates for these high-value schemes are fully scoped, evidence-based and robust. For these schemes we developed detailed scopes and bottom-up cost estimates, providing a materially higher degree of confidence and accuracy in the proposed costs.
128. Aqua’s quantity surveyors and engineers reviewed surveys, defined required repairs, calculated quantities and developed detailed scopes of work. NWL asset owners then validated these outputs, strengthening understanding of individual asset condition and providing assurance that the proposed interventions are appropriate.
129. Under BP24, our costing approach relied on a top-down method using asset replacement cost curves, from which we applied informed assumptions regarding the proportion of replacement cost relevant to repair activities. Following Ofwat’s feedback, and to increase confidence in our revised proposals, we applied the bottom-up approach for the largest schemes, conducted by Aqua. This method developed specific schedules of work for each site, replacing generic assumptions with detailed, site-specific engineering judgements.
130. The review resulted in refinements to scope and cost, with both increases and decreases driven by:
- **Methodological differences:** Top-down assumptions based on replacement cost curves may over- or under-estimate scope relative to a detailed bottom-up assessment. For example, replacement curves assume default activities such as demolition or full construction that may not be required on specific schemes. This resulted in adjustments to scope and cost for several assets.
  - **Changes in scope due to improved condition understanding:** Engagement with asset owners and deeper review revealed that some assets require more significant intervention than assumed in BP24, including full replacement rather than refurbishment. For example, in our CMA business case we said that Langford West reservoir required full replacement (cost increase from £6.5m to £39.3m), and Washington WWTW primary settlement tanks also required replacement (cost increase from £5.4m to £8.8m). Additionally, two of the 23

assets included in BP24 have since required intervention to prevent imminent failure (Sedgeleth and Hexham) and so had been removed from the forward programme.

**FIGURE 16 - CHANGE IN COSTING APPROACHES, BP24 TO CMA**



131. Simply selecting a single preferred option does not necessarily provide any more certainty about the intervention that will be delivered – and in BP24, we sought to manage this uncertainty by considering the probability that different levels of intervention would be required. At CMA, we instead developed the preferred option in more detail to increase the likelihood that the preferred option would be required. This is a different way of managing uncertainty.

132. However, we need to be clear that although the preferred options proposed in the CMA case (based on the Aqua approach) have a higher likelihood, there remains a residual risk that in practice, the work required to refurbish these assets could be less than the cost of the preferred option – or it could be significantly more. It is not possible to reduce this uncertainty further without significant costs, and it would not be good value for customers to do this.

### 3.2.3. Additional phasing and cross-checks for the cost change process

133. We also note that there are some wider options that we could consider, in three possible categories: phasing; systems thinking; and innovation.

134. Firstly, although the analysis of need for investment shows which assets should be addressed, we could phase this investment. That is, we could do part of this now and delay part until later. We considered some options as follows:

- We could **defer some or all** this investment to AMP9. At PR24, we explained our reasoning for addressing these assets now – customers asked us to invest when there was an immediate impact on services, where there was some certainty about the work required, and when it would be more cost-effective to do this work now than in the future. We based our AMP8 proposals on this evidence from customers (see section 3.4 for more details). We have considered again whether or not we should deliver this whole programme by 2030, and concluded that this should still be done as soon as possible to avoid additional costs and service impacts
- We could **accelerate more investment**, including for example carrying out updated asset condition surveys on those assets that might have been close to (and may have already) reached Condition Grade 4. We have not asked customers about this investment and did not propose this during our business plan. Some customers did want a greater level of ambition (see section 3.4) and might support an accelerated plan; however, we consider that the timetable for developing such a plan would be too challenging. In addition to this, customers preferred us to focus on risks to other asset classes not in the priority assets (such as sludge tanks) which are in worse condition than those assets just reaching Condition Grade 4; so, we will retain space to develop these plans further in AMP8.

135. Secondly, we considered if there were any “systems thinking” solutions for sewage treatment works where we had poor condition assets to refurbish/replace in this case. That is:

- Are there any opportunities to refurbish/replace assets as part of any other treatment works upgrades (such as phosphorus removal)? Is this already happening using base expenditure (this is not part of the scope of any enhancement funding)?
- Are there any assets which will no longer be needed after any AMP8 or possible AMP9 investments (such as growth)?
- Are there any proposals to close/consolidate treatment works in the future, that might be able to be brought forward? Are there any alternative processes we could use?

136. We have confirmed that there are no proposals to close/consolidate treatment works in the future. We looked at only our “top ten” largest sites, which account for most of the costs in this programme, as we would not expect relatively minor refurbishments to lead to any wider decisions about treatment works. Our summary is in Figure 17 – we note

that this does not include minor, routine, or base expenditure works, only larger projects that might have an impact on strategic decision making.

**FIGURE 17 - SUMMARY OF CROSS CHECKS**

Site	Other treatment works upgrades in AMP8	Recent or future proposals/investments
Washington WWTW	Storm overflow investment in this catchment but not at WWTW	None that would affect primary settlement
Barkers Haugh WWTW	Storm overflow investment including at this WWTW (but no impact on trickling filter needs) Phosphorus removal in AMP8 - added in CMA (but no impact on trickling filter needs)	Recent investments - £8m settlement tanks/iron compliance investment in AMP6/AMP7 <sup>12</sup>
Birtley WWTW	Phosphorus removal in AMP8 – PST refurbishment reduces risk	Birtley is the home of the BEWise wastewater innovation site, our sewage research hub in partnership with Newcastle University <sup>13</sup>
Barnard Castle WWTW	None in AMP8	None that would affect settlement tanks
Carlton and Redmarshall WWTW	None in AMP8	Phosphorus removal in AMP7
East Tanfield WWTW	Phosphorus removal in AMP8 (no impact on trickling filter needs)	None
Great Ayton WWTW	Phosphorus removal in AMP8 (no impact on trickling filter needs)	Storm tank upgrades
Leamside WWTW	None in AMP8	None
Willington WWTW	Phosphorus removal in AMP8 (no impact on trickling filter needs)	None
Bran Sands WWTW	Large base asset health projects – sludge tanks, blowers Bran Sands LSO	None

137. Figure 17 shows that investments at these treatment works will mean that these sites will continue to be needed in future – but there are no clear overlaps where asset health improvements are already funded.

138. We note that for Birtley WWTW, our phosphorus removal project has identified that Primary Settlement Tank asset health could be a risk to meeting tighter phosphorus consents, but this was not included in the scope and costs of this project at PR24 (this was not assessed through Ofwat’s P removal, but instead as a deep dive on our Catchment Permitting proposal for the River Team<sup>14</sup>). This means customers are not paying twice for this (or any) investments, as there is no overlap with enhancement totex allowances.

<sup>12</sup> [Barkers Haugh STW \(2021\)](#)

<sup>13</sup> [About the Facility | Bio Engineering: Wastewater Innovation at Scale | Newcastle University](#)

<sup>14</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/PR24-FD-CA65-Wastewater-catchment-permitting-enhancement-expenditure-model.xlsx>

139. We considered consolidating East Tanfield and Birtley treatment works as part of our PR24 business planning process<sup>15</sup> but discarded this option at secondary screening. We concluded that centralising these sites to a new, larger works would cost significantly more to construct and would have a higher operating cost (including carbon), as well as a need to protect the existing water course.
140. We note that Aldin Grange treatment works (not in the “top ten” list in Figure 17) is included in AMP8 as a “growth at wastewater treatment works” project, with enhancement funding. Similarly, this site had investment in AMP7 under a phosphorus driver. We can confirm that neither of these projects affected (or will affect) the need for the trickling filters that we include for refurbishment in this case, and neither project included funding for any work on trickling filters.
141. Finally, we considered innovation and how this might affect our decision making. Both settlement tanks and trickling filters are long-established technologies that are efficient, and innovation has focused on smaller operational solutions such as media and circulation rather than fundamentally different systems. Our costs are based on historical known costs and include frontier shift efficiency adjustments as well as cost sharing for any further efficiencies; and there are no expected step changes in efficiency in this technology. In many cases, our proposal is to refurbish an existing asset which leaves very limited scope for improvements. We could not see any cost efficient innovative solutions, and we would expect any minor improvements to be considered in the overall detailed design of these projects in the context of detailed expert knowledge about the treatment works as a whole – there are no standardised alternative design options (as there might be for new tertiary treatment, for example).

### **3.3. PROPOSED SOLUTION**

142. The set of interventions we propose in this case are based on the best information we have from inspecting assets (that is, what specific intervention is required) and our information and analysis of the right phasing. This is a mixture of refurbishments and replacements, depending on the most likely work that is required.
143. To determine the most appropriate intervention, we have adopted a ‘best value for money’ approach in deciding whether refurbishment or replacement is the most appropriate option in each case. We demonstrated this in the Hexham WWTW Biological Filter Distribution Chamber case study (see Appendix 6). As part of the Hexham WWTW Refurbishment Project, this asset was identified as a deteriorating masonry structure exhibiting cracking and leakage, with the potential to compromise long-term STW performance if left unaddressed. Structural inspections and condition assessments confirmed that intervention was required to arrest deterioration, maintain operation of the biological filters and ensure STW compliance.

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<sup>15</sup> [nes13.pdf](#), p101

144. Two interventions options were identified and assessed to address these issues, partial rebuild or refurbishment and remediation. A cost and asset life assessment was carried out to identify the most appropriate option:
145. Option 1 – Partial Rebuild required an estimated capital investment of around £150,000 and would deliver an estimated 40-50 years of extended asset life, resulting in an annualised cost of £3,000-£3,750 per year. This was the most comprehensive intervention and offered the longest service life, but it also carried the highest total and annualised cost and delivery risks.
146. Option 2 – Refurbishment / Remediation was split into two interventions due to the different anticipated service lives. Internal relining required around £42,000 capital investment and provided 25-30 years of life extension, giving an annualised cost of £1,400-£1,680 per year. Structural remediation required around £9,000 capital investment and was warranted by the supplier for 10 years; if required, the remediation could then be repeated beyond the warranty period.
147. In this case, Option 2 was selected as the most appropriate option, providing value for money based on the lower anticipated annualised cost and reduced construction risks that was required to deliver the intervention. It should not be taken for granted that refurbishment is always the best option, we have proposed the most appropriate method of intervention in each of our proposals.
148. By intervening now, we can deliver clear benefits over the current situation by preventing further asset deterioration, extend asset life, and improve long term performance and resilience. Our deterioration modelling and risk analysis show that acting now avoids accelerated failure, which would otherwise lead to more frequent service disruptions, higher environmental risks, and significantly greater future repair costs. By maintaining asset condition proactively, the investment secures more reliable performance, reduces the likelihood of operational incidents, and strengthens the overall resilience of the network.
149. This approach also matches what our customers have asked us to do on asset health, and is consistent with our PR24 business plan which identified the same risks.

### **3.4. CUSTOMER ENGAGEMENT**

150. In our PR24 business plan<sup>16</sup>, we set out how we engaged with our customers on asset health in general, and civil assets at wastewater treatment works specifically. We explained our understanding of customer preferences and our customer engagement in our PR24 enhancement case (NES35) and in our Line-of-Sight summary of our decisions:

“Our customers described the decision about phasing as a “dilemma between a short-term fix and a long-term plan”. Some customers were cautious about spending money before it is necessary and noted that the future was uncertain. They prioritised affordability over asset health. The majority of customers

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<sup>16</sup> Appendix A7.1, Line of Sight ([NES45](#))

thought we should do more, noting that this could prevent costs and problems escalating in future years. They also valued safe, clean spaces for workers and communities (enhancements and other service area summaries, [NES43](#)). In the North East, customers were more likely to favour bill reductions.

“Customers asked for a “hybrid, middle ground” option, that focuses on where we know exactly where work is necessary now, and where this has an immediate impact on service (and safe, clean spaces). This middle ground would be more affordable now, without taking too much risk on problems escalating in future years (enhancements and other service area summaries, [NES43](#)).

“Investments to replace concrete tanks at service reservoirs, water treatment works and wastewater treatment works were viewed as a high priority for respondents across all regions as they relate to the main function of the company - to provide a safe water supply. Most customers included asset health in their “ideal plan” (enhancements and other service area summaries, [NES43](#)).

“In our Affordability and Acceptability Testing qualitative research, customers supported our “medium” investment in asset health – seeing this as keeping pace with the required level of work, while allowing a high level of investment in other areas.

“In Essex and Suffolk, customers often preferred a higher phasing option – which included increasing our mains replacement in this area.”<sup>17</sup>

151. We developed our PR24 plan based on the criteria from customer engagement – that is, to focus on areas where we know exactly what work is necessary now, and where this has an immediate impact on service.
152. For civil assets at treatment works, we had detailed inspections that show asset conditions, and we understand the impact of failures. This means these met the criteria set from our customer engagement, as well as matching the areas where service impacts are most likely to affect customers (through pollution incidents).
153. This was more difficult for mains replacement, where we had less detailed information about the condition of these assets (as they cannot be readily visually inspected) and where it was more difficult to estimate the benefits of replacing a given main (or to have confidence that this targeting is effective). We prioritised civil assets at service reservoirs and treatment works in our customer engagement throughout our planning process, as these improvements were better value for customers.
154. As a result of our customer engagement, we increased our expenditure on mains replacement in 2020-25 to increase the rate of replacement. The impact on service levels was less clear for individual replacements, as it is more difficult to inspect these assets directly, but it was clear that the implied asset life was much too high, and the

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<sup>17</sup> Appendix A7.1, Line of Sight ([NES45](#)), p25

replacement rate would need to increase. The Water Forum challenged us to consider a higher replacement rate of 1% per year, as this more closely matched a realistic asset life.

155. As a result of our customer research at PR24, we looked at potential options for balancing affordability against an increased investment in asset health. We explored the costs of a smaller uplift in mains renewal, as well as challenging our costs and implicit allowances for our investments in treatment works and service reservoirs. This challenge led to us removing our enhancement need for service reservoirs and so allowing us to include some mains replacement without changing the overall level of investment for asset health – and so remaining close to the level of investment that our customers supported in our qualitative research. Our customers had challenged us to go further to tackle potential future problems including for mains replacement, and so we included this in our investment plans for 2025-30. In our PR24 business plan, we put forward this balanced package of asset health investment that we had developed through customer engagement – including civil assets at treatment works and mains replacement (but not service reservoirs, which we deferred until AMP9).
156. We had tested customer views about phasing in our published “[pre-acceptability research](#)”. A slight majority (52%) of respondents in this research supported investments in wastewater treatment works now to avoid service failures, with some preferring to push back due to the cost-of-living crisis and weighing up its importance against other investments. This was the preferred option for civil assets at wastewater treatment works, compared to 30% of respondents who suggested that this could be pushed back beyond 2030.
157. After Ofwat’s Draft Determination in July 2024, which ruled out asset health allowances in these areas in AMP8, we [asked customers](#) if we should accept or challenge this decision. The majority of customers in the North East said that we should challenge Ofwat’s decision, highlighting that this seemed “shortsighted” and that they didn’t want “the repercussions of them breaking down in the short term”. These customers felt that a small increase in bills now would reduce the risk of a higher cost in future if the systems were to fail completely.
158. Other customers felt that we should not challenge Ofwat’s decisions, because they felt that Ofwat were well placed to make an educated decision on these investments and had the best interests of customers at heart.
159. We provided this evidence to the independent Water Forum, when it was considering its own response to DD24. The Water Forum said in response to DD that:

“We found a paucity of evidence or explanation of the extent to which Ofwat has assessed the level of customer engagement and challenge of the Business Plan, and, importantly, how it may have influenced the DD. Engaging customers is in our view of critical importance and given that it can be resource intensive, it should be at the heart of decision making, especially when customer resources are being squeezed: even more reason to elicit, and listen to, their views....

“The Water Forum has seen that asset health is important to customers, and NWL’s Business Plan reflected this. We want to see sufficient, affordable investment in asset health as a whole to enable

customers’ expectations to be met both now and in the future. A fresh look by the regulator at the approach to tackling this issue would be welcome.”<sup>18</sup>

160. CCW also commented on asset health in its own response to DD24:

“Discretionary investment is limited in this determination due to the high cost of the statutory investment programmes, as trade-offs have been made to protect customer affordability. However, this has mean that some customer support investment proposals have been delayed, reduced or cut, so we remain concerned that some issues such as “asset health – civil structures on treatment works” may not be fully addressed until PR29 or beyond.

“In this context, Ofwat must ensure that companies provide assurance that any deferred investment does not lead to risk to service delivery in the intervening period, and indicate what future bill impacts may be when companies have to “catch up” at a later date. We also have a concern that deferred schemes may be more urgent and costly when it comes time to deliver them.”<sup>19</sup>

161. Based on these views, we provided further evidence to support our case in response to DD24 – with some refinements in scope based on Ofwat’s feedback. The investments we proposed in civil assets at wastewater treatment works at each of BP24, DD24, and during the CMA appeal are the same investments supported by customers in our business planning process, and where customers (and other stakeholders) asked us to challenge Ofwat further.

162. Although Ofwat’s [Consumer Involvement Rule](#) did not exist during the PR24 business planning process, we consider that this decision would be “likely to have a material impact on customer matters” and so we have tested this against the Rule.

**FIGURE 18 - SUMMARY OF CUSTOMER INVOLVEMENT RULE ANALYSIS**

Requirement under the Rule	What did we do?
<p><b>Component 1 – insight on views and preferences:</b></p> <p>To support delivery of the core requirement, undertakers must put in place, and follow, effective arrangements to appropriately understand the views and preferences of their consumers in relation to matters relevant to this rule. Such arrangements must include:</p> <ul style="list-style-type: none"> <li>• Surveys of consumers; or,</li> <li>• Qualitative research among their consumers; or,</li> <li>• Engagement with independent consumer experts; or,</li> </ul>	<p>Our PR24 programme of customer research had effective arrangements for understanding the views and preferences of customers – we describe our strategy and approach, including triangulation, in our <a href="#">business plan appendix A7</a>. This includes describing how we met the principles for good customer engagement.</p> <p>This programme included surveys of customers, qualitative (and deliberative) research, and engagement with the independent Water Forum and its Customer Engagement Panel (assessing quality of research).</p>

<sup>18</sup> [Water Forum response to DD24](#), August 2024

<sup>19</sup> [CCW response to NES DD24](#), August 2024

Requirement under the Rule	What did we do?
<ul style="list-style-type: none"> <li>Additional or alternative approaches which achieve the outcome in paragraph 7; or,</li> <li>A combination of any of the above arrangements.</li> </ul>	<p>We published the reports from the independent <a href="#">Water Forum</a> and <a href="#">Customer Engagement Panel</a> with our business plan.</p>

**Component 2 – decision-making mechanisms:**

Undertakers must have arrangements in place at the appropriate levels of decision-making within the undertaker to deliver the core requirement. This means that undertakers must ensure that the views, experiences and preferences of consumers, including those understood as a result of component 1, are appropriately fed into, and taken into account, in the decision-making process for decisions that are likely to have a material impact on consumer matters.

At Board level, in relation to decisions relevant to this rule, this must include:

- Allocated time within the annual board cycle for discussions focusing regularly on consumer matters at meetings of the Board; or,
- Arranging for the regular attendance of independent consumer experts at meetings of the Board; or,
- Designating an independent non-executive Board member with specific responsibilities for involving consumers; or,
- Holding open meetings of the Board which consumers are able to attend; or,
- Additional or alternative approaches which achieve the outcome in paragraph 8 or,
- A combination of any of the above arrangements.

We fully integrated customer preferences into our PR24 business planning process. Our [line-of-sight report](#) describes the top-down assessment from discussions at our Board, Water Forum and other similar forums (informed by our customer engagement); and our bottom-up assessment from our PR24 planning teams, reviewing a range of insights and making judgements on the findings to inform decisions through the business plan development process. This meant that the business plan proposals were continually refined using the full range of insights, not just at limited decision points. The light-of-sight report describes how we took customer views into account for each decision, including asset health.

In addition to this, our [data, information and assurance appendix](#) describes how we made sure that we had fully met the requirements on customer research – and how our Board satisfied itself that our Business Plan really was supported by our customers (this was beyond the requirements for Board assurance). The Board sub-group met 17 times during the development of the plan; including Water Forum attendees at two meetings. Our Board nominated an independent non-executive member (Peter Vicary-Smith) as the Board lead on customer engagement, attending Water Forum meetings as required. Members of the Board sub-group attended customer engagement sessions, as well as operational colleagues, to seek to make sure that this was integrated into decision making culturally as well as practically.

Ofwat confirmed through its PR24 QAA that this met its quality requirements on customer engagement and assurance.

**Component 3 – Feedback on consumer experiences:**

In order to deliver the core requirement, undertakers must seek feedback from consumers on their experiences relevant to this rule, so that the impact on consumers of past decisions:

- is understood;
- is taken into account in decisions affecting current and future consumers; and
- informs relevant future planning for delivery of this rule.

The feedback component is not as relevant to this particular process, as this was about making decisions about future phasing and needs (that is, the impact of past decisions about asset health is simply that this has been delayed as much as possible by Government and regulators and there now needs to be more investment). We will repeat this research as we move towards PR29 and for other asset health in-period processes, including testing the decisions and criteria set by PR24 respondents.

**Guiding considerations:**

We met these requirements by:

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<b>Requirement under the Rule</b>	<b>What did we do?</b>
<p>Accessibility – making involvement as easy as possible for a range of audiences.</p> <ul style="list-style-type: none"><li>• Independence – ensuring that views are not unduly influenced by the undertaker and reflect the genuine views of consumers.</li><li>• Timeliness – considering consumers' views at a frequency and time that makes sense for the subject matter and allows for meaningful involvement.</li><li>• Representativeness – involving a broad range of consumers or independent consumer experts that appropriately reflects the range of consumers the undertaker serves.</li><li>• Transparency – being open and honest with consumers who are being involved in decisions, and being open about how consumers have been involved in decisions.</li></ul>	<ul style="list-style-type: none"><li>• Independence – we described in our <a href="#">Appendix A7</a> how we met the best practice principles, including using an independent research partner. The Customer Engagement Panel reported its independent views on the quality of our research.</li><li>• Timeliness – we carried out this research during the business planning process, in time for these decisions to be made using customer preferences. We also asked customers how they wanted us to respond to DD24. This research is now &gt;18 months old, but it is not appropriate to ask customers the same questions again as these preferences have not yet been acted upon.</li><li>• Representativeness – we used representative customer panels for deliberative discussions, and a representative sample for our acceptability research</li></ul>

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#### **4. ROBUST AND EFFICIENT COSTS**

163. Our initial costing of these interventions started in 2023 when we included additional investment as a cost adjustment claim as part of our business plan submission. At that time, we were less certain about which interventions would be required and used a Monte Carlo approach to derive our cost estimates based on the worst, likely and best-case options that we might need to undertake – we estimated these as percentages of the costs of a rebuild. Following Ofwat’s feedback at PR24 we focused these interventions on a single option around what we would do on each asset so that it was clearer what interventions we would undertake.

164. For this submission we have undertaken a further review of our approach and have improved it further as set out in section 4.1 below.

##### **4.1. DETERMINING COSTS**

165. We undertook a consistent review approach by consolidating all available design and scope information to enable a single, standardised assessment of each proposed intervention. We developed cost estimates using the available design and scope data, and priced wall and concrete refurbishment works using bespoke, bottom-up methodologies aligned to the specific construction activities required. We quantified the required enhancements against standardised intervention scopes, informed by asset condition surveys and verified asset dimensions, ensuring the extent and area of works were evidence based.

166. This approach differs from iMOD, which applied percentage-based assumptions to full asset replacement costs rather than estimating the cost of the specific works required. The application of bespoke bottom up estimating for refurbishment works ensures that costs are directly linked to the specific activities required.

167. The two biggest improvements that this has provided are that:

- We now use bottom-up estimates for each and every refurbishment intervention. This means that we are more directly pricing the required intervention rather than basing the estimate on the percentage of a replacement.
- We have addressed some discrepancies in scope between interventions. In particular, we identified that some of the scopes were missing certain activity lines and these have now all been made consistent to ensure that the scope of works is as accurate as possible.

168. A full list of the interventions included in this business case is provided in Appendix 5. To ensure alignment with Ofwat’s definitions of refurbishment and repair, we have removed the assets which did not fall within the scope of refurbishment. As part of this process, we removed the assets with repair costs below the £5,000 threshold, resulting in a more focused and achievable proposal.

169. Overall, we consider the updated methodology provides a realistic and deliverable representation of scheme costs, demonstrates efficient targeting of investment, and provides a stronger starting point for assurance and benchmarking as the scopes of the interventions better match the required activities.

#### **4.2. ENABLING COSTS UPLIFT**

170. In our PR24 business plan, we generally only produced estimates for direct asset-improvement costs. These did not include the enabling works required to initiate construction or to maintain compliant operation throughout the delivery of civil asset improvements.

171. These enabling activities are essential at sites with limited hydraulic or process resilience to ensure statutory treatment performance is maintained and that customers continue to receive reliable sewerage services during construction. For example, tankering of all flows while civil structures undergo refurbishment, temporary over-pumping and storage to divert flows around settlement tanks, or wetting rings and HSAFs (Hybrid Submerged Aerated Filters) may be deployed to provide resilience whilst working on filters. While a small number of sites possess sufficient inherent resilience to proceed without additional enabling measures, these represent exceptions rather than the norm across the proposed investment portfolio.

172. With a more detailed programme of investments, we have now been able to assess and quantify these costs. To do this, we applied a consistent cost-build methodology across all proposed investments. Drawing on delivery experience from our Integrated Delivery Services (IDS) team and the WWTW Minor Works sub-programme, we developed standardised unit costs for a defined suite of enabling activities: tankering, wetting rings, HSAFs, overpumping systems, and temporary storage tanks. These unit costs reflect the estimated cost of delivering the enabling activities in current (2026) prices. To ensure consistency with the direct civils cost estimates, the enabling works costs have been converted to a 2022/23 price base using the CPIH adjustment factor.

173. Where applicable, these activities include standard commissioning costs, and all items have been costed using a weekly OPEX rate to reflect their temporary yet essential nature. For each enabling activity, the weekly OPEX cost is multiplied by the duration (in weeks) of the on-site works. For each investment, the required duration has been assumed to be an eighth of the time between Gateway 4 to Gateway 5 - Delivery. This duration is based on prior experiences of delivering similar works at descriptive sites, typically lasting for 12-16 weeks, and using this to calibrate the other typical durations through our Integrated Delivery Service (IDS).

174. Between Gateway 4 and Gateway 5, project activity focuses on executing the full suite of delivery -phase management, assurance and coordination tasks required to support construction, ensuring the project delivers safely, compliantly and in line with its approved scope in addition to the actual construction itself. This includes maintaining alignment with the Business Case and Benefits Register, managing scope and budget governance, progressing third-party requirements, and delivering the approved procurement approach. The Project Manager leads ongoing coordination through Delivery Launch meetings, contract management, risk and change control, and

implementation of health, safety, environmental and security plans. In parallel, the Project Engineer completes and signs off Success and Acceptance Criteria, actions technical reviews, assesses deviations, verifies O&M handover requirements, supports operational readiness, and confirms security, safety and method-statement compliance. These structured Gateway-4-to-5 activities, ensure that when Gateway 5 is reached, the project is fully assured, technically complete, operationally accepted, and ready for commissioning and handover.

175. A significant driver of the enabling cost uplift is the requirement for HSAF units to be deployed at a number of sites while investments are delivered concurrently. However, it is not assumed that a new HSAF unit would be purchased for each site. We currently own a fleet of 27 HSAF units, of which 8 are available to be deployed to a new site, and it is not expected that this availability will change significantly through AMP8. As a result, we expect that 9 sites will require 13 HSAFs at the same time at the point of highest demand, and therefore 5 additional HSAF units would be required for purchase to guarantee compliance of all sites proposed. We have ensured that the cost of only the 5 net new HSAFs have been included in the enabling costs build-up, while the operating costs of all 13 units has been retained. HSAF commissioning costs have been intentionally excluded from the cost-calculation formulae to avoid applying a new HSAF unit cost to every site where HSAFs are required.
176. Where there are multiple lines of investment at a single site with the same enabling cost (such as Barkers Haugh), this is not a double counting issue. All the enabling needs of a single site were calculated into one total, which was then divided and split by the number of investment lines. This was carried out to ensure that, where sites had investments in both the trickling filter and settlement tank categories, cost was split between these two categories.
177. We have applied uplifts to the combined cost of the civils improvement and enabling works to reflect Contractor Indirects, Project Overheads, Risk, and Estimating Uncertainty. Under this methodology, the civils cost estimate and the enabling works cost, both taken on a pre-uplift basis, are first aggregated, with a consistent set of uplifts then applied to the total scheme cost. This ensures that all elements of the investment are treated consistently and avoids differential uplift treatment between civils and enabling activities.
178. This approach reflects the fact that enabling works are integral to the delivery of the civil asset improvements and place equivalent demands on contractor resources, project management, site supervision, and delivery governance. In particular, the inclusion of Contractor Indirects and Project Overheads recognises that enabling activities, while temporary in nature, increase the duration and complexity of delivery for both internal delivery teams and delivery partners.
179. The application of Risk and Estimating Uncertainty uplifts is consistent with best practice for schemes that have not yet progressed through full concept and definition stages, and aligns with our PR24 costing methodology. Together, these uplifts provide a robust and proportionate allowance for residual uncertainty while ensuring that total scheme costs are presented on a consistent and transparent basis.

180. Our updated civils cost estimates have been developed on the basis of a clearly defined scope boundary, with no allowance included for activities that are classified as enabling works. Enabling activities—such as temporary treatment, flow management, or operational resilience measures—are therefore captured exclusively within the enabling works cost build-up, ensuring there is no overlap where costs associated with enabling activity are embedded within the civils estimates.
181. We consider our approach ensures that enabling works are estimated using evidence-based, repeatable assumptions grounded in recent comparable delivery.
182. At a number of sites within the proposed investment portfolio, the cost of enabling works materially exceeds the cost of the direct civil asset improvement itself. This is particularly evident at treatment works which treat large flows, but where there is limited inherent hydraulic or process resilience available to allow individual units to be taken out of service. In these circumstances, enabling measures become the primary driver of total scheme cost, notwithstanding that the underlying civil intervention remains essential.
183. A clear example of this relationship can be seen at Aldin Grange (refer to Appendix 7), where the direct civils improvement associated with the trickling filters represents only a small proportion of the overall scheme cost. The majority of expenditure at this site relates to the provision of enabling works required to maintain statutory compliance and service continuity during construction.
184. This cost dynamic is emblematic of a wider subset of sites within the programme. While the civil interventions at these locations are tightly scoped to address targeted asset health issues, the operational context in which the works must be delivered necessitates extensive enabling activity.
185. As a consequence, at these constrained sites the direct civils component may form a relatively small fraction of total scheme cost, even though it is the trigger for the investment. This should not be interpreted as disproportionate enabling provision, but rather as a reflection of the fundamental relationship between asset resilience and deliverability. Where resilience is limited, the cost of maintaining compliant operation during construction necessarily dominates.
186. This effect has been consistently and transparently captured through the standardised enabling-cost methodology described above, and is supported by the site-level outputs presented in the Appendix 8. The resulting cost profiles therefore provide a realistic and evidence-based representation of what is required to safely and compliantly deliver essential civil asset improvements across the programme.

### 4.3. DETAILED COST BREAKDOWN

187. Applying the methodologies above we developed the costings as set out in the table below.

**FIGURE 19 - COSTING OF ADDITIONAL CIVILS WORKS (£M, 2022/23 PRICES)**

	Civils costs	Enabling costs	Indirect costs + Risk and EU	Total
Settlement tanks	7.9	5.0	19.0	32.0
Trickling filters	9.4	11.3	30.2	50.9
Total	17.3	16.3	49.2	82.8

188. When combined with our AMP8 base plan, maintenance savings and the implicit allowance this gives the following position for each of the asset classes.

**FIGURE 20 - COST BREAKDOWN FOR SETTLEMENT TANKS (£M, 2022/23 PRICES)**

	Capex	Total
Additional investment	32.0	32.0
AMP8 base plan	8.5	8.5
Implicit allowance	10.0	10.0
Maintenance savings	0	0
Total request	30.5	30.5

**FIGURE 21 - COST BREAKDOWN FOR TRICKLING FILTERS (£M, 2022/23 PRICES)**

	Capex	Total
Additional investment	50.9	50.9
AMP8 base plan	4.5	4.5
Implicit allowance	1.7	1.7
Maintenance savings	0	0
Total request	53.7	53.7

189. In total, our asset health case proposes an additional **£84.2m** across the 2 asset classes to undertake these additional asset health investments.

#### 4.4. COST BENCHMARKING

190. For cost benchmarking we commissioned Turner and Townsend to review our costings and benchmark these against their benchmarking cost database. Their report<sup>20</sup> is provided as a supplementary document to this submission and we have provided a write up summarizing how we used these results in section 6.1 of the "Northumbrian Water - cost change submission" document.

191. As part of their analysis, they benchmarked the entirety of our case (i.e. 45 interventions for settlement tanks and 50 interventions for trickling filters) against the costs implied by the cost benchmarking database for individual items. The results of this analysis are set out in Figure 22 and Figure 23 below.

**FIGURE 22 - SETTLEMENT TANKS BENCHMARKING RESULTS (2022/23 PRICES)**

	NWL Capex Costs (£)	T&T Benchmark (£)	Variance (£)	Variance (%)
Direct Costs	£7,920,761	£7,261,506	£659,255	-8.32%
Enabling Cost	£5,048,812	£5,048,812	£0	0.00%
Contractor Indirects	£7,781,744	£7,386,191	£395,553	-5.08%
Project Overheads	£2,075,132	£1,969,651	£105,481	-5.08%
Risk	£2,282,645	£2,166,616	£116,029	-5.08%
Estimating Uncertainty	£6,847,935	£6,499,848	£348,087	-5.08%
<b>Total</b>	<b>£31,957,028</b>	<b>£30,332,623</b>	<b>£1,624,405</b>	<b>-5.08%</b>

**FIGURE 23 - TRICKLING FILTERS BENCHMARKING RESULTS (2022/23 PRICES)**

	NWL Capex Costs (£)	T&T Benchmark (£)	Variance (£)	Variance (%)
Direct Costs	£9,376,084	£8,643,325	£732,760	-7.82%
Enabling Cost	£11,271,773	£11,271,773	£0	0.00%
Contractor Indirects	£12,388,714	£11,949,058	£439,656	-3.55%
Project Overheads	£3,303,657	£3,186,416	£117,242	-3.55%
Risk	£3,634,023	£3,505,057	£128,966	-3.55%
Estimating Uncertainty	£10,902,069	£10,515,171	£386,897	-3.55%
<b>Total</b>	<b>£50,876,320</b>	<b>£49,070,800</b>	<b>£1,805,520</b>	<b>-3.55%</b>

192. For both of these areas the T&T benchmarks were slightly below our own costings – 5.08% for settlement tanks and 3.55% for trickling filters. T&T conclude that our costs are “in line with industry standards at this stage of the project lifecycle” and that “The uplifts applied for indirect cost elements (contract overheads, project overheads, risk and estimating uncertainty) are acceptable in line with industry norms”.<sup>21</sup> Given the small gap we observe for these assets which is within well within the margin of error for estimates at this stage of the project lifecycle we do not propose to make any changes to our cost estimates based on this benchmarking. While we are slightly over the

<sup>20</sup> NWL Asset Health Benchmarking report, Cost Change Submission Appendix 1.

<sup>21</sup> NWL Asset Health Benchmarking report, Cost Change Submission Appendix 1, page 9-10.

benchmark in these asset classes, we are under in boreholes and water towers which more than offset these variances. At a programme level we think we have made the right decision to stick with our own costs – this is discussed further in section 6.1 of the "Northumbrian Water - cost change submission" document.

193. The Ofwat guidance asks us to show evidence of internal benchmarking. Our original PR24 costs used our iMOD costs to support estimates; however, this is no longer the case as these cost estimates have been updated. Our approach to bottom-up costing (as described in section 4.1) uses our historical costs to build up the costs for these new scopes and contains historical costs for similar projects and individual items, and uses these cost curves to estimate the costs of future projects. This means that we do not need to separately benchmark these against similar projects. We then rely on external benchmarking that allows us to extend this to a third party, independent comparison with other projects elsewhere (where we do not have access to costs for individual items from other water companies).

## **5. CUSTOMER PROTECTION**

194. Ofwat challenged us at FD24 to “identify (how) outputs of investment could be tied to a price control deliverable”<sup>22</sup>. In response, we developed a PCD for civil structures as part of our Statement of Case for the CMA, using Ofwat’s template from FD24 (neither Ofwat nor the CMA provided any specific feedback on this PCD).

195. We designed this PCD to be as similar as possible to existing PCDs from PR24. This will support us in making sure that the PCD is consistent with the approach adopted in the PR24 final determinations – that is, based on a similar common framework; protecting customers if we fail to deliver funded improvements by returning the funding to customers; and incentivising us to deliver “on time” where appropriate. This will support us in making sure that the PCD is consistent with the approach adopted in the PR24 final determinations – that is, based on a similar common framework; protecting customers if we fail to deliver funded improvements by returning the funding to customers; and incentivising us to deliver “on time” where appropriate.

196. In developing this PCD, we considered any impact on or overlaps with existing performance commitments and PCDs. There are no overlapping PCDs relating to these assets at wastewater treatment works, though we note that there are some that relate to other enhancement investments at these sites (particularly phosphorus removal and storm overflows). In section 3.2.3, we explain how we have made sure that this programme does not overlap with funding already provided at PR24.

197. This investment could have an impact on some PCLs (particularly pollutions), but not within the AMP8 period. These assets have a very small individual impact on these PCLs because the likelihood of failure remains low for any given year; however, an individual failure which required a wastewater treatment works to be placed out of service could have a very large impact. We do not think that an adjustment is appropriate for PCLs because this will not apply in

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<sup>22</sup> Ofwat, PR24 Final Determinations: Expenditure Allowances, p79

period and would be very small in future (that is, these investments are about avoiding the low probability of high impact failures, not about improving performance). We cannot quantify this impact on PCLs, but we note that these improvements would not be made until 2030 and so would not affect AMP8 PCLs.

198. We have set out this PCD to cover the three-year programme for these assets, completing most of these projects by 31 March 2030. For two sites (Washington and Barkers Haugh) we expect to complete these by 31 March 2033, a six year programme.
199. We considered time incentives for this PCD. Although there are many deliverables, these are all scheduled for completion by 31 March 2030 at the earliest, with no earlier delivery dates. This means that there are no benefits to customers in applying time incentives in-period.
200. We considered whether these schemes should be substitutable in-period. In many asset health cases, substitution would be beneficial because more detailed asset inspections could reveal that refurbishment or replacement is not required as envisaged – and other assets could deteriorate more quickly than expected, or further inspections could reveal other problems. However, we concluded that there would not be time within the three-year window to substitute schemes for these asset classes. Where we find that refurbishment or replacement is not required, we will return the funding through the PCD.
201. We note that there are some investments from the existing AMP8 base plan for settlement tanks and trickling filters, and we have taken this into account when calculating our totex requests. However, as we set out in Figure 9, these are reactive and minor works – and so there is no specific programme of replacements that can easily be set out as a base PCD. We do not think it is sensible to lose the flexibility that base expenditure allowances provide, and it is correct to be able to target the areas of most need on an annual basis (rather than setting this all out in advance, regardless of shifting risks or needs). Ofwat could set a PCD similar to network reinforcement which reconciles based on expenditure rather than outputs, but this could quickly become complicated. This is not as easy as for mains replacement, for example, where outputs are more clearly measured in km.
202. Instead, we suggest that customers could be protected from non-delivery of the base elements of this case by introducing a new adjustment mechanism – that is, requiring us to have spent £8.5m on settlement tanks and £4.5m on trickling filters from base expenditure in AMP8, or return the difference in funding to customers. Ofwat could consider taking a common approach for all companies on this. This might include considering, for example: setting a total expected base spend on priority assets where an asset health allowance has been made (rather than individual allowances); and the interaction with cost sharing and where this might inadvertently change the incentive to spend efficiently.

## **5.1. DELIVERY OF THE AMP8 PROGRAMME**

203. Section 6.2 sets out how we are delivering our existing programme in AMP8. This shows that we are currently on track to deliver most of our programme, and the areas that we have identified as at risk of late delivery are for specific reasons (rather than a lack of capacity or effort to do so). In Section 2.2.3, we set out our AMP8 base plan for capital maintenance in this area and we confirm that we forecast to spend our base allowances in full (and exceed these).

204. Figure 9 shows that we are already using our AMP8 base allowances to refurbish the highest priority assets, and we are spending more than our implicit allowance on this. This demonstrates that we are using our AMP8 base allowance for these asset classes appropriately.

205. We can also demonstrate that we are efficient in delivering these types of projects. Our cost estimates for civil assets, based on our own historical costs through the iMOD estimations, are similar to our external benchmark (see section 4.4).

## **5.2. DELIVERABLE**

206. This PCD will ensure the delivery of 100 interventions to measurably improve the health of civil structures. Investment will deliver an improvement in condition grade score for each listed asset from 4 or 5 (poor or very poor) to condition grades 1 to 3 (good, fair and adequate). This will provide benefits to customers by reducing the risk of asset failure, and extending asset life (measured through asset condition).

207. The list of schemes to be delivered is recorded in the Asset Health Civil Structures Scheme List (Appendix A). Each intervention within the list will count as one output. Each intervention has been assigned a unique name in the Asset Health Civil Structures Scheme List.

208. Non-delivery payments will use scheme-specific rates, for schemes which have not achieved the required improvement. Failure to deliver a named intervention will lead to the associated non-delivery payment for that intervention being returned to customers at the end of the price control period. The table in Appendix A lists the non-delivery payment for each scheme, which is the same as the capex cost, and the delivery date for each PCD.

209. We note that **we have not included any specific schemes from base expenditure**, as there are no named schemes in base expenditure. Instead, we propose that a condition of the PCD should be to spend at least our planned base expenditure on these assets (£4.5m on trickling filters; and £8.5m on settlement tanks – see Figure 9). We have raised this in section 5 above.

### **5.3. MEASURING AND REPORTING**

210. The company will report progress against deliverables as per the common reporting requirements set out by Ofwat in its [Price Control Deliverables Appendix](#).

### **5.4. OTHER CONDITIONS**

211. No additional conditions apply. We note that there are no third party funding or delivery arrangements that apply for this investment, and so customers do not require additional protection against third party funding risks.

### **5.5. ASSURANCE REQUIREMENTS**

212. Common assurance requirements apply as per Ofwat's [Price Control Deliverables Appendix](#).

213. In addition to the common requirements, independent third-party assurance should be provided on a sample basis:

- The date that the scheme was fully commissioned, operational and in permanent use.
- That the solution delivered must be permanent and not temporary.
- That the intervention has secured a change in condition in line with the requirements set out in the Deliverables section above.

### **5.6. NON-DELIVERY PAYMENT**

214. The non-delivery payment rate is based on the totex allowance assigned to each intervention, as defined in the PCD Asset Health Civil Structures Scheme List (Appendix A). The non-delivery payment will be returned to customers if the company fails to deliver any of the schemes in the PCD Asset Health Civil Structures Scheme List by 31 March 2030.

215. Non-delivery PCD payments will apply as per the formula below:

216. *Non – delivery PCD payment = Sum of scheme – specific payment rates for each intervention not delivered*

### **5.7. TIME INCENTIVE PERFORMANCE PAYMENTS**

217. We propose that time-incentive performance payments could apply to those projects that are due to be completed by either 31 March 2030, or 31 March 2033. We consider that these should be set at PR29, to be consistent with policies that Ofwat sets then (including, for example, cost of capital and inflation policies). There seems to be no benefit to customers to set these now, as this would provide only the opportunity for outperformance payments in-period. Ofwat can set underperformance rates at PR29 if these are delayed – it has said it will do this already for those PCDs with no time incentive performance payments that are delayed beyond 31 March 2030.

218. However, we would expect these to be set at approximately the same rates as other similar payments. For example, for our gravity sewers investment, we have based this on the same percentage of the non-delivery payment as used as PR24 (that is, the outperformance payment is set at 3.97% of the non-delivery payment; and the underperformance payment is set at a third of this). This would imply a range of time incentive payment rates depending on the project.
219. We recommend that Ofwat considers setting a percentage rate for these types of projects, rather than individual £m rates. This will apply a consistent approach to all asset health expenditure.
220. For those projects that are due to be completed by 31 March 2033, there seems to be little benefit in setting time-incentive performance payments now. These should be set at PR29, as they will need to be reviewed then in any case.

## **6. INVESTMENT DELIVERY PLAN**

221. We examined supply chain availability and the deliverability of the wider programme in our business plan, describing the steps our Board had taken to satisfy itself that the supply chain risk was manageable and delivery plans accounted for: the ability of NWL and its supply chain to expand its capacity and capability; the impact of similar levels of growth across the sector and any overall sector and supply chain capacity constraints; and key supply chain risks and capacity constraints. Appendix A6 of our Business Plan (NES07) describes the steps we took and the results of deliverability reviews.
222. In section 5.2 of the "Northumbrian Water - cost change submission" document, we revisit this wider supply chain risk and describe how we have made sure that sufficient resources are available for the design and delivery of our proposals in aggregate – that is, including our asset health proposals and our projects under the Large Scheme Gated Process (including Bran Sands in the 2026 cost change process). This shows that we have capacity within our supply chain to deliver the whole programme, including our cost change proposals. In section 6.1 below, we explain how this separate assessment is relevant to civil assets at wastewater treatment works specifically.
223. In section 5.3 of the "Northumbrian Water - cost change submission" document, we also summarise our current delivery plan. Our existing AMP8 investment is on track, and we are confident that additional allowances can be delivered. Since this applies to all cases together, we provide the evidence for this separately in that document. In section 6.2 below, we comment on how this applies specifically to civil assets at wastewater treatment works.
224. In section 6.3, 6.4, and 6.5 below we explain the design and delivery risks for this programme in particular, our specific stakeholder engagement needs, and our delivery programme. We provide our risk register separately as Appendix 9.
225. The plan confirms that AMP8 investment has been fully scoped, risk assessed and structured into 19 deliverable work packages aligned to intervention needs and programme duration. This provides strong evidence that the proposed workload is both achievable and appropriately prioritised.

### **6.1. SUPPLY CHAIN ENGAGEMENT**

226. In our separate "Northumbrian Water - cost change submission" document, we describe our two primary delivery vehicles which differentiate our approach depending on the size, complexity, and technical input required of each project scope. This takes into account repeatability, opportunities to batch for efficiency, technologies, project duration, and cost.
227. We also describe how we monitor our overall supply chain capacity, and how we have confirmed that we have supply chain capacity for these programmes. For civil assets at wastewater treatment works, we propose to deliver most projects through our Integrated Delivery Services route – but for the two largest projects, we propose to deliver

these over six years through our Living Water Enterprise (LWE). Our Living Water Enterprise (LWE) is the partnership between NWL and our largest strategic, technical and delivery partners.

228. We discussed this programme with our IDS programme manager to develop this in more detail – including reviewing the enabling works required, geographical distribution of sites, asset types, and the anticipated scale and cost of interventions. We identified a series of flexible work packages to support efficient delivery, and explored how best to facilitate access, streamline site activities, and accelerate delivery, resulting in a number of practical proposals to support programme execution.

229. Following various engagement sessions with our stakeholders, including asset and site managers, we have confirmation that the availability and sourcing of materials for civil asset enhancement is not a high risk. As described in the individual cost breakdowns for each civil asset (see Section 4), the materials and equipment we will require for deliverability are standard materials. Our risk register shows that inflation or materials scarcity would likely lead to increases in costs, rather than placing the delivery of the programme at risk.

230. Collaborating with our partners, we have developed a comprehensive Programme Delivery Plan, with regular reporting, engagement and monitoring during all stages of delivery. This is to ensure any issues and risks around supply chain issues are managed in a timely manner.

## **6.2. 2025-30 (AMP8) DELIVERY**

231. In section 5.3 of the "Northumbrian Water - cost change submission" document, we summarise our AMP8 delivery plan. This confirms that our existing AMP8 investment is on track to be delivered by the end of the 2025-30 period.

232. In our Delivery Plan Summary in November 2025, we raised some "red" and "amber" risks. Following the CMA determinations in March 2026, only one of those risks remains: that is, our **Linford WTW and borehole scheme**, which is currently behind schedule due to the inability to secure a land lease agreement, with competition from (and concerns about) other infrastructure projects.

233. This does not raise any general concerns about overall supply chain capacity.

## **6.3. DELIVERY RISKS**

234. We have considered the design and delivery risks for this programme, and we provide our full risk register in Appendix 9.

235. We have identified the following key risks to delivery:

- Insufficient bypass / flow control capacity and consent compliance during outages: On some sites there is a lack of redundancy and resilience in the network to allow for assets to be taken out of service.

- Contractor availability: There is a significantly increased amount of investment across the industry with specialised contractors required to deliver the interventions.
- Permit delays (EA, planning, land access): An increase in the amount of approvals and permits will be required to be able to deliver the interventions.
- Supply chain delays (media, scrapers, diffusers): There is a significantly increased amount of investment across the industry with a limited supply chain able to provide key materials such as filter media and scrapers.
- Structural failure of civil assets during refurbishment by uncovering unknown structural defects: It has only been possible to survey the external faces of some structures and some are buried. The full structural condition of the structures is unknown and may be worse than expected.
- Unknown asbestos on the sites (eg MCCs & cabling, insulation materials): Asbestos Refurbishment & Demolition surveys may not have been carried out on the assets.
- Ecology constraints: Wildlife presence, protected habitats, pollution risks during rehab.
- Biodiversity Net Gain: The purchase of new land may be required to install replacement assets.

236. Through a series of engagement sessions with key stakeholders, including asset and site managers, our Tactical Planning Team, Delivery, and PMO, we have developed a comprehensive Programme Delivery Plan (PDP) supported by an accompanying Risk Register. This collaborative process ensured that operational insight, delivery constraints, and programme dependencies are fully reflected. The PDP consolidates all 100 interventions into 19 deliverable work packages scheduled for completion by the end of AMP8, providing a clear, structured and manageable route for programme execution.

237. During visual inspections carried out by Atkins, a few sites were identified as requiring substantial demolition and full reconstruction. Given the scale and complexity of these works, we anticipate the need for close and sustained collaboration with the local authority throughout planning and delivery for projects requiring demolition and reconstruction.

238. Our PDP is structured into phased stages through to the end of AMP8 and slightly beyond, with each phase detailing the required design activities, resourcing, timelines and key milestones. These elements will be monitored in real time and aligned closely with our Risk Register to ensure effective control throughout delivery. The plan embeds robust communication, engagement, reporting and governance arrangements to maintain visibility and accountability across all stakeholders. In parallel, we have worked with our PMO colleagues to produce a detailed and comprehensive Risk Register that captures the full range of delivery, commercial, operational and external risks, along with corresponding mitigations. This register will be actively monitored to identify emerging issues early, enabling proactive intervention and preventing escalation. Within the PDP will be the requirement for an allowance for contingency to be incorporated within the detailed delivery schedule to accommodate the time impact of the risks that are identified within the risk register.

**6.4. STAKEHOLDER ENGAGEMENT**

239. We discuss our engagement with the EA in section 2.6. This will continue through the design and construction of replacement boreholes.

240. Stakeholder engagement is an ongoing activity that has continued seamlessly from the development of this business case and will remain integral throughout programme delivery. We will maintain regular, structured and timely engagement with all stakeholders to ensure the programme stays on track and that emerging issues or risks are identified and mitigated at the earliest opportunity. These communication and engagement requirements are fully embedded within our Programme Delivery Plan, providing a consistent and transparent framework for collaboration and decision making across the life of the programme.

241. During the design and planning phase, beginning with our largest assets, which require significant intervention including, in some cases, full demolition and reconstruction, we will engage proactively with local authorities and regulators to secure the necessary planning permissions and permits. Early engagement will enable us to identify requirements upfront, address concerns promptly, and reduce the risk of delays that could impact delivery timelines.

242. Where programme delivery may have an impact on customers, we will plan and issue communications proactively and in advance, ensuring that customers are informed early and understand what to expect. This approach will help minimise disruption, reduce the risk of complaints, and maintain trust throughout the delivery period.

**6.5. DELIVERY PROGRAMME**

243. An outline of delivery schedule is below, however, to note these dates are an indication and maybe subject to change. We provide a full delivery programme as Appendix 10.

**FIGURE 24 - OUTLINE DELIVERY SCHEDULE**

Stage	Timeline	Key activities
<b>1. Project initiation &amp; scoping</b>	<b>May 2026 – December 2026</b>	<ul style="list-style-type: none"> <li>• Define scope for refurbishment/replacement.</li> <li>• Finalise design brief, budget envelope, and delivery governance.</li> </ul>
<b>2. Detailed design &amp; surveys</b>	<b>December 2026 onwards</b>	<ul style="list-style-type: none"> <li>• Commission staggered structural asset surveys.</li> <li>• Workshops with structural engineers to firm-up scope.</li> <li>• Produce detailed designs, specifications, and method statements.</li> </ul>
<b>3. Procurement &amp; approvals</b>	<b>March 2027 onwards</b>	<ul style="list-style-type: none"> <li>• Procure equipment/supplies/mechanical components via framework suppliers.</li> <li>• Secure internal approvals, permits, and construction risk assessments.</li> </ul>

Stage	Timeline	Key activities
<b>4. Construction &amp; installation</b>	<b>March 2027 onwards</b>	<ul style="list-style-type: none"> <li>• Deliver refurbishment/replacement across programmes all enhancement programmes (trickling filters, settlement tanks).</li> <li>• Mechanical refurbishments and structural repairs.</li> <li>• Staged commissioning to maintain treatment continuity.</li> </ul>
<b>5. Testing, commissioning &amp; handover</b>	<b>Mar 2027 onwards (rolling)</b>	<ul style="list-style-type: none"> <li>• Wet/dry testing of pumping systems.</li> <li>• Verify trickling filter rotation and media performance.</li> <li>• Settlement tank flow/settlement checks.</li> <li>• Final handover and updates per package.</li> </ul>

244. To fully understand the scale and complexity of delivering a successful and achievable enhancement programme, we engaged extensively with our stakeholders to gather their expert insight and build a clear picture of the challenges ahead. Their input has been central in shaping both our understanding of asset condition and the feasibility of the interventions required.

245. Based on the civil asset surveys undertaken by Atkins (primarily visual assessments) between 2020-2023 we currently have 100 cases within the two priority groups classified as condition grade 4. Given the time elapsed since these inspections, combined with the natural rate of degradation highlighted in our asset risk and deterioration models, we anticipate that many of these assets are now in a worse condition than originally recorded.

246. Our ambition is to intervene and deliver most projects by the end of AMP8. Among the two priority asset groups, 100 cases were identified as condition grade 4 during the 2020–2023 survey cycle. Our risk assessment and deterioration modelling clearly indicate that these priority assets have continued to degrade since inspection. As a result, early and targeted intervention is now critical to prevent escalations that could significantly impact service delivery, with potential consequences for customers and the environment. We therefore plan to undertake and complete improvement works on these assets within the current AMP.

247. We set out our delivery plan in Figure 24. A summary of the current delivery schedule, subject to refinement once the delivery programme is finalised, outlined below:

- Undertake further assessment of the identified assets:  
 Conduct more detailed inspections of the 100 interventions included in this business case by the end of 2027, to gain a full understanding of their condition and to accurately define the scope of required interventions.
- Secure the necessary supplies, materials, and resources:  
 Confirm procurement pathways and ensure availability of specialist materials, equipment, internal and external resources to support timely delivery.

- Maintain continuous engagement with stakeholders and subject matter experts:  
Work closely with key stakeholders and SMEs throughout the programme to proactively identify, monitor, and mitigate risks at an early stage and ensure alignment across all delivery phases.
- Include an allowance for contingency within the detailed delivery schedule to accommodate the time impact of the risks that are identified within the risk register.

248. For two of our sites (Washington and Barkers Haugh) we expect to deliver improvements through LWE, and we expect these projects will last six years. These projects are larger and require more substantial planning.

## **7. ASSURANCE**

249. We have provided separate technical and commercial assurance report from our suitably qualified providers (the same providers as for our delivery plan and large scheme gated processes). These confirm that the proposed investment meets the requirement in the Ofwat guidance. We have no remaining red or amber issues.

**8. APPENDICES**

**Appendix A: Costs in 22/23 price base for each wastewater civils intervention**

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Aldin Grange Nth (Bearpark) STW	Trickling Filters	137,295	468,826	887,361	1.493	31 March 2030
Allenheads STW	Humus Tanks	42,000	79,079	177,260	0.298	31 March 2030
Bardon Mill STW	Trickling Filter	232,557	146,791	555,366	0.935	31 March 2030
Barkers Haugh STW	Secondary Trickling Filter No.1 and No.2	2,624,912	820,435	5,043,988	8.489	31 March 2033
Barkers Haugh STW	Tertiary Trickling Filter No. 1	45,000	820,435	1,266,997	2.132	31 March 2033
Barnard Castle STW	Primary Settlement Tank No.1	85,322	607,415	1,014,167	1.707	31 March 2030
Belmont STW	Primary Settlement Tank No.4	5,922	0	8,670	0.015	31 March 2030
Berwick Hill STW	Trickling Filter	236,529	99,761	492,328	0.829	31 March 2030
Berwick STW	Primary Settlement Tank Distribution Chamber	15,000	120,831	198,856	0.335	31 March 2030
Berwick STW	Primary Settlement Tank North East	128,446	120,831	364,941	0.614	31 March 2030
Berwick STW	Primary Settlement Tank South East	128,446	120,831	364,941	0.614	31 March 2030
Berwick STW	Primary Settlement Tank South West	128,446	120,831	364,941	0.614	31 March 2030
Birtley STW	Primary Settlement Tank Distribution Chamber	49,207	170,435	321,555	0.541	31 March 2030
Birtley STW	Trickling Filters No.3 and No.4	51,595	170,435	325,051	0.547	31 March 2030
Birtley STW	Primary Settlement Tank No.1, No.2, No.3, and No.4	318,813	170,435	716,258	1.206	31 March 2030

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Birtley STW	Secondary Trickling Filters No.5, No.6, No.7, No.8, No.9, and No.10	996,995	170,435	1,709,117	2.877	31 March 2030
Bishop Middleham STW	Secondary Trickling Media Filter No.1	7,500	160,514	245,972	0.414	31 March 2030
Bishop Middleham STW	Secondary Trickling Media Filter No.2	7,500	160,514	245,972	0.414	31 March 2030
Bishop Middleham STW	Primary Settlement Tank	17,381	160,514	260,439	0.438	31 March 2030
Butteryhaugh STW	Secondary Trickling Filter No1. and No.2	82,500	146,791	335,683	0.565	31 March 2030
Carlton & Redmarshall STW	Secondary Trickling Filter No.1, No.2 and No.3	199,925	652,099	1,247,364	2.099	31 March 2030
Coalburns STW	Primary Settlement Tanks	50,815	79,079	190,164	0.320	31 March 2030
Cockfield STW	Primary Settlement Tank No.1	12,276	0	17,972	0.030	31 March 2030
Cockfield STW	Primary Settlement Tank No.2	12,276	0	17,972	0.030	31 March 2030
Consett STW	Siphon distribution chamber No.1	33,803	87,485	177,565	0.299	31 March 2030
Consett STW	Siphon distribution chamber No.2	43,803	87,485	192,205	0.323	31 March 2030
Consett STW	Primary Settlement Tank No.1	20,588	87,485	158,218	0.266	31 March 2030
Consett STW	Primary Settlement Tank No.2	20,588	87,485	158,218	0.266	31 March 2030
East Gate STW	Secondary Trickling Filter	50,437	99,761	219,890	0.370	31 March 2030
EAST TANFIELD STW	Trickling filters 1,2,3 and 4	637,251	581,050	1,783,592	3.002	31 March 2030
East Woodburn STW	Covered Primary Settlement Tank	57,941	79,079	200,598	0.338	31 March 2030
Eggleston STW	Primary Settlement Tank	10,163	96,557	156,238	0.263	31 March 2030

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Embleton STW	Primary Settlement Tank	8,946	349,938	525,406	0.884	31 March 2030
Falstone STW	Humus Tank	11,660	39,540	74,956	0.126	31 March 2030
Falstone STW	Primary Settlement Tank	13,660	39,540	77,884	0.131	31 March 2030
Frosterley STW	Secondary Trickling Filter	20,181	468,826	715,906	1.205	31 March 2030
Gainford STW	Primary Settlement Tank No.1	9,598	115,606	183,298	0.309	31 March 2030
Gainford STW	Primary Settlement Tank No.2	15,824	115,606	192,414	0.324	31 March 2030
Gainford STW	Secondary Trickling Filter No.1	98,803	115,606	313,894	0.528	31 March 2030
Gainford STW	Secondary Trickling Filter No.2	98,803	115,606	313,894	0.528	31 March 2030
Great Ayton STW	Secondary Trickling Filter (Northern)	691,585	0	1,012,480	1.704	31 March 2030
Greatham STW	Primary Settlement Tank No.1	6,146	161,107	244,858	0.412	31 March 2030
Greatham STW	Primary Settlement Tank No.2	18,424	161,107	262,834	0.442	31 March 2030
Greatham STW		13,606	161,107	255,780	0.430	31 March 2030
Gunnerton STW	Humus Tank	20,990	79,079	146,500	0.247	31 March 2030
Heddon Hall STW	Primary Settlement Tank	10,323	79,079	130,885	0.220	31 March 2030
Hedleyhope Colliery STW	Trickling Media Filter	67,082	79,079	213,979	0.360	31 March 2030
Heugh Hall STW	Primary Settlement Tank and Sludge Chamber	42,815	39,540	120,566	0.203	31 March 2030
Heugh Hall STW	Syphon Chamber	20,047	39,540	87,235	0.147	31 March 2030
Hunstanworth STW	Secondary Trickling Filter	55,000	99,761	226,570	0.381	31 March 2030
Hurbuck Cottages STW	Primary Settlement Tank	48,041	99,761	216,382	0.364	31 March 2030

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Hutton Rudby STW	Primary Settlement Tank No.1 and No.2	73,688	174,969	364,034	0.613	31 March 2030
Hutton Rudby STW	Secondary Trickling Filter Distribution Chamber	12,565	174,969	274,549	0.462	31 March 2030
Ingoe STW	Secondary Trickling Filter	37,815	49,881	128,386	0.216	31 March 2030
Ingoe STW	Inlet and Primary Settlement Tank	30,841	49,881	118,176	0.199	31 March 2030
Juniper STW	Primary Settlement Tank	222,804	99,761	472,235	0.795	31 March 2030
Langley STW	Secondary Trickling Filter	127,710	99,761	333,019	0.560	31 March 2030
Leamside (West Rainton) STW	Secondary Trickling filter No. 1	212,645	295,721	744,247	1.253	31 March 2030
Leamside (West Rainton) STW	Secondary Trickling filter No. 2	212,645	295,721	744,247	1.253	31 March 2030
Longbyre STW	Secondary Trickling Filter	28,168	99,761	187,288	0.315	31 March 2030
Low Wadsworth STW	Secondary Trickling Filter No.1 to No.4 Siphon Chamber	21,809	349,938	544,239	0.916	31 March 2030
Low Worsall STW	Distribution Chamber	10,647	26,656	54,612	0.092	31 March 2030
Low Worsall STW	Primary Settlement Tank No.1	10,590	26,656	54,527	0.092	31 March 2030
Low Worsall STW	Secondary Trickling Filter No.1	12,112	26,656	56,756	0.096	31 March 2030
Low Worsall STW	Secondary Trickling Filter No.2	24,913	26,656	75,497	0.127	31 March 2030
Lynemouth STW	Primary Settlement Tank No.1	10,670	0	15,621	0.026	31 March 2030
Manfield STW	Copasac and Siphon Chamber	48,041	79,079	186,103	0.313	31 March 2030
Melkridge STW	Secondary Trickling Filter	66,082	49,881	169,769	0.286	31 March 2030

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Melkridge STW	Inlet Chamber and Primary Settlement Tank	33,041	49,881	121,397	0.204	31 March 2030
Milbourne STW	Primary Settlement Tank	58,041	79,079	200,743	0.338	31 March 2030
Mitford STW	Secondary Trickling Filter	46,760	99,761	214,508	0.361	31 March 2030
Mordon STW	Secondary Trickling Filter	32,480	99,761	193,601	0.326	31 March 2030
Newton under Roseberry STW	Secondary Trickling Filter	120,291	99,761	322,157	0.542	31 March 2030
Picton STW	Secondary Trickling Filter	29,448	99,761	189,162	0.318	31 March 2030
Quarry House Lane STW	Secondary Trickling Filter Chamber	35,291	79,079	167,437	0.282	31 March 2030
Ramshaw STW	Primary Settlement Tank No.1	19,857	290,525	454,399	0.765	31 March 2030
Ramshaw STW	Secondary Trickling Filter No.2	130,497	290,525	616,377	1.037	31 March 2030
Rookhope STW	Secondary Trickling Filter	97,802	146,791	358,085	0.603	31 March 2030
Sadberge STW	Secondary Trickling Filters	159,573	581,050	1,084,272	1.825	31 March 2030
Scots Gap STW	Secondary Trickling Filter No.1 and No.2	60,509	136,400	288,275	0.485	31 March 2030
Sedgeleth STW	Primary Settlement Tanks No.1, No.2, No.3, and No.4	224,759	0	329,047	0.554	31 March 2030
Sheraton STW	Syphon Chamber	41,815	79,079	176,988	0.298	31 March 2030
South Cleatlam STW	Secondary Trickling Filter	46,857	99,761	214,649	0.361	31 March 2030
Stamfordham STW	Secondary Trickling Filter No.1 and No.2	90,692	81,533	252,137	0.424	31 March 2030
Stonehaugh STW	Primary Settlement Tank No.1 and No.2	9,486	79,079	129,659	0.218	31 March 2030

Site Name	Assets	Civils Cost (£)	Enabling Cost (£)	Indirect Costs + Risk and EU (£)	Total capex and PCD non-delivery rate (£m)	Completion date
Tow Law STW	Secondary Trickling Media Filter No.2	292,428	206,134	729,894	1.228	31 March 2030
Tow Law STW	Filter Feed Siphon Chamber	58,441	206,134	387,338	0.652	31 March 2030
Tow Law STW	Primary Settlement Tank No.1	20,055	206,134	331,140	0.557	31 March 2030
Trimdon STW	Secondary Trickling Filter No.3	9,023	306,246	461,553	0.777	31 March 2030
Trimdon STW	Trickling filter distribution chamber	9,172	306,246	461,772	0.777	31 March 2030
Wark on Tyne STW	Inlet and Primary Settlement Tank Distribution Chamber	20,740	130,856	221,936	0.374	31 March 2030
Wark STW	Inlet Works and Primary Settlement Tank	180,025	99,761	409,607	0.689	31 March 2030
Washington STW	Primary Settlement Tank No.1, No.2, No.3, and No.4	5,308,133	0	7,771,107	13.079	31 March 2033
Wear Valley Junction STW	Secondary Trickling Filter	33,291	99,761	194,788	0.328	31 March 2030
Western Area STW	Secondary Trickling Filter No.1	501,797	591,441	1,600,501	2.694	31 March 2030
Whiteadder STW	Secondary Trickling Filter	70,329	79,079	218,734	0.368	31 March 2030
Whittingham STW	Secondary Trickling Filter	10,281	56,848	98,277	0.165	31 March 2030
Willington STW	Distribution Chamber for Secondary Trickling Filter No.1, No.2, No.3, and No.4	87,491	193,683	411,639	0.693	31 March 2030
Willington STW	Primary Settlement Tank No.1 and No.2	363,722	193,683	816,042	1.373	31 March 2030
Willington STW	Secondary Trickling Filters No.7 and No.8	168,211	193,683	529,813	0.892	31 March 2030

Note: the combination of site name and assets should be the unique identified for this list. We note that the PCD is to return the specified assets to Condition Grade 1-3 in each case.

**Appendix 1 - NWL Workload and Expenditure Analysis Settlement Tanks.pdf**

**Appendix 2 - NWL Workload and Expenditure Analysis Trickling Filters.pdf**

**Appendix 3 - NWL Post CMA Hearing Databook.xlsx**

**Appendix 3 - NWL Post CMA Hearing Submission.pdf**

**Appendix 4 - NWL Statement of Change Appendix 2 Overview and Key Evidence - Asset Health Investment Case for Civil Structures and Service Reservoirs.pdf**

**Appendix 5 - NWL Full List of Civil Investments.xlsx**

**Appendix 6 - NWL Hexham WWTW Refurbishment Project STW Biological Filter Distribution Chamber.pdf**

**Appendix 7 - Aldin Grange Atkins Survey Report.pdf**

**Appendix 8 - NWL Asset Health Reopener Enabling Costs.xlsx**

**Appendix 9 - NWL Civil Assets Delivery Risk Register.xlsx**

**Appendix 10 - Delivery Programme -Asset Health Investment Case - Civil Assets.pdf**

**Appendix 11 - Asset Group Strategy - Settlement Tanks.pdf**

**Appendix 12 - Asset Group Strategy - Trickling Filters.pdf**

**Appendix 13 - NWL Civil Assets Risk Analysis.docx**

**Appendix 14 - NWL Historic Workload and Expenditure Analysis.pdf**