Yorkshire Water PR24 Cost Change Submission Asset Health – Boreholes - REDACTED

[Content in this document has been redacted due to it containing commercially sensitive information.]

Contents

1. Submission Context and Scope

1.1 Regulatory and PR24 context

Successive price reviews and their associated incentive regimes have driven service improvements and reduced costs in the sector, to the benefit of customers. Within the available final determination Totex constraints, we seek to maximise the service benefits for our customers within each AMP period. However, this may require us to place greater reliance on reactive interventions and increased Opex, rather than proactive replacement or refurbishment of long-life assets, which may not arrest their underlying deterioration. The current regulatory economic model challenges water companies to balance the tension between efficiency and affordability within a price control period to provide long-term value, which is not a simple task for regulator or regulated company. The current framework for determining Base allowances is underpinned by top-down econometric benchmarking built on historical expenditure, which, therefore, 'bakes in' any previous underinvestment within future funding models[1]. A limitation of using historical spend as a proxy for future efficient allowances is that major, targeted Base investment programmes can often be deprioritised or deferred due to the finite nature of the funding available. It is important therefore that particular choices, appropriate at a point in time, do not become part of the econometric baselines and regulatory price setting in such a way that steers the industry down a sub-optimal route that requires future customers to pick up an unfair share of the costs to rectify that position.

Asset condition will tend to deteriorate over time, and with our complex asset base, this is not a uniform, linear trend. Most assets in the water industry have relatively long operational lifespans, and maintaining their resilience often requires investment in the form of routine or regular maintenance or replacement; to get assets to their useful life or renew expended useful life respectively. Within an efficient whole-life cost approach to asset management, there will be periods when that deterioration in condition can be managed effectively through more reactive and operational responses. However, there will come a phase in the asset lifecycle, where it becomes more efficient to replace or refurbish those assets to minimise whole-life cost and reduce risk to service. In the context of increasing future service expectations and more stretching performance targets, the need for that transition will tend to be brought forward in time as the value of those future service improvements increases. This transition is not sharply delineated and, in truth, is part of a continuum, but when considering particular groups of assets, such as those included in this claim, it becomes clear that the transition is now occurring and a step change in investment is needed.

We have operated a risk-based asset management approach for over 20 years, which has helped keep costs for customers low, and targeted our investment to meet the cost and performance challenges set by the regulator. This mature asset management system is ISO55001 certified and ensures all our processes and activities continue to deliver strategic outcomes, with sustainability and the improved health of our assets considered as part of that decision making. This is stated within our Asset Management Policy[2]. However, our asset management processes have identified a growing misalignment between our need for investment in long-term sustainable asset health and the Totex and performance expectations allowed for in the five-yearly price review process.

1.2 Company strategy alignment

We have a vision for a thriving Yorkshire, which is right for customers and right for the environment. This vision is not new; it is central to our purpose as an organisation, and our strategy provides the framework that will enable us to achieve it. Across our region we manage a varied asset base, of which improving the condition and performance of these assets is a

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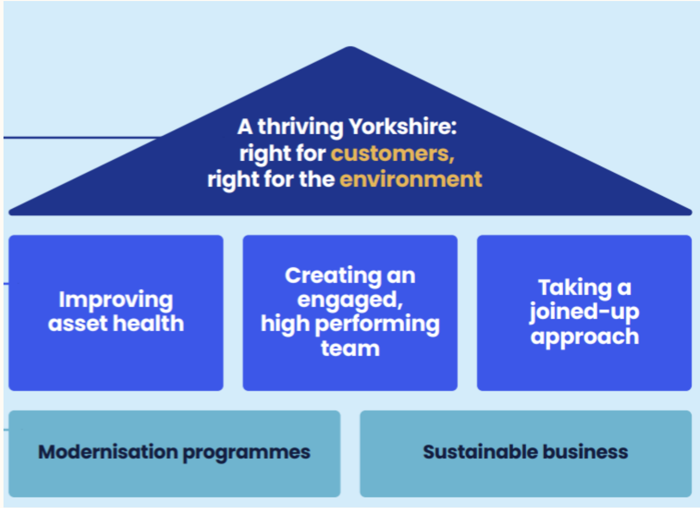
[1] *ISSUES WITH OFWAT's APPROACH TO BASE COSTS ASSESSMENT (Economic Insight, 2024)*

[2] *Yorkshire Water Asset Management Policy*

key strategic pillar for delivering our vision. The inclusion of '*Improving asset health*' as a key activity within our strategy demonstrates our commitment to long-term investment decision-making and effective asset management[3].

Figure 1: Yorkshire Water company strategy



To deliver our vision of a thriving Yorkshire, right for customers and right for the environment, we're committed to maximising the lifespan of our assets, necessitating a long-term approach to investment for the reliable service delivery and continuous performance improvement we w ant. As part of maximising our assets, we use data and insight to inform proactive maintenance, day-to-day operational decision-making and align strategic priorities.

1.3 Cost change process route (standard or extended)

This investment proposal for the **boreholes** priority asset class is being submitted through the standard cost change process route, in line with Ofwat's Asset Health Investment Assessment Guidance.

The submission therefore constitutes a single, full investment proposal, providing sufficient and convincing evidence across all assessment gates, including: the need for a step change in investment, selection of the best option for customers, demonstration of robust and efficient costs, customer protection arrangements, and a balanced investment delivery plan (route 1 'Standard - single main submission' as per the cost change guidance[4]).

This submission is intended to trigger the cost change process in the 2026 submission window, with a view to securing additional allowances for an end of period adjustment in accordance with Ofwat's published timelines and decision-making process.

1.4 Priority asset class definition and scope inclusions/exclusions

Boreholes are groundwater abstraction assets comprising the bore structure, lining, screens and associated headworks necessary to maintain sustainable abstraction capability. The scope of this submission focuses on capital maintenance interventions required to address deterioration in borehole condition and associated risks to long-term supply resilience.

[3] *Our strategy & vision (Yorkshire Water website)*

[4] *pg7 PR24 Cost change process: Asset health investment assessment guidance (Ofwat)*

This submission focuses on the asset health of borehole abstraction assets only, such as the bore structure, lining, screens, and headworks (as per Binnie's condition methodology 'list of components'[5]); treatment assets are considered separately under other regulations and are not a sub-process that informs the asset health of this asset group. Therefore, groundwater treatment processes at some Yorkshire Water borehole sites are excluded from this asset health assessment and cost change submission. This ensures the submission targets capital maintenance for boreholes without overlapping with treatment process investment.

This investment case focuses on major refurbishment and/or replacement interventions as the main types of investment to implement improved asset health.

The claim does not include for provision of new capacity as that would fall under supply enhancement investment driver.

1.5 Interfaces with other investment drivers

There is no direct overlap between the asset health risks identified as part of this submission and other enhancement investment drivers.

At PR24 we are investing in our borehole asset stock under Water Industry National Environment Programme (WINEP), Water Resource Management Plan (WRMP) and water quality enhancement drivers:

- WINEP: Catchment investment protecting sources from nitrate contamination.
- WRMP: Increasing deployable output to sustain supply-demand balance.
- Water quality[6]: Enhancing [redacted] boreholes treatment processes to ensure compliance via raw water management, blending, or improved treatment due to raw water deterioration.

Content is redacted due to it containing commercially sensitive information.

We identify and discuss some committed AMP8 Base investment in the borehole asset group later in this submission (***3.1 Overview of AMP8 capital maintenance plan for the asset class***), addressing how we intend to use existing allowances in alignment with the Cost Change process: Asset health investment assessment guidance[7].

[5] *pg4 Methodology – Boreholes: Asset Health Condition Data Collection*

[6] *YKY29_Water Quality Improvements Enhancement Case*

[7] *pg23 PR24 Cost change process: Asset health investment assessment guidance (Ofwat)*

2. Need for a Step Change in Investment

This section details the need for a Base expenditure adjustment to address our borehole asset health concerns and the pressing need to move towards a higher renewal rate than in the recent past. We include evidence as to why an increased rate of capital intervention is required to address the growing challenges associated with deteriorating asset health. And demonstrate how this business case meets Ofwat's core evidential requirements:

- Evidence of historical investment
- Identification of risks posed to service or the environment
- Forecast of future asset health
- Evidence of alignment to long-term asset class strategies

2.1 Historical expenditure and workload analysis

We have compiled workload and expenditure information as part of the sector-wide data submission. We have invested £ million (22/23 CPIH) in Base maintenance of boreholes over the period 2015-2025.

Table 1 – Boreholes expenditure AMP6 & AMP7

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Figure 2 -Borehole and Adit expenditure 2015-2025 (22/23 CPIH)

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Table 1 shows that there has been an increase in expenditure on repair and replacements interventions for boreholes from AMP6 to AMP7, but a decrease can be seen in refurbishment and other spending. A further breakdown of this expenditure is shown in **Figure 1**, from the beginning of AMP6 in 2015-16 to the end of AMP7 in 2024-25. The repair expenditure shows a steady trend over the period.

Figure 2 also shows the peaks in refurbishment and replacement spending on borehole assets, which can be attributed to schemes carried out at specific sites. The Springhead Roof scheme accounts for the increased replacement and refurbishment spending in 2015-17, with an additional replacement scheme: Malton Norton BHS & WTW scheme, contributing to the increased replacement expenditure in 2024-2025. Other expenditure covers the additional work, which is not directly related to improving asset health, such as facilitating inspections, regulation compliance and the decommissioning of assets.

Table 2 below shows the workload data across the same period. This shows that there is a drop in workload for repairs and other interventions from 2022-23. It can also be seen that there is a small volume of workload for refurbishment and replacement interventions, which correlates with the increase in expenditure related to the aforementioned schemes.

Table 2 - Borehole workload per year (2015-2025)

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2.2 Industry-wide workload and expenditure data

Figure 3 and **Figure 4** below show the industry-wide capital maintenance expenditure activity for refurbishments and replacements. There is a substantial variance, with a minority of companies showing very high levels of investment (compared to the wider industry), however, the majority display similar levels, with Yorkshire Water positioned within the middle of the industry range. It is important to note that we are unable to assess the spend per asset count across the industry as we do not hold this data. This may skew the figures as companies with greater expenditure may simply have a higher proportion of assets and vice versa. Yorkshire Water are however around the middle of the industry range in terms of costs per refurb/repair. This doesn't reflect the extent of any works undertaken but does provide a metric for comparison.

The workload and expenditure data is a snapshot in time and therefore does not reflect investment in the AMPs before 2015, or projected current and future investment profiles, which is covered under ***3.1 Overview of AMP8 capital maintenance plan for the asset class*** and ***3.2 Expected sustainable level of intervention*** respectively.

Figure 3 - Refurbishment Capex total per water company, OFWAT cost share data (nominal prices)

Content is redacted due to it containing commercially sensitive information

Figure 4 – Replacement Capex total per water company, OFWAT cost share data (nominal prices)

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Interpretation of the variance shown in refurbishment and replacement costs across companies (**Figure 3** and **Figure 4**) suggests that companies have undertaken markedly different amounts of intervention across their boreholes asset base. The differences represented are dependent on each company's asset base size, complexity and age amongst other asset health impacting factors (such as aquifer type), as well as being influenced by a company's prioritisation approach to Base maintenance and risk appetite. Variance may also arise from, as previously mentioned, how companies may be interpreting ‘less defined areas’ in the workload definitions leading to data that is not directly comparable across the sector. We have expressed concerns on the uncertainty of the data and its use in absolute terms (as per our response to query OFW-YKY-WLE-002). In realising our own limitations in compiling the Capex data, we highlighted there could be varying degrees of assumptions and approaches in retrieving the data. Therefore, there is inherent risk of incorrect inclusion and/or exclusion of workload and expenditure data dependent on each company’s specific reporting approach.

2.3 Historical asset health trends

Ofwat’s historic Base cost models do not explicitly account for major capital interventions on groundwater sources. The models assume that routine maintenance is sufficient to sustain borehole performance, but this does not reflect the nature of groundwater asset deterioration.

Major borehole interventions such as full redevelopment, structural refurbishment, pump and column replacement, or drilling new replacement boreholes involve costs well beyond those captured in Base allowances. Because the deterioration mechanisms vary by geology and abstraction history, these costs are company-specific and outside modelled industry averages.

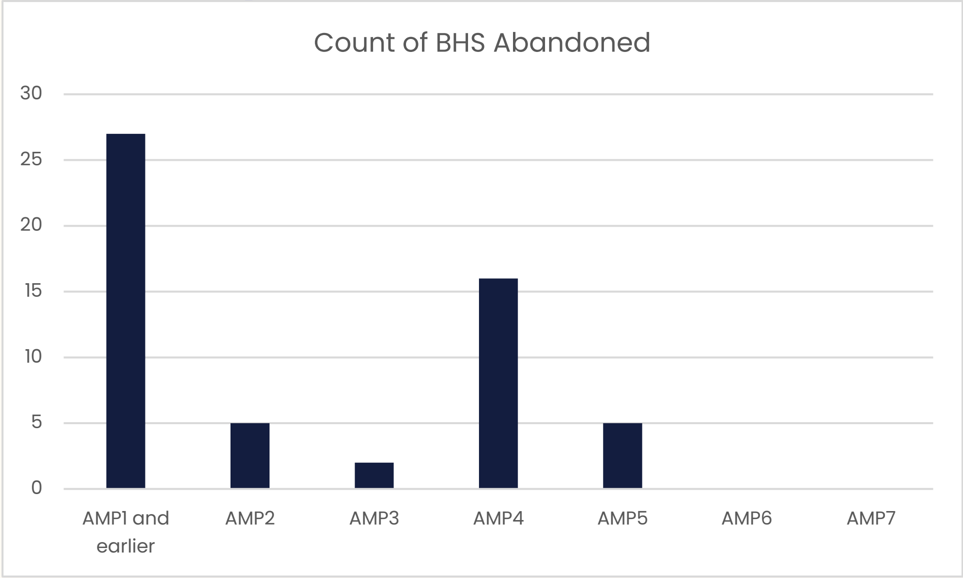
Constraints on historic Totex allowances have led to companies becoming more reliant on a short-term approach of reactive interventions rather than proactive replacement or refurbishment of long-life assets.

Borehole lifespan is typically a minimum of 40 years but as they are generally reliable assets and will continue to produce water in excess of that lifespan, this has meant that funding is frequently deferred to higher priority assets.

Over 60% of our borehole assets are in excess of 40 years old. 51% of these are graded as either condition grade 4 or 5. Without investment there will be an increased risk to service through more frequent failures, coupled with increasing operating expenditure. Continuing with current rates of renewal, we would see the average age of our asset stock grow and the proportion of boreholes where age exceeds the maximum expected asset life grow significantly.

Historically, during prior Asset Management Periods (AMPs), we opted to decommission borehole assets instead of allocating resources to repair or replace. **Figure 5** illustrates the number of boreholes that were abandoned over time; notably, AMPs 4 and 5 saw the abandonment of 21 boreholes. This action was justified as adequate supply resilience permitted tolerating a reduction in yield at that time. In contrast, no boreholes were abandoned during AMPs 6 and 7, and all feasible measures were employed to maintain asset operability. The decision not to abandon boreholes in AMPs 6 and 7 stemmed from a recognition that supply resilience had diminished. This highlights the increasing necessity to safeguard our current supply sources through targeted investment.

Figure 5 - Count of boreholes abandoned over time



2.4 Current asset health position

Yorkshire Water relies heavily on a network of boreholes to supply its groundwater. Many of these boreholes were built decades ago and have reached a stage of their asset life where intervention is required to ensure consistent performance, protect water quality, and meet abstraction licence requirements.

Monitoring and inspections have revealed that some boreholes are deteriorating beyond the point where routine maintenance can solve issues. This has been observed through the following presenting evidence:

- Yields are dropping because screens are blocked by iron and manganese deposits, limiting drawdown.
- Pumps and risers are corroding, leading to inefficiency, higher energy consumption, and the risk of pump failure.
- Casing or headworks are degrading, which increases the risk of contamination and regulatory water quality breaches.
- Some ageing boreholes are no longer operating efficiently, potentially affecting nearby sources or causing aquifer instability.
- Rising turbidity and the presence of bacteria point to structural issues that may require redevelopment or replacement.

These problems, all caused by asset condition, undermine system resilience, lead to more frequent outages, and pose a greater threat of supply shortfalls during periods of high demand or dry weather.

2.4.1 Condition grade assessment

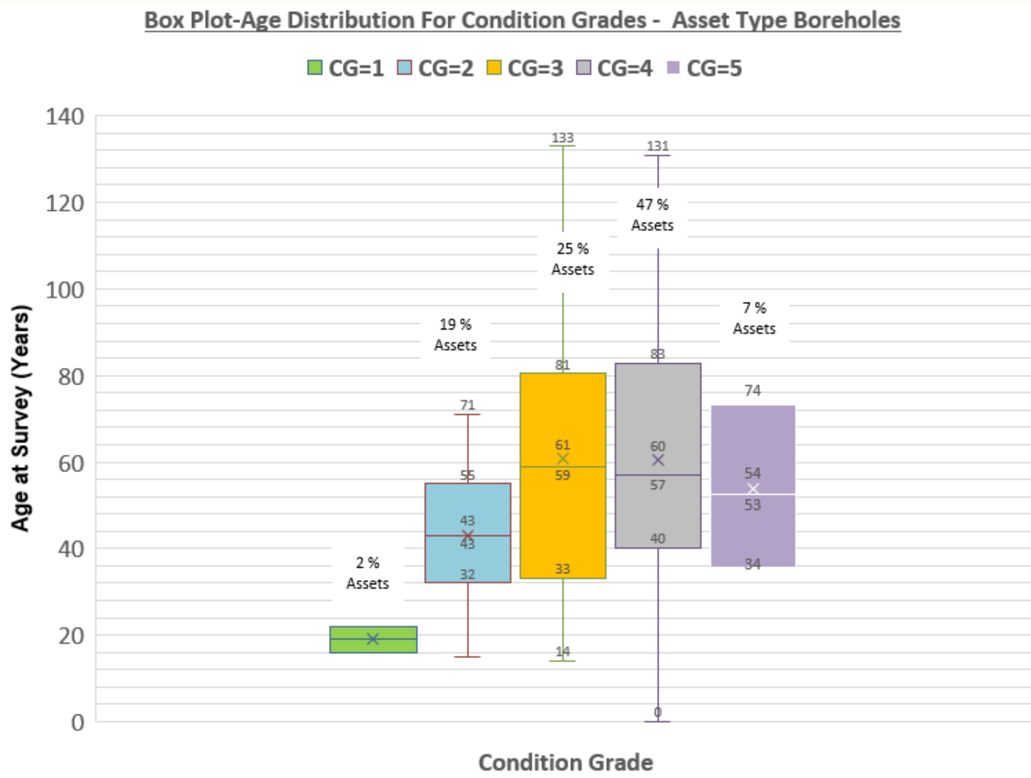
It is not solely age that determines the useful life of an asset once constructed, factors such as quality of construction, loading rates and environment also affect asset life. The basic metrics for quantifying current asset health are age qualified by condition grade. The box plot in **Figure 6** below shows the summary statistics for the age of all boreholes according to condition grade; the age being the age at last survey.

A statistical chart known as a 'Box Plot' summarises the upper and lower quartiles, median, average and outliers of a data set. The height of the box shows the data range for the central

50% of the data, whilst the 'x' and horizontal line mark the mean and median averages respectively. Note that the box plot does not scale the boxes according to asset count (the asset count is represented in Table 3).

The borehole box plot shows considerable overlaps in age between condition grades confirming that a borehole's longevity is significantly affected by local factors other than age.

Figure 6: Boreholes - asset age distribution for condition grades - box plot



2.4.2 Existing asset stock valuation – by Gross Modern Equivalent Asset Value (GMEAV), age and condition: boreholes (shaft)

Yorkshire Water values its civils and mechanical and electrical assets using cost models embedded in their deterioration modelling software NITRO. Figure 7 and Table 3 show the average age and valuations of our existing operational stock of borehole shaft; the peak of investment was 1960 to 1980 during which 37% by value of our existing asset stock was constructed.

33% by value of our asset base was constructed at or before 1950 and so in theory has a minimum age of 76 years. There are 27 boreholes with an average age of 99 years which are still operational.

This asset profile confirms that boreholes are a long lived and robust asset group that has historically required relatively low levels of replacement. However, the asset profile shows a significant proportion of shafts at condition grade 4 and 5 which are likely to be facing end of asset life over the next few AMPs; this will require a step change in investment policy and Base allocations.

Figure 7 - GMEA Value and count of borehole shaft by installation year and condition grade

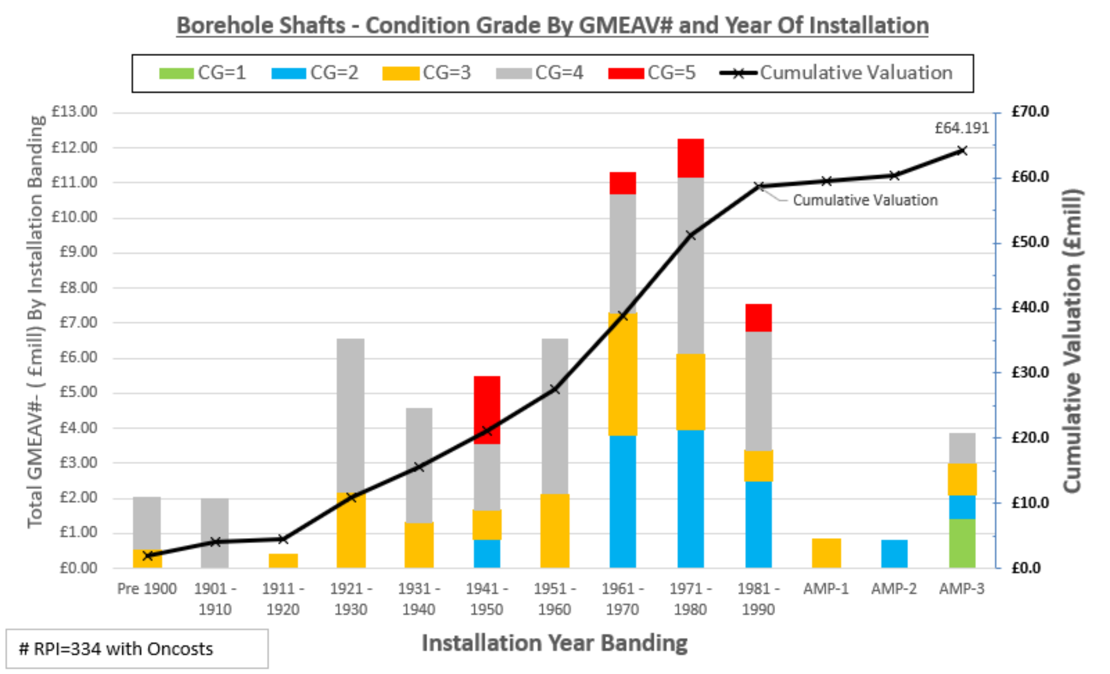


Table 3 - Age and GMEA Valuation of existing boreholes

Installation Year Band	Age Count as of 2026	Total Replacement Value £mill)	% Of No of BHS	% OF Total Value	Cumulative % of Value
Pre 1900	4	£1.995	5%	3.1%	3%
1901 - 1910	2	£1.995	3%	3.1%	6%
1911 - 1920	1	£0.397	1%	0.6%	7%
1921 - 1930	6	£6.541	8%	10.2%	17%
1931 - 1940	7	£4.578	9%	7.1%	24%
1941 - 1950	7	£5.503	9%	8.6%	33%
1951 - 1960	8	£6.550	10%	10.2%	43%
1961 - 1970	12	£11.309	15%	17.6%	61%
1971 - 1980	15	£12.240	19%	19.1%	80%
1981 - 1990	9	£7.538	12%	11.7%	91%
AMP-1	1	£0.822	1%	1.3%	93%
AMP-2	1	£0.830	1%	1.3%	94%
AMP-3	5	£3.863	6%	6.0%	100%
Grand Total		£64.191			

2.5 Current risk to service and the environment

Our boreholes are essential to the consistent delivery of water across multiple supply zones; however, the declining condition of these assets is increasingly impacting operational performance, resilience, and risk management.

A significant number of our boreholes were constructed several decades ago and are now subject to natural aging and deterioration. Common issues include ingress of poor water quality, declining yields, corrosion of pumps and risers, casing deterioration, and heightened turbidity levels. These challenges have led to a range of operational impacts:

- **Reduced Deployable Output:** Yield losses from critical boreholes have decreased available groundwater resources, placing additional strain on alternative sources and narrowing operational margins—especially during periods of peak demand or dry weather.
- **Increased Unplanned Outages:** Asset degradation has resulted in more frequent failures of pumps, column pipes, and structural elements, necessitating reactive maintenance and causing production interruptions.
- **Elevated Water Quality Risks:** Increases in turbidity, mobilisation of iron and manganese, and occasional bacteriological detections have required intensified monitoring, corrective measures, or temporary withdrawal of sources, thereby disrupting operational stability.
- **Rising Operating Costs:** Diminished borehole efficiency has led to higher energy use and increased operational complexity, including repeated chemical treatments, and deployment of emergency pumping systems.
- **Heightened Supply Risk in Smaller Groundwater Zones:** Limited redundancy in some borehole-fed areas means asset failure can immediately compromise local supply resilience and elevate the risk of service disruption.

Despite ongoing optimisation and routine maintenance, asset condition continues to decline, and operational interventions alone are insufficient to reverse this trend. Without targeted investment in repair, refurbishment, or replacement, we anticipate continued decreases in reliability, escalating costs, and greater performance risk throughout the groundwater asset base.

2.6 Asset health and deterioration analysis

Asset deterioration modelling helps us understand how the condition of our existing asset base is expected to change over time and aids in medium- to long-term investment planning decisions. Yorkshire Water's models are a risk-based process for determining future investment needs using a standardised and repeatable corporate risk methodology, incorporating best practice and 'Greenbook' approaches, e.g. Spackman whole-life cost approach and monetisation of benefits. We have been undertaking asset deterioration modelling since PR04 (post MD161) and have undergone many transformations over time as understanding of risk, approaches and data availability has increased. The latest large-scale review of our models was done circa 2017 as part of our Decision Making Framework (DMF) development (with AECOM). Another lighter touch review was completed by our strategic planning partner, Stantec, in 2021.

We use a suite of deterioration models, split into NITRO and IDET (non-infra and infrastructure models respectively) to estimate the likelihood of asset failure, assess the potential impact on service levels using the Service Measure Framework (SMF), and identify appropriate mitigation options by considering optimal proactive and reactive interventions given defined service or cost constraints.

We continually develop, update, and refine our asset models by collecting and analysing current data from our asset inventory and work management systems. The models offer a full-scale view of the investment required to address the total level of risk within the asset base. This is based on assumed deterioration rates, acknowledging that not all assets predicted to fail will do so, though their condition will deteriorate over time. Asset models do not identify exactly which assets will fail at a specific point in the next AMP; instead, they highlight where risk exists, and the level of investment required should those risks materialise.

The Non-Infra deterioration model uses the two parameter Weibull (shape and scale) for the majority of borehole equipment types to calculate reliability and associated mean time to failure; a feature of the model is that it considers age and condition with the adoption of an effective age to generate a condition adjusted reliability. A mean time to failure of less than or equal to one in any timestep would trigger asset replacement to prevent the asset being out of service and the associated resultant service failure.

In respect of the physical borehole, as these are long lived assets and utilise a three parameter Weibull, it is not possible to generate a condition adjusted effective age due to the high location parameter and thus use of the actual age for these assets may cause extended lives beyond that which is considered typical. It should also be noted that a borehole may still be in service beyond the end of its typical life and the model would consider this asset to be in a serviceable state at the start of the modelling period. Due to these complications, it was decided to consider replacement needs based upon known age of the boreholes rather than using the modelled variable of mean time to failure to trigger asset replacement.

In a report produced by AECOM, by using the commission dates and relevant dates of abandonment they were able to produce an estimated typical life of the borehole shaft which also took into consideration the aquifer type the borehole is abstracting from (see **Table 4**). **Figure 8** shows the proportion of our operational boreholes in the respective aquifer type.

Table 4 - AECOM Summary of MTTF based on aquifer type

Short Code	Aquifer Strata	Typical Life (Yr)
BHS_AQ1	Carboniferous Limestone, Coal Measures, Millstone Grit	44.36
BHS_AQ2	Chalk	95.35
BHS_AQ3	Corallian, Magnesian Limestone	66.99
BHS_AQ4	Sherwood Sandstone	57.43

Figure 8 - % of operational boreholes in aquifer types

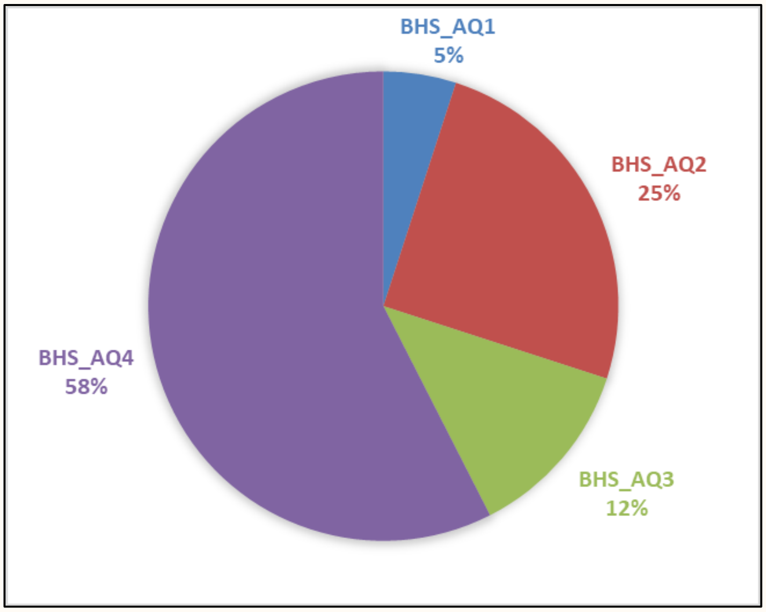
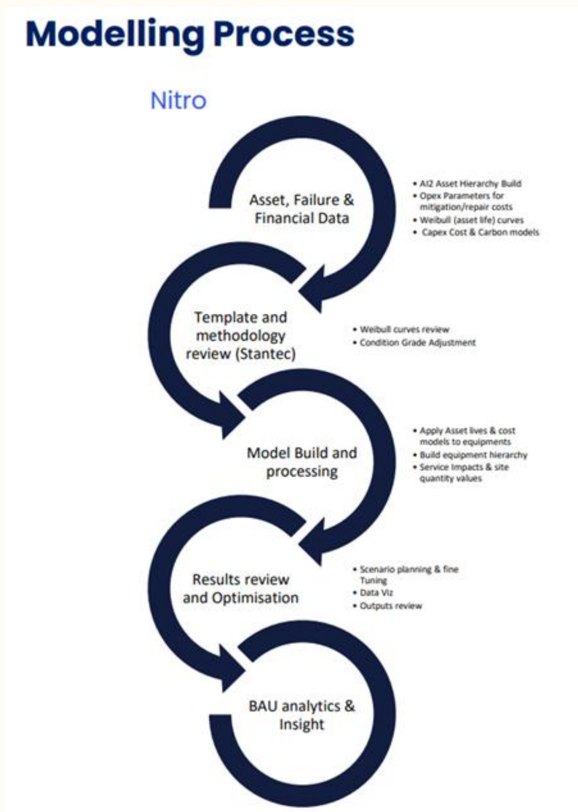


Figure 9 – Overview of our asset deterioration modelling process - NITRO



2.7 Forecast future analysis

By applying the typical asset life for each borehole against its aquifer type (as outlined in ***2.6 Asset health and deterioration analysis***)***,*** we are able to determine AMP periods for each borehole where replacement is expected to be due, as shown in **Figure 10**. The condition of the asset along with a multitude of other factors may lead to a deviation from the below but provides a meaningful metric. Pre-AMP1 and AMP9 present spikes in the data, whilst **Figure 11** highlights circa 45% of the boreholes are due for replacement by the end of AMP8, when applying the typical asset life values as detailed in ***2.6 Asset health and deterioration analysis***.

Yorkshire Water is forecast to deliver a minimum of five replacement or refurbishment schemes during AMP8 from existing Base expenditure (as detailed in Section ***3.1 Overview of AMP8 capital maintenance plan for the asset class***). This, alongside the 14 boreholes we would promote (should this case be successful), would mean we are significantly improving the health of around 20% of our overall asset stock across the AMP, whilst tackling around 50% of the boreholes due for replacement up to the end of AMP8. This would lead to a significant step change and help to reduce the cumulative bow wave in future AMPs to a more sustainable level, thereby improving our longer-term resilience (as discussed in the following section).

Figure 10 - Borehole site replacement forecast by AMP period (using typical lifespan by aquifer type)

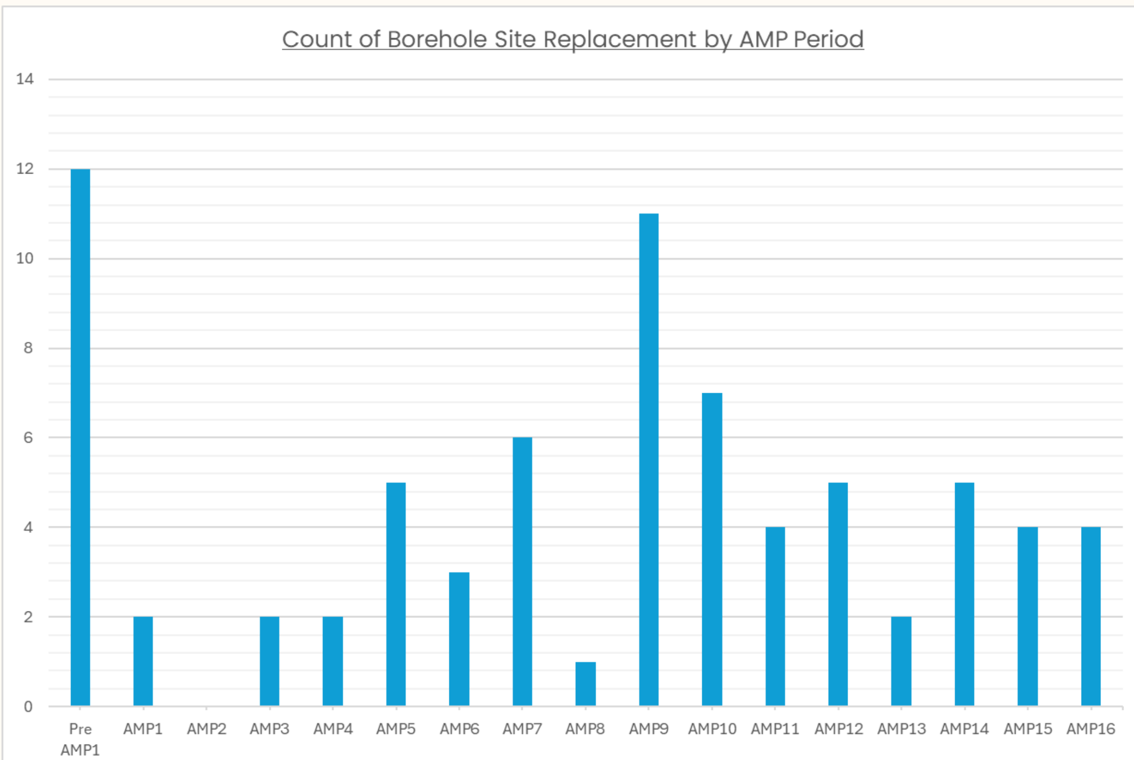
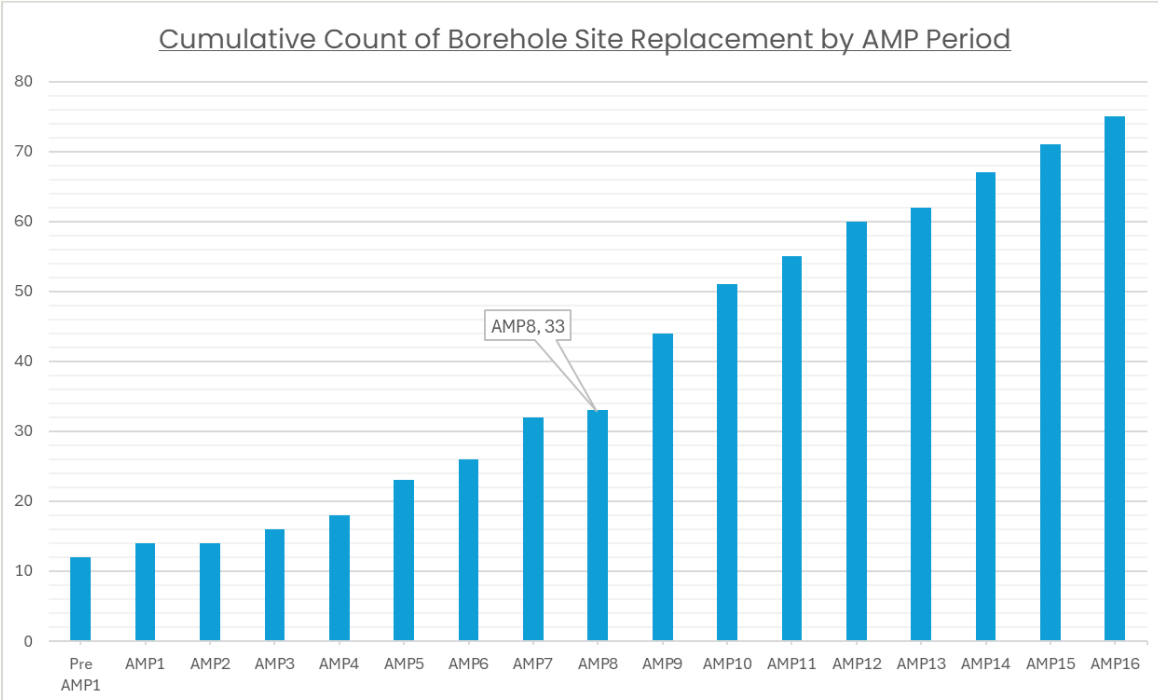


Figure 11 - Cumulative count of borehole replacement by AMP (excl. Adits and non-operational sites)



2.8 Long-term strategic alignment and future uncertainties

The asset health need identified for borehole assets, has been assessed in the context of future strategies and remains aligned with the water supply system (WSS) resilience strategy[8] set out at PR24 and the assumptions underpinning the Water Resource Management Plan (WRMP).

Boreholes play a critical role in providing resilient and flexible supply within the WSS resilience strategy, and the WRMP assumes their continued availability and operability over the planning horizon. The asset health risks addressed in this submission relate to underlying deterioration of borehole infrastructure which, if unaddressed, would reduce source availability and undermine delivery of both the WSS resilience strategy and the WRMP. Future uncertainties, including climate change and evolving groundwater quality pressures, are expected to increase operational reliance on boreholes and place additional stress on ageing assets, reinforcing the case for timely intervention.

Our WSS resilience strategy recognises that future conditions are uncertain and therefore prioritises system level resilience rather than reliance on individual assets. As set out in PR24, this approach focuses on reducing vulnerability to unplanned outages and factors outside management control by maintaining flexibility and redundancy across the supply system. The asset health interventions proposed support this strategy by reducing the risk that deterioration of individual assets constrains system performance, ensuring continued delivery of PR24 outcomes.

The borehole assets included within the scope of this submission are being assessed from an asset integrity, reliability and deterioration perspective, rather than as water resource options, and the proposed interventions are intended to restore or sustain asset health rather than to increase deployable output or alter our abstraction strategy.

[8] *YKY31_Water Resilience Enhancement Case*

As such, the investment proposed through the PR24 cost change process does not duplicate, pre-empt or conflict with WRMP proposals or associated Environment Agency consultations. The separation of scope between asset health investment and water resource planning has been maintained to ensure clarity of purpose, regulatory alignment, and avoidance of double funding.

For the borehole asset class specifically, we are in the process of updating and refreshing our asset strategies and asset class policies. They focus on asset capability, availability and outcomes and will inform maintenance and investment plans for PR29 and the beyond.

3. Determining What Base Buys

This section describes the need for a Base expenditure cost change over and above what we are already funded through the Price Review process. We provide an assessment of what we are implicitly funded for in AMP8 for the specific priority asset boreholes. Here we will demonstrate how this business case meets Ofwat's core evidence requirement:

- Assessment of 'what Base buys'

3.1 Overview of AMP8 capital maintenance plan for the asset class

This section summarises the AMP8 capital maintenance plan, focusing on the refurbishment and replacement of borehole assets. Only Base capital maintenance costs are included, excluding routine operational expenditure and repairs. **Table 5** lists current AMP8 schemes and spend forecasts, showing only refurbishment or replacement costs and omitting wider site works and routine maintenance. The projected AMP8 investment is £6.58 million (2022/23 price base), covering planned replacements and refurbishments.

Table 5 - Forecasted AMP8 programme for capital maintenance – boreholes

Site Name	Total Value 22/23 Price Base	Additional Information
Content is redacted due to it containing commercially sensitive information	£2,135,699	Cost reflects the proportion of the scheme being delivered in AMP8 to install a new borehole.
	£225,844	Refurbishment of rising main and pump replacement.
	£93,662	Costs reflect the proportion of the scheme being delivered in AMP8 to refurbish the borehole.
	£577,785	Relining of borehole at .
	£3,282,960	Drilling a new borehole
	£261,075	Estimated proportion of resilience expenditure directly apportioned to supporting refurbishments/replacements.
Total	**£6,577,028**	

The planned AMP8 capital maintenance expenditure in **Table 5** indicates, as of now, that we intend to spend over our implicit allowance of £5.76 million (defined in ***3.3 Company assessment of what Base buys***). This forecasted AMP8 spend gives assurance that we will at least utilise the capital maintenance allowance already funded to us through the PR24 determination, and that all of the required capital uplift requested as part of this submission is over and above what customers have already paid for.

3.2 Expected sustainable level of intervention

Historical activity outlined in ***2.1 Historical expenditure and workload analysis*** shows that Yorkshire Water has delivered a consistent pattern of refurbishment and replacement interventions, albeit at a relatively modest scale compared with the size and age of the borehole asset base. Across the sector-wide dataset, companies vary significantly in how frequently they undertake planned refurbishment (**Figure 3**) or full replacement of boreholes (**Figure 4**), with Yorkshire Water positioned within the middle of the industry range, alongside several companies adopting similar frequency of targeted capital interventions. It is also important to note that due to a lack of normalisation metrics, there is uncertainty in using this data for conclusive comparative purposes. This may skew the figures, for example where companies with greater expenditure may simply have a higher proportion of assets, or assets of greater scale (i.e. borehole depth), and vice versa. Yorkshire Water is however around the mid-range in terms of cost per repair/refurb (when compared to the wider industry data return). Whilst the expenditure data doesn't reflect the extent of any works undertaken, it provides a metric for comparison. It is important to highlight that the workload and expenditure data is a snapshot in time and therefore doesn't reflect investment in previous AMPs.

However, as demonstrated in the deterioration and end-of-life analysis in ***2.6 Asset health and deterioration analysis*** and ***2.7 Forecast future analysis*** respectively, the future condition profile of our boreholes is materially different from the past. A substantial proportion of assets are now projected to reach end of life by the end of the AMP, indicating that historic refurbishment and replacement rates are no longer sufficient to maintain long-term resilience. This aligns directly with Ofwat's definition of when a step-change toward a sustainable renewal rate is required.

A sustainable level of intervention for the 2025–30 period therefore requires a higher and more regular level of refurbishments and replacements, moving away from long periods of deferral. This shift is consistent with the long-term asset class strategy described in ***2.8 Long-term strategic alignment and future uncertainties*** and is necessary to prevent further asset health deterioration and rising service risk. **Figure 12** shows the number of other interventions carried out on boreholes.

Figure 11 - Number of borehole interventions carried out by YW, taken from OFWAT cost share data

Content is redacted due to it containing commercially sensitive information

We are already beginning this transition in AMP8, with a planned increase in refurbishment and replacement Capex as seen in **Table 5** compared with historic levels seen in ***2.1 Historical expenditure and workload analysis***. This demonstrates that the business is proactively moving toward a more sustainable pattern of investment, rather than relying solely on additional allowances to initiate this change.

In line with Ofwat's "What Base Buys" framework, the expected sustainable level of intervention includes:

- the refurbishments and replacements that can be reasonably delivered through existing PR24 Base allowances; and
- the additional capital maintenance interventions required to achieve a sustainable renewal rate, which form the basis of our Cost Adjustment Claim.

This ensures transparency, avoids any risk of double funding, and clearly shows how the proposed programme aligns with a sustainable long-term investment trajectory.

3.3 Company assessment of what Base buys and triangulation of approaches

We recognise that PR24 Botex econometric models are trained on historic aggregate Base expenditure. If the industry has historically invested in certain asset groups within Base, the sector-level regression will naturally carry some average implicit capital maintenance funding into the modelled Base allowance for a representative company.

However, we do not necessarily consider that this leads to a specific allowance for an individual company or for a specific asset group for several reasons:

Top-down design: The models explain total Base costs from high-level drivers, not asset-level needs. They do not produce reliable company-specific allowances for (say) service reservoirs versus rapid gravity filters. Coefficients capture sector-average correlations, not a causal breakdown by asset group for each company. These factors mean reverse-engineering a company-specific, asset-group 'implicit allowance' from top-down Botex is not credible, even if a sector-average implicit allowance exists. (Ofwat's own guidance recognises no perfect way to quantify 'what Base buys' and urges awareness of data limitations.)

Differences between companies: Companies differ considerably on a variety of interconnected factors both in and outside of company control:

- Existing asset bases (designs, age profiles, materials)
- Historic investment, regulatory incentives and targets
- Future performance challenges, incentives and operating strategies

These mean that the optimal allocation of existing capital maintenance allowance (or Totex more broadly) will not be the same for each company or a 'fixed' value for each asset group. This is a key tenet of a Totex and outcomes approach, which has been the approach to setting cost allowances for the last three price reviews.

Data quality: The published industry Workload and Expenditure (WLE) Data for each priority asset group indicated significant deviation between company submissions. As set out in our response to the draft dataset, we were concerned that companies have interpreted guidance differently and that the dataset was not comparative. This was evidenced by the large disparity between companies on the scale and types of interventions as well as the unit rates of intervention types.

That said, for 2026 submissions, we have followed Ofwat's suggested methods (Chapter 4 of Asset Health Investment Guidance) to develop estimates of what the WLE data implies an implicit allowance for a representative company with Yorkshire Water's characteristics would be. Throughout this document where we refer to the 'Implicit Allowance' or 'What Base Buys', it is this representative value we refer to rather than our view of what Yorkshire Water's Base allowances actually buy.

We considered three potential approaches for calculating an implicit allowance for our target asset groups: trickle filters and boreholes. The first two align with those set out in Ofwat's methodology.
Ofwat states in its Asset Health guidance (Chapter 4.1):

"We therefore consider that refurbishment and replacement capital maintenance data is most relevant to determining what Base buys for this type of investment."

We agree with this and have used only the Capital expenditure on Replacement and Refurbishment in the approaches set out below.

Methodologies used to estimate implicit Base funding[9]
A - Pre-modelling Adjustment approach: The first approach is to utilise the models that set the Base cost allowances and to estimate the difference between the efficient AMP8 expenditure allowance, with and without the targeted maintenance costs in the modelled Base cost definition. To be consistent with the workload dataset, we use a modelling period of 2015/16 to 2023/24. That is, no pre-2015 data has been used, so any additional assumptions regarding how they were estimated are not required. **B - Cost-share approach** The second approach is to apply the historical industry average maintenance spend as a proportion of wholesale costs to the efficient AMP8 allowances for wholesale water and wastewater network plus. We use the mean average proportion of maintenance expenditure to Base costs of the industry (consistent with Ofwat's approaches for post-modelling adjustments at PR24 FD in network reinforcement and with how econometric modelling is typically established, i.e. estimates are based on mean relationships rather than the median). We calculate the proportion of maintenance spend relative to Base wholesale water and wastewater network plus Base costs for each company and year (between 2015/16 to 2023/24), calculate the mean average proportion for the industry as a whole, and subsequently apply this to the company's forward-looking efficient allowance. **C - Workload approach** The final approach we considered was to align with the approach taken by Ofwat at PR24 for mains replacement and meter renewals. That is, to construct a normalised activity variable as the ratio of workload (maintenance activity) to a measure of scale (i.e. properties in wholesale water and load in wastewater network plus). The implicit allowance would be calculated as the industry average of the normalised variable during the benchmarking period (2019–2024) applied to the forecasted scale driver. Specifically in this approach, given the aggregation of refurbishment and replacement activities, it would require us to construct a total weighted workload variable whereby the volume of maintenance activities are weighted by the industry median unit cost across each activity. As noted above, in our response to the workload and expenditure dataset shared with companies we expressed serious concerns about the quality of the data based on: - Disconnects between cost and workload figures - material inconsistencies in how companies have interpreted the intervention definitions set out in the request - Highly variable and counterintuitive unit costs for interventions. Based on these concerns we consider that any implicit allowances based on the WLE dataset are treated with caution, but we specifically consider using workload data to be inappropriate. Therefore we do ***not*** progress approach C any further in defining implicit allowances for this process.

Following each of these approaches we apply frontier shift efficiency and real price effects as set out at PR24 Final Determination. This is then comparable to the planned Base expenditure in the period which is based on our post-FS/RPE allowances.

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[9] Water UK has produced a report with Economic Insight on this topic. We broadly agree with the principles in this report although due to timing we have not used its findings to influence our assessment of WBB for 2026.

Results

Table 6 - Implicit allowance assessment (post frontier shift, 22/23 prices)

Asset Group		Assessed Implicit allowance for each approach		Triangulated
		A	B	A+B /2
Boreholes	£m	6.55	4.97	5.76

NOTE: We do not append the detailed calculations for each approach but these are available on request.

3.4 Reconciliation between Base investment and requested uplift

The below **Table 7** shows that for the targeted asset groups, our planned AMP8 capital maintenance is greater than the indicative implicit allowance.

Table 7: Forecast AMP8 planned spend vs. implicit allowance

Asset Group		Forecast AMP8 Capital Maintenance spend	Implicit Allowance (triangulated A+B)	Difference	Requested Uplift
Boreholes	£m	**£6.58**	5.76	+0.81	13.69

Although our forecasted Base capital maintenance is higher than the implicit allowance, we will not request additional uplift. Given this, we also do not propose applying the PCD to this difference (see ***6. Customer Protection***). By keeping this expenditure within our general Base allowance, we believe customer interests are best served through increased flexibility.

4. Best Option for Customers

This section details the exploration, identification and evaluation of a range of intervention options across our borehole asset base. Here we detail how the sites and interventions for our 2026 claim were identified, the assessment process and results, and how we have arrived at a succinct, considered list of interventions for this AMP period. We will demonstrate how this business case meets Ofwat's core evidential requirements:

A) Evidence of an unconstrained set of potential options over a range of intervention types
B) Demonstrate robust decision making and robust whole life cost-benefit appraisal
C) Explanation of the proposed solution, including scale and timing of the investment
D) Additional benefits the proposed solution will provide
E) Demonstration of engagement with customers

4.1 Identification of the need

The need for investment in borehole assets was established following a thorough evaluation of asset conditions and service risks. This assessment used targeted CCTV footage and geophysical surveys reviewed by expert hydrogeologists. The results were combined into condition reports for key borehole components, offering clear evidence of the need that affects both asset health and reliability.

Although survey data varied in type, our hydrogeology experts consistently applied professional judgement alongside Ofwat's grading guidance to assess the severity and significance of risks. This method ensures that decisions about investment are grounded in evidence, proportional, and closely tied to reducing loss of deployable output, unplanned outages and water quality, rather than simply reacting to age or condition alone.

Sites selected for investment were chosen through a structured, evidence-driven prioritisation process, where asset health was the primary criteria, supported by supply resilience and water quality risks. The initial candidates were borehole assets graded 4 or 5, with inspection and performance data pointing to high failure risk, or declining availability. Each site was evaluated across four risk areas: asset health, supply resilience, water quality, and the probability of the risk occurring within AMP8.

Table 8 outlines the unconstrained list of condition grade 4 and 5 Borehole sites. Sites marked "Selected" have the highest risk in all four categories, with no investment planned or underway in AMP8. This means poor asset conditions are already affecting multiple service areas and further decline is expected during AMP8 if no action is taken.

Sites not chosen for AMP8 investment had fewer or less severe risks, low likelihood of deterioration during this period, or risks manageable through operational changes or non-capital solutions for now.

Table 8 - Unconstrained site selection matrix at site level

Name	Condition Grade	Asset Health related risk	Supply Resilience Risk	Risk expected in AMP8	Water Quality Risk	Count of ticks	Investment in AMP8
Content is redacted due to it containing commercially sensitive information	5	✓	✓	✓	✓	4	Selected
	5	✓	✓	✓	✓	4	Selected
	5	✓	✓	✓	✓	4	Selected
	5	✓	✓	✓	✓	4	✓
	4	✓	✓	✓	✓	4	✓

Content is redacted due to it containing commercially sensitive information	4	✓	✓	✓	✓	4	Selected
	4	✓	✓	✓	✓	4	Selected
	4	✓	✓	✓	✓	4	Selected
	4	✓	✓	✓	✓	4	✓
	4	✓	✓	✓	✓	4	Selected
	4	✓	✓	✓	✓	4	✓
	4	✓	✓	✗	✓	3	✗
	4	✗	✓	✓	✓	3	✓
	5	✗	✓	✓	✓	3	✓
	4	✓	✗	✗	✓	2	✗
	4	✓	✗	✗	✓	2	✗
	4	✓	✓	✗	✗	2	✗
	4	✓	✓	✗	✗	2	✗
	4	✓	✗	✗	✓	2	✗
	4	✓	✓	✗	✗	2	✗
	4	✗	✓	✗	✓	2	✗
	4	✓	✓	✗	✗	2	✗
	4	✓	✗	✗	✗	1	✗
	4	✗	✓	✗	✗	1	✗
	4	✗	✗	✓	✗	1	✗

We considered a range of alternative options across the asset base to address the identified risks. The table below summarises the principal alternatives assessed through the risk matrix, alongside the rationale for their exclusion where they were not progressed.

Alternatives considered included site-specific raw water blending arrangements, where available, to mitigate water quality risks. Where blending was assessed to be a viable risk mitigant, this was captured within the water quality risk assessment and denoted by a cross in the relevant column (for example,).

We also considered the use of alternative sources where water supply system headroom was available, either at site level or from nearby sources within the wider supply system. Where sufficient headroom was identified and the supply resilience risk could be mitigated without asset intervention, this was reflected by a cross in the supply resilience risk column (for example,).

Content is redacted due to it containing commercially sensitive information.

Table 9 provides additional information on the sites selected for investment, outlining the site-specific condition, service and water quality risks. More detail on the risk identification at each site level is available in ***APPENDIX A: Detailed asset information and condition assessments***.

Table 9 - Needs identified and associated risks

Site	Asset Condition Description	Primary Risk: Impact on Service	Secondary Risk: Water Quality
Content is redacted due to it containing commercially sensitive information	Casing and headwork defects; ingress risk	Outage risk; reduced resilience	Bacteria, viruses
	Casing defects; sand pumping.	Loss of yield; outage risk	Turbidity, nitrate, bacteria
	Casing defects; wet-weather vulnerability	Loss of yield	Nitrate, bacteria, viruses
	Sand pumping; illegal landfill proximity	Loss of yield; contamination risk from landfill	E.coli, nitrate, turbidity
	Non-operational asset; aquifer fracturing	Complete loss of yield	Turbidity, nitrate, viruses, tritium
	Condition uncertain; constrained by nitrate scheme	Outage risk	Nitrate, bacteria, viruses
	Non-operational since 2013; sand pumping	Long-term loss of yield	Turbidity, E.coli, nitrate, viruses

The assets identified for investment comprise 14 boreholes across seven sites, with an average asset age of around 71 years, including several boreholes approaching or exceeding a century in service.

As shown in **Table 10**, the need for investment is evidenced through a clear and demonstrable link between deteriorating borehole condition and material impacts on service performance. Across the assets, all 14 boreholes were assessed as condition grade 4 (Poor) or condition grade 5 (Awful), indicating advanced deterioration of critical borehole components and an increased likelihood of failure.

This poor asset condition is associated with a loss of up to 80 Ml/d of deployable resource, representing a reduction in the volume of raw water available for treatment, and 30 Ml/d of unplanned outage, reflecting the loss of treated water available to supply customers. Together, these impacts demonstrate a material risk to operational resilience and supply reliability without proactive investment. The MLD figures presented in the table for and represent realised risks due to the assets being out of service, while the figures for other locations indicate the projected impact before the conclusion of AMP8.

Content is redacted due to it containing commercially sensitive information.

Table 10 – Boreholes condition grade and realised/forecast service impact and age

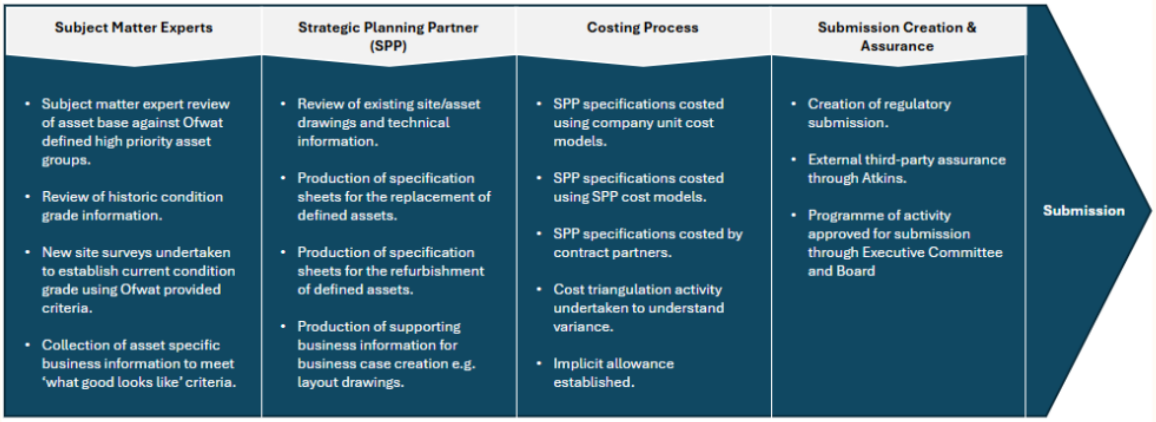
Site	Borehole(s)	Condition Grade(s)	Loss of Resource (MLD)	Unplanned Outage (MLD)	Ave Age (Yrs)
Content is redacted due to it containing commercially sensitive information		4 – Poor (all)	22.5	13	97
		4 – Poor (Both)	11	0	60
		4 – Poor	3.5	0	51
		4 – Poor (All)	13.5	11.4	112
		5 – Awful	15	5.9	48
		5 – Awful (Both)	7	9.8	61
		5 – Awful (Both)	10	0	79
Total		**4/5**	**80**	**30**	**~71**

In summary, we have completed a structured, risk-based prioritisation, with asset health as the primary driver, supported by supply resilience and water quality. We have ensured that investment is targeted only where poor condition is already impacting, or is expected to impact, deployable output, outage performance and operational resilience by the end of AMP. Investment is therefore necessary to address the clearly evidenced asset health and service need.

4.2 Definition of solutions

Following the identification of the specific site and asset health needs, we instructed Stantec, our Strategic Planning Partner (SPP), to produce desktop concept designs of potential capital interventions to introduce substantiative change in asset health for the selected assets. Outline scopes and high-level indicative site layouts were developed for both major refurbishment and replacement interventions based on existing asset information and descriptions supplied by Yorkshire Water. This concept definition included the highlighting of constructability or site-specific constraints of the proposed interventions (e.g. land availability and location of new structures). The figure below shows how this formed part of our overall submission development process.

Figure 12: High-level process map of business case development



For all SPP scopes identified as part of this case, further refinement and solution development is required prior to implementation of any final solution. Whilst some potential treatment options are explored as part of this submission under notional, high-level assumptions, they are not exclusively the only options which may be feasible for each asset – further investigation and detailed design in our delivery process would be carried out to finalise the optimal solution.

The details of each option's notional design can be found in ***APPENDIX B: Solution details and benchmarking scope***.

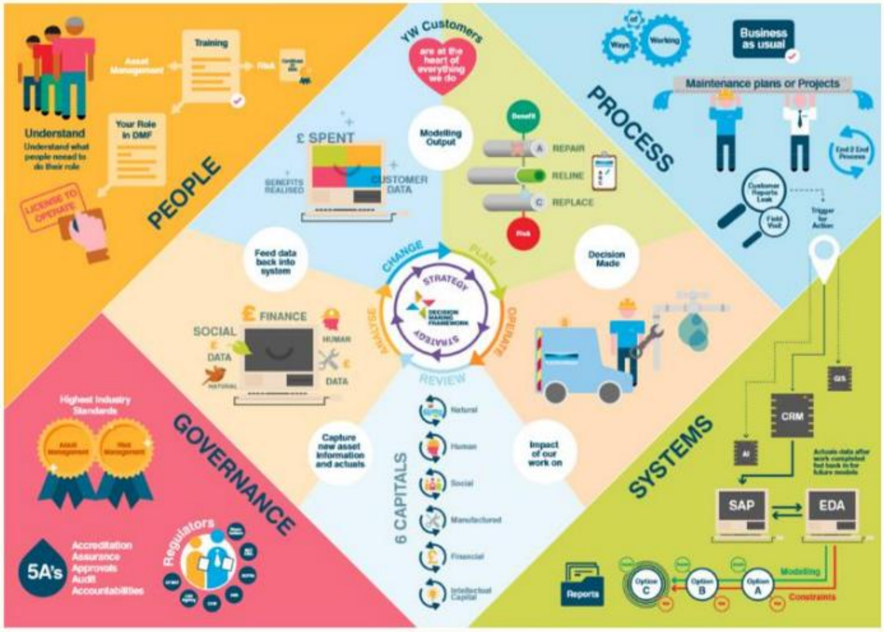
4.3 Cost-benefit assessment methodology

We have assessed the interventions for each asset using our robust, well-established Decision Making Framework (DMF), which we routinely use to make optimal investment choices, through the consistent application of risk, benefit and cost intelligence.

Yorkshire Water's approach to assessing the costs and benefits of intervention options ensures decisions are based on Totex Net Present Value (NPV), consistent with the application of our Service Measure Framework (SMF) within the Decision Making Framework (DMF). These frameworks allow us to evaluate investment options on a comparative basis, ensuring that the preferred interventions are selected, which will deliver the greatest long-term service, performance and cost value for customers and the environment, which is in alignment with Ofwat's Asset Health Investment Guidance. The approach is also consistent with the processes used across our PR19 and PR24 planning cycles and has been further improved over time through ongoing research, customer engagement and external assurance. An overview of the DMF with its key domains and process relationships is shown in **Figure 14.** A more detailed explanation of our DMF can be found in our PR19 plan[10] when the tool was initiated.

[10] *pg57 Our PR19 Plan (Yorkshire Water)*

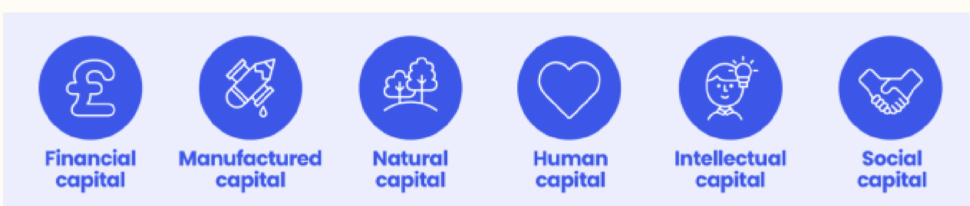
Figure 13: The overall Decision Making Framework (DMF)



When assessing options, we evaluate the full range of lifecycle costs and carbon impact associated with each intervention. This includes the capital investment required to improve or restore asset condition, the operational and maintenance expenditure required to sustain performance, and the carbon impacts associated with both the embodied materials and day-to-day operation. All capital costs are developed using company cost models and/or quotations (or analogous / comparative estimates if appropriate) and normalised to the same price base. The carbon impact (tonnage) of proposed schemes is derived from company embodied carbon models (similar in design to the cost models, see ***5.1 Cost estimation methodology*** and then monetised in order to include carbon on a consistent evaluation with cost. These cost components are treated consistently across all intervention types, ensuring Whole Life Costs (WLCs) are comparable regardless of asset class or deterioration mechanism.

Once we have understood our risks to service, identified our potential interventions and estimated efficient costs, we assess the wider environmental, social and economic benefits using our six capitals valuation approach. This enables us to understand the broader impacts of our decisions beyond Totex metrics alone.

Figure 14: Benefits evaluation - our six-capitals approach



- Financial capital reflects changes in operational efficiency, avoided reactive costs and reduced outage management.
- Manufactured capital considers the improved reliability and resilience achieved through refurbishment or replacement.
- Natural capital captures impacts such as improved water quality, reduced abstraction stress and lower carbon emissions.
- Human capital includes workforce safety and wellbeing.

- Intellectual capital covers learning and insights gained through asset inspections, redevelopment and monitoring.
- Social capital reflects customer trust and confidence in maintaining safe, reliable water supplies.

Where robust valuation evidence is available, these benefits are monetised within the SMF. This allows us to quantify impacts and benefits on a 'common currency' with Totex expenditure. Where monetisation is not appropriate, we capture impacts qualitatively to ensure they are recognised in the final decision.

The DMF provides the structure through which all cost and benefit information is integrated and assessed. Each intervention option is evaluated against its ability to mitigate the deterioration risk. Whole life costs are evaluated alongside monetised benefits to determine overall value of the post-investment position. Whole-life costs are evaluated alongside monetised benefits to determine overall value of the post-investment position. Scenario testing is undertaken to understand the robustness of results. All options are reviewed and compared within our Enterprise Decision Analytics (EDA) system to ensure transparency and consistency across the programme.

4.4 Whole life cost and benefit assessment

The Cost Benefit Assessment table below details each prioritised borehole asset and its potential interventions, including its cost, total benefit and selection as the preferred intervention (**Table 11**).

The total value of the reopener submission for boreholes is **£13.69 million** based on our preferred options.

Each asset has two solution options:

1. Major borehole refurbishment to extend life and reduce service failures, with relining and headworks maintenance.
2. Full asset replacement by redrilling a new borehole and updating associated headworks.

Each intervention's service benefits are evaluated using the six-capital methodology with scoring assigned to the following service measure categories:

- Primary driver: Enhanced supply resilience and fewer outages.
- Secondary driver: Improved water quality by reducing risks like turbidity, contamination, and infrastructure decay.

The CBA assessment has been used for optioneering purposes at a site level only and not for portfolio site selection (see this approach in ***4.1 Identification of the need***). Our approach calculates cost-benefit comparisons for each major refurbishment or replacement over a fixed 33-year NPV assessment period. Following the Spackman approach to discounting, the intervention Capex is annuitised over the period using an annuity rate of the WACC (weighted average cost of capital), and the costs and benefits expressed in present value terms using the HM Treasury Green Book discount rate of 3.5%. Capital reinvestment is assumed if the intervention asset life expires within the NPV period (e.g. repeat refurbishment if the refurbishment life is less than the 33-year assessment period).

Table 11 - Cost benefit assessment for considered solutions (22/23 price base)

Site	Intervention Type	AMP8 Capex (£m)	Total Cost Benefit (£m)	Preferred Option (Y/N)
Content is redacted due to it containing commercially sensitive information	*Refurbishment*	2.51	24.25	Yes
	Replacement	5.37	21.53	No
	Refurbishment	0.74	0.21	Yes
	Replacement	1.11	-0.36	No
	Refurbishment	1.11	0.72	Yes
	Replacement	1.93	0.06	No
	Refurbishment	1.41	6.34	No
	Replacement	4.90	18.06	Yes
	Refurbishment	1.43	10.49	No
	Replacement	1.74	10.99	Yes
	Refurbishment	1.06	18.35	Yes
	Replacement	1.95	16.48	No
	Refurbishment	1.64	0.24	Yes
	Replacement	3.03	-0.9	No
	Total Value of Claim	**13.69**	**72.82**	

4.5 Proposed solution description and rationale

The preferred solutions are summarised in Table 11 and comprise interventions to extend the life of a total of 14 boreholes across seven sites, including 10 major refurbishments and four full replacements. These interventions were selected to address deteriorating asset condition and associated service risks in the most proportionate and efficient manner.

The six-capitals approach applied through the Decision Making Framework (DMF) was used to inform option selection by providing a structured assessment of costs and benefits. However, the DMF was not applied in isolation. Cost–benefit outputs reflect only the quantified information entered into the model and do not fully capture all site-specific constraints, qualitative risks or operational considerations. As such, professional judgement from our hydrogeologists and wider company and industry intelligence were also applied to determine the preferred solution at each site. More detail on the preferred solution rationale at an asset level is available in ***APPENDIX A: Detailed asset information and condition assessments***.

Table 12 shows the associated scope of works and the rationale for selection at each borehole site. Options were assessed against asset condition, service risk (including loss of yield and unplanned outage), capital cost and cost–benefit performance, ensuring that the selected solution represents the most proportionate response to the identified need.

Refurbishment was selected where it delivered comparable performance and risk reduction to replacement at a lower cost, or where the difference in total cost benefit between options was not material given the assumptions and inherent uncertainties around each cost and SMF input. Conversely, replacement was preferred where refurbishment would not adequately address the underlying condition risks or where site-specific constraints meant it would not provide a durable solution.

Overall, the table demonstrates that option selection was site-specific, evidence-led and value-for-money focused, with investment targeted at the lowest-cost option capable of mitigating unplanned outage and maintaining supply resilience.

Table 12: Preferred intervention rationale and scope summary

Site	Cost (£M) 22/23	Preferred Intervention	Solution Scope	Preferred Rationale
Content is redacted due to it containing commercially sensitive information	2.51	Refurbishment	Investigate, reline, headworks upgrades	Most cost beneficial and lowest cost
	0.74	Refurbishment	Reline; headworks upgrades; reduce pumps from 2 to 1	Most cost beneficial and lowest cost
	1.11	Refurbishment	Investigate, reline, headworks upgrades	Most cost beneficial and lowest cost
	4.90	Replacement	Redrill BHs; infill existing	Most cost beneficial

Content is redacted due to it containing commercially sensitive information	1.74	Replacement	Redrill BH; infill existing	Most cost beneficial and Capex delta insignificant
	1.06	Refurbishment	Investigate post-WQ scheme; reline BH , headworks upgrades	Most cost beneficial and lowest cost
	1.64	Refurbishment	Reline , headworks upgrades	Most cost beneficial and lowest cost
Total	13.69			

4.6 Post-investment benefits

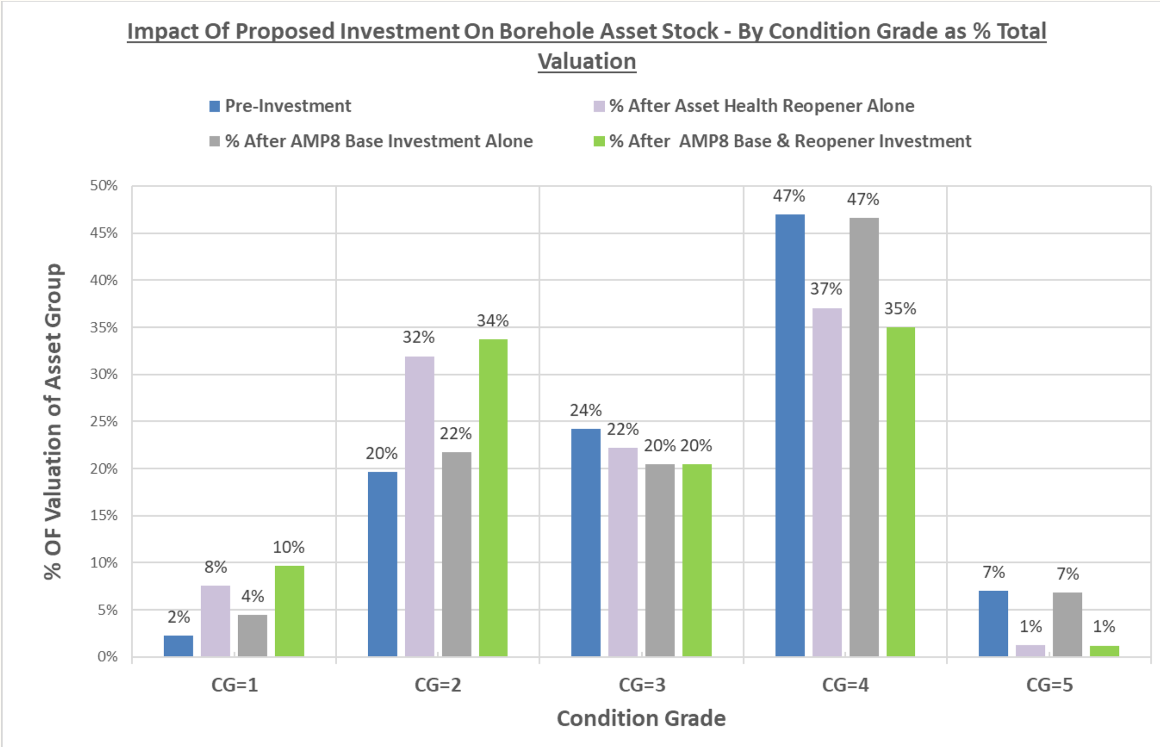
The preferred solutions will improve condition grades, extend asset lives, and enhance site and water supply resilience. The risks shown in **Table 10** will be mitigated with a broader set of benefits delivered.

For condition grading and improved asset lives, we propose to express the measured impact as the change in condition grade according to the Gross Modern Equivalent Asset Values (GMEAV) of the sites in each condition grade. This is expressed as a percentage of the total asset group GMEAV rather than absolute £ values as this removes any dependence on inflation factors. We consider that this provides an appropriate *scaling of benefit* to the asset stock (as opposed to changes to asset count or age distribution for the condition grade, neither of which act as proxies for site size).

Figure 16 shows the asset group's condition and valuation profile before and after the proposed investments from both existing AMP8 schemes and the proposed asset health reopener investment (details on the claim build-up in ***4. Best Option for Customers*** and ***5. Robust and Efficient Costs***).

In summary, the proposed asset health reopener investment achieves an increase of 18% by GMEAV in sites at condition grades 1 or 2 and a 16% reduction in sites at condition grades 4 or 5. The AMP8 Base investment adds 4% increase and 2% decrease respectively. Overall, the two investment streams achieve an overall increase of 22% GMEAV at condition grade 1 and 2.

Figure 15 Impact on condition grade profile of proposed investment in boreholes



4.7 Scale, timing and phasing of the preferred solutions

The preferred solutions will be delivered as a phased programme of capital interventions during AMP8 years 3, 4 and 5, subject to approval through the PR24 cost change process. This timing allows for appropriate prioritisation, detailed planning and efficient delivery while managing operational and delivery risks.

Further detail on delivery milestones, phasing and confidence in deliverability is set out in the ***6. Customer Protection*** and ***7. Investment Delivery Plan*** sections of this submission.

4.8 Customer engagement

In line with Ofwat's expectation that companies meaningfully involve customers in decisions that have a material impact on bills, Yorkshire Water undertook a focused programme of research to understand customers' views on the proposed Asset Health Cost Change process. Nearly 1,600 customers took part across diverse groups, including financially vulnerable customers, customers in vulnerable circumstances, future customers and non-household (NHH) customers. Their input provided a strong evidence base to ensure the investment proposed reflects what matters most to them. The full research report is available on our website[11].

Customers were clear that investment should prioritise maintaining the safety, reliability and quality of essential services. When presented with the condition of assets and the risks associated with deterioration, support for upgrading condition grade 5 assets was exceptionally strong across all groups. Customers viewed this as essential to preventing failures, safeguarding drinking water quality and maintaining environmental compliance. Levels of support from customers included:

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[11] *Asset Health Cost Adjustment Claim: Research Report January 2026*

- **86%** Household sample
- **86%** Future bill payer sample
- **93%** Non financially vulnerable
- **73%** Financially vulnerable
- **85%** Customers in vulnerable circumstances
- **87%** Non-vulnerable circumstances

Drinking water assets were consistently the highest priority, particularly service reservoirs and boreholes due to their direct link to safe water supply and resilience, as well as the recent experience of drought conditions.

During testing, customers were shown that the Asset Health Cost Change would introduce a £5 annual bill impact (this bill impact was based on a much larger scenario that included investment in all of the Ofwat non-infrastructure priority assets). Around half of household customers and most NHH customers felt this increase would be manageable, with many believing it offered good value given the risks of doing nothing. Where concerns were raised, these were largely linked to the broader cost-of-living context rather than the principle of investment itself.

Financially vulnerable customers and future customers expressed more caution. They were less likely to say the increase would be easy to afford and more likely to question value for money. This reinforced the need for clear communication and accessible support so that the proposal remains fair for those who may find it hardest to pay.

These findings were examined with the Yorkshire Forum for Water Customers ("the Forum"). While recognising strong support among those who participated in the research, the Forum noted that customers more broadly may not welcome additional bill increases during AMP8, given the significant rises applied at the start of the period. Any further increase would likely be perceived as unexpected and could lead to negative sentiment.

As the company considered the full weight of the evidence - strong support for preventing failures, the importance of drinking water resilience, but also heightened affordability concerns across financially vulnerable and future customers - it became clear that a careful balance was needed. Customers supported improvements across all poor-condition assets tested, yet keeping bills low consistently emerged as their number one priority, particularly in the current cost-of-living environment.

Reflecting this, the business has focused the programme on the asset types that provide the greatest benefit within a limited bill impact envelope - boreholes and trickle filters. This choice reflects a deliberate balancing of these priorities with a wider set of business considerations, ensuring investment is targeted where it contributes most to outcomes customers value - resilience, drinking water quality and environmental protection - while respecting customers' clear message on affordability. It also recognises NHH customers' preference for stability and predictability in costs.

Overall, the evidence shows that customers support investment where the link between risk reduction, outcomes and affordability is transparent. The assets not taken forward in this submission remain important, and Yorkshire Water will continue to explore them through further research and testing as part of preparations for PR29.

5. Robust and Efficient Costs

It is essential that any additional allowances provided are reflective of actual delivery costs and an efficient use of customers' money, as well as not overlapping with any allowances from other areas so that we are not funded twice to do the same work. In this section we will demonstrate how this business case meets Ofwat's core evidential requirements:

- Evidence of costing methodology
- Efficient costs for options and proposed solution
- Cost breakdowns for individual schemes
- Evidence of historical actual costs and undertaking of cost benchmarking

5.1 Cost estimation methodology

The cost estimation methodology of this claim has used our robust internal suite of unit cost models, collectively managed through our Unit Cost Database (UCD). This is consistent with our PR24 plan and for our in-AMP business-as-usual programme and project cost estimation purposes, and the approach has been externally audited.

These models have been rigorously developed from the continual capture of actual outturn cost data from delivered capital projects. The captured historical cost data is reviewed, challenged and quality assured by a dedicated trained cost modelling team in conjunction with our internal finance function to make sure that the correct, proportionate expenditure is settled against each asset. The outturn costs are price base adjusted and used as the input into specific cost curves for physical assets and capital activities across our asset base. Yorkshire Water's UCD currently consists of over 32,000 live datapoints, resulting in 907 models, which provide us with the ability to quantify capital schemes down to various levels of asset granularity (e.g. process or equipment). The number of datapoints and models available within the UCD is actually much greater than this, our modelling philosophy tries to use as much recent data as possible and time-expires old data, with exceptions being made where particular models lack statistically significant quantities of data or where the extremes of the asset are delivered infrequently (e.g. very large assets). The UCD therefore represents the most reasonably recent view of current market and delivery circumstances.

Our unit cost modelling follows a top-down, parametric technique that uses outturn costs from historic schemes to inform the costs of future schemes. Outturn cost data is attributed to specific models based on cost drivers or binaries and then modelled against a determinant 'size' metric, which builds a unit cost relationship that can be used to estimate future costs, e.g. the cost for a kiosk, with or without a concrete base and/or of a given material, is regressed against the plan area size of the kiosk.

Figure 16: Example of Yorkshire Water UCD cost model

Content is redacted due to it containing commercially sensitive information.

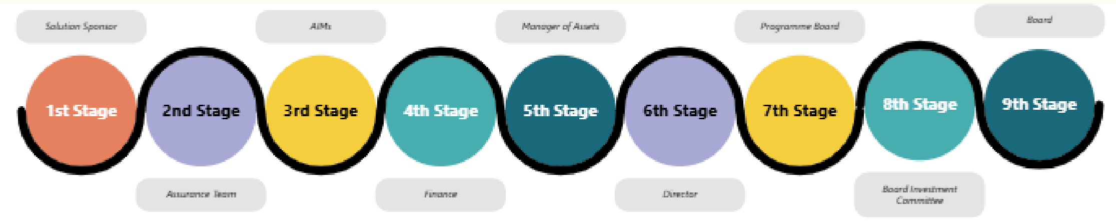
The model line of best fit represents the all-inclusive average cost of delivery of an asset or capital activity for any given 'size' metric, based on the coverage of the data points within the model. The datapoints within each model include both the 'direct' construction costs (labour, plant, materials) and the ancillary 'indirect' scheme costs (prelims, contractor overheads), as well as materialised risk.

We then produce the total capital intervention cost to Yorkshire Water by applying our oncosts model. This accounts for all additional capital delivery costs expended by Yorkshire Water, not attributed to the delivery partner. Currently this equates to a programme-level average %. This has been modelled based on historical financially complete schemes where all monies are settled and reported.

5.2 Delivery governance and management approach

Cost control and approval of the expenditure will be managed through our existing nine-step process (**Figure 18**), depending on the expenditure value being approved. This governance process will also be used for approval of cost changes through the asset life cycle at commercial hold points, whereby approval levels may change if the cost difference triggers the next level of authorisation.

Figure 18: Yorkshire Water's 9-step approval process



A simple process diagram below (**Figure 19**), illustrating our decision tree for capital delivery approvals, demonstrates how the correct levels of authorisation are assigned through our systems, with equivalent process charts existing for any in-flight changes to cost. The cascading design of the levels of authorisation ensures that appropriate and comprehensive scrutiny of delivery costs and risks is completed, with the multiple stages of authorisation providing a clear and strong route for approval or escalation.

Figure 17: Decision tree for capital delivery approvals

Content is redacted due to it containing commercially sensitive information.

The project lifecycle will be managed through our existing corporate promotion gateways which provide strategic, technical and commercial governance. The end-to-end gated process is in line with best practice set out by the Association for Project Management (APM) and is our overarching process that governs capital projects. The nine gateways and a brief process step description are shown below (**Figure 20**).

Figure 20: End-to-end gated capital delivery process

Gate 01	**Project Initiation** – Review of business case, risk, notional solutions, benefits, whole life cost and affordability prior to approving promotion of a new project.
Gate 02	**Investigation Funding Approval** – Investigation requirements and funding approved to ensure the project can progress with optioneering and investigations.
Gate 03	**Solution Approval** – Investigations are completed, and the single solution is agreed as the most efficient solution to meet the project outcomes.
Gate 04	**Delivery Funding Approval** – Delivery contracts have been developed and partner costs agreed. Funding approval has been done through the GMS process.
Gate 05	**Design Acceptance** – Designs have been developed and accepted prior to commencing construction phase.
Gate 06	**Construction Testing Acceptance** – Construction phase complete. Testing to ensure Assets constructed to all safety and design requirements.
Gate 07	**Commissioning & Testing Acceptance** – Commissioning & Testing Acceptance – Commissioning and Testing to confirm Asset is performing as required. Scope fulfilled and where relevant Regulatory Compliance achieved.
Gate 08	**Take-Over & Completion** – Final documentation approval of Asset Data. Completion Certificate issued.
Gate 09	**Defects Completion** – Following remediation of all major/minor defects. Defects and Final Payment Certification issued.

To facilitate approval at each gateway, we have defined an accompanying technical assurance process consisting of key meetings that occur with a clearly defined purpose and clear responsibilities. Every project within the capital programme is assigned a Project Manager who is responsible for the delivery of the project, working as part of the Collaborative Project Team (CPT). The CPT is made up of core members including the Yorkshire Water Project Manager, Project Sponsor, Engineering Representative and Capital Partner Lead and Strategic Planning Partner/Principal Designer (if applicable). The CPT call on additional internal and external subject matter experts as necessary throughout the project lifecycle (e.g. commercial, operations, technical and planning experts). The CPT are responsible for managing the project through the gated end-to-end delivery process following each of the key meetings referenced below in **Figure 21*.***

Figure 21: Key Meeting process for capital projects

Key Meeting	Title	Stage	Purpose	Chair	Key Attendees
KM0	Concept phase design sprint	Pre-Gate 01	To develop and agree the delivery approach for new projects including design sprints if required to focus the investigation.	Asset Planning	SPM, Sponsor, Engineering, Commercial, SPP, S&R
KM1	Project kick off meeting	Pre-Gate 02	Bring CPT members together to review business needs, Delivery Strategy, KM0 outputs, risk(s) and identify investigation scope.	PM	PM, Sponsor, SPP & or Contract Partner
KM2	**Options review & preferred solution meeting**	Pre-Gate 03	When several solution options are being considered and developed, these are presented to EDT for a decision on which preferred option(s) to progress with.	EDT	EDT, PM, Sponsor, SPP & or Contract Partner Costing team representative
KM3	**Solutions acceptance meeting & ALM**	Pre-Gate 03	Sign off the preferred solution to progress into delivery.	EDT	EDT, PM, Sponsor, SPP & or Contract Partner Costing team representative
KM4	Development phase kick off meeting	Pre-Gate 04	Bring CPT members together following acceptance of the tender design by YW to kick off the delivery stage.	PM	PM, Sponsor, SPP & or Contract Partner
KM5	Delivery contract kick off meeting	Pre-Gate 05	Following delivery funding approval & delivery contract award review delivery programme & scope.	PM	PM, Sponsor, Contract Partner
KM6	Commissioning planning	Pre-Gate 05	Review of the commissioning plan.	PM	PM, Sponsor, Operations, Contract Partner
KM7	**Design acceptance meeting**	Pre-Gate 05	Review and acceptance of the Contract Partner's design. Note for large schemes this can be phased over multiple KM7 meetings.	EDT	EDT, PM, Sponsor, Contract Partner
KM8	Prestart meeting	Pre-Gate 06	Prestart on-site meeting to review programme.	PM	PM, Sponsor, Operations, Contract Partner
KM9	Commissioning & testing completion	Pre-Gate 07	A review to confirm all construction, commissioning, performance, and reliability testing has been completed in accordance with the YW Engineering Specification. All contractual and commercial obligations should be finished with the completion documentation ready for review and acceptance by YW.	PM	EDT, PM, Sponsor, Operations, Contract Partner
KM10	Handover readiness	Pre-Gate 08	Review to confirm all completion documentation in place.	PM	EDT, PM, Sponsor, Contract Partner

5.3 Treatment of risk, uncertainty and optimism bias

Our UCD cost models represent the true materialised cost of delivery, including for realised risk, and are therefore only allowing for the costs likely to occur. The models guard against optimism bias and uncertainty. They therefore denote the average cost to deliver specific assets or activities without the need to build in any overestimates through additional risk or contingency costs. By including and continuously updating models with multiple datapoints, we inherently capture variances in scheme risk, uncertainty and complexity within the models and do not need to account for them separately in the cost estimation process. The top-down models represent an efficient, realistic 'typical' cost based on all circumstances encountered previously.

In the application of the cost models, peer reviews and cost challenges are completed within the specialist costing team to make sure that: a) the correct cost models have been selected against the described design, b) cost models are applied consistently between sites and options (unless deemed appropriate to deviate), and, c) the output costs are rational compared to historic examples.

Risk and uncertainty with the proposed costs is also mitigated through external benchmarking (see below ***5.4 Benchmarking against external data***).

5.4 Benchmarking against external data

We have based this submission on our known efficient cost of delivery having used our internal cost models, consistent with the application used within our PR24 submission. Our unit cost models represent what has and can be realistically delivered under our specific company settings and frameworks.

In line with the cost estimation methodology, we have benchmarked these costs against three external, independent sources:

- Strategic Planning Partner (SPP)
- Water Research Council (WRc) – TR61 cost model database
- Delivery contract partner estimates

The benchmark cost adopted for this submission is therefore considered to represent an efficient and robust estimate of the cost of delivery.

Table 13 presents the comparative cost evidence for each borehole intervention, including the individual estimates from YWS UCD, SPP, partner and TR61, together with the benchmark calculated average value. The table demonstrates that while individual estimates vary by source, the benchmarked averages provide a stable central estimate that moderate potential outliers. This directly supports Ofwat's efficiency test, as the adopted costs avoid reliance on any single high or low estimate and reflect a balanced view of efficient delivery costs.

TR61 costs were only available for replacement interventions and are shown separately in **Table 13** to maintain transparency. Where TR61 data was not applicable, triangulation was undertaken using the remaining datasets.

Table 13 - Borehole cost benchmarking (22/23 price base)

Boreholes	Intervention Type	YWS Cost (£m)	Partner Cost (£m)	Stantec Cost (£m)	TR61 Cost (£m)*	Benchmark Average Cost (£m)
Content is redacted due to it containing commercially sensitive information.	Refurb	Content is redacted due to it containing commercially sensitive information.				**£2.51**
	Refurb					**£1.11**
	Refurb					**£0.73**
	Replace					**£4.90**
	Replace					**£1.74**
	Refurb					**£1.06**
	Refurb					**£1.64**

**TR61 costs only available for replace solution interventions.*

Borehole relining and redrilling are relatively infrequent activities across the UK water sector, resulting in limited directly comparable industry benchmarks. The number of datapoints included in our borehole UCD cost models is low; there are four and two datapoints in our models for refurbish and replace respectively (**Table 14**). The table shows these two cost models which make up 76% of all of the submission costs. The number of datapoints and temporal range of the datasets within these cost models are low – ZY2025 reline model has three out of four datapoints from 2002/03. As a result, we have a lower confidence in the accuracy of our cost estimates and believe using the benchmark approach brings in more datapoints to the estimation. In this context, the benchmark approach strengthens the robustness of the cost assessment by drawing on multiple credible and independent sources, reducing sensitivity to the assumptions or methodologies applied within any single dataset.

Table 14: YW UCD cost models most utilised in cost build-up

Model Reference	Model Description	% total submission cost	Nr of datapoints in model	Datapoints date range
ZY2031	RAW/GEN Borehole - New - drilled depth of borehole (m)	50.6	2	2001/02 – 2015/16
ZY2025	RAW/GEN/Borehole Liner - Replace. (length of liner m)	26.1	4	2002/03 - 2018/19

Compared to our AMP8 schemes outlined in the implicit allowance section (for see ***6.1 Proposed price control deliverables (PCDs)***), the replacement costs we have collated for the boreholes in this submission are considerably lower. **Figure 22** and **Figure 23** show how costs and the benchmark average measure up to Yorkshire Water's AMP8 delivery costs per borehole. This further justifies using the benchmark cost instead of our UCD models for this case.

Content is redacted due to it containing commercially sensitive information.

Figure 18: Total average cost per borehole replacement

Content is redacted due to it containing commercially sensitive information.

Figure 19: Total average cost per borehole refurbishment

Content is redacted due to it containing commercially sensitive information.

Overall, the benchmarking approach demonstrates that the adopted costs are both efficient, by reflecting a central estimate across multiple sources, and robust, by being transparent, well-evidenced and resilient to uncertainty associated with infrequent asset types.

5.5 Cost breakdown by scheme

The details of each site's asset interventions can be found in ***APPENDIX B: Solution details and benchmarking scope*** – this is the scope information which was provided to all parties for cost estimation and forms the basis for all provided costs. This includes two types of data:

1. Solution Information for Costing sheet (SIC) - this document is an itemised delivery scope, with a list of assets and/or activities and metrics or descriptions defining their size.
2. Notional site layouts of the preferred and alternative solution options, outlining the relevant location of assets on site and the changes proposed as part of the asset intervention.

The individual cost breakdowns for each of the proposed options, which is based on the SIC scope and notional site drawings listed above, can be found in ***APPENDIX C: Solution cost breakdowns***.

5.6 Separation of Base and additional allowance costs

The solutions proposed in the claim are discrete from activities funded through Base allowances and relate solely to addressing specific asset health risks that cannot be efficiently managed within existing Base expenditure. Base allowances continue to fund routine maintenance, operational activities and reactive interventions necessary to sustain day-to-day serviceability. In contrast, the interventions included in this submission address underlying asset deterioration and structural condition issues that require targeted, proactive capital investment to halt declining asset health.

6. Customer Protection

This section details the customer protection to be implemented to ensure that customers receive the benefits that were funded for and be protected from non-delivery. Here we will explicitly detail what protection is provided in line with Ofwat's core evidential requirements:

- A proposed price control deliverable (PCD) for this priority asset class.
- The PCD should cover all aspects of the requested investment.
- PCD design should follow the guidance set out in the PR24 methodology and final determination.

6.1 Proposed price control deliverables (PCDs)

As described in ***3. Determining What Base Buys***, customers will be protected by PCDs that cover the specific investments that make up our requested uplift, plus additional activity up to our calculated implicit allowance.

We demonstrate in ***3. Determining What Base Buys*** that we plan to spend more on boreholes within our existing Base allowance than what we deem implicit. We are not including this additional value in our cost change claim and therefore we do not propose that it should be part of the PCD. In our view customers are better protected if this allowance retains an element of flexibility.

Table 15: Summary of Borehole Costs subject to PCD

Asset Group		Total Proposed Spend on Asset Group	Requested Uplift	Forecast AMP8 Capital Maintenance spend	AMP 8 Implicit Allowance (triangulated)	Minimum Scope of PCD (uplift + implicit)	Additional Planned Base no PCD required
Boreholes	£m	20.26	13.69	6.58	5.76	19.46	0.81*

**in order to include named schemes in the PCD we include slightly more than what is required within the PCD. This reduces the additional planned base to £0.581m*

Borehole PCD

It is important that customers are protected from non-delivery, so we have developed PCDs that enable this but also do not unfairly penalise the company or limit the ability to find genuine efficiency.

For our PCD for boreholes, we considered various options, assessing whether a unit cost could be developed for different metrics. We have considered the differences between our refurbishment and replacement activities. In our consideration we take into account both.

We find that separate PCDs for refurbishment and replacement of borehole assets are most appropriate.

We are committing to deliver these interventions by 31/3/2030 so we propose that these are end-of-period non-delivery PCDs. We are not proposing any time-incentive/ late delivery PCDs for this activity.

Refurbishment

For refurbishment, the analysis found that a simple count of boreholes is the best cost driver to use. The average unit rate per borehole refurbished in our programme we anticipate to cost, on average, £0.694 million. Given that the cost of each individual scheme varies very little from this, we believe that this is an appropriate measure to use for the PCD. We also note that this is consistent with the approach proposed by UUW/STW in the presentation shared by Ofwat at *'Roadmap for enhancing asset health understanding in the water sector - Workshop 10'.* **Table 16** below sets out the costs for each site and compares them to the unit rate.

Table 16: Refurbishment unit cost analysis

BOREHOLES	Intervention	Cost (£m)		Nr	Unit Rate £m/BHS	variance from average unit rate

Content is redacted due to it containing commercially sensitive information.

As the costs for an individual borehole refurbishment are close to this unit rate, we consider that this provides adequate protection for both customers and companies in the event of non-delivery of one or more of these sites.

Depth for refurbishment is also a reasonably good cost driver, however we consider that using number of boreholes will be a much simpler PCD to administer.

Therefore, our proposed PCD for refurbishment of boreholes is as follows:

Table 17: Borehole refurbishment PCD

Non-delivery PCD payment	Unit	Payment rate

Content is redacted due to it containing commercially sensitive information.

Definition	Major borehole refurbishment to extend life and reduce service failures, with relining and headworks maintenance. As set out in Section 4.

PCD outputs (cumulative)	Unit	2025-26	2026-27	2027-28	2028-29	2029-30
Number of boreholes Refurbished	nr					11

Replacement

Contrary to our findings for refurbishment, we consider that a simple unit rate for replacement is less appropriate. There is a slightly larger variance against the average unit rate for each site and as the costs are higher, this variance leads to more material differences in money returned in the event of non delivery. A 'unit rate' approach may fail to protect customers or companies depending on whether the individual site was below or above the average rate.

Table 18: Replacement unit cost analysis

BOREHOLES	Intervention	Cost (£m)		Nr	Unit Rate £m/BHS	variance from average unit rate

Content is redacted due to it containing commercially sensitive information.

We therefore consider that the most appropriate PCD is a site-specific PCD where non delivery of a site returns the full amount to customers. We do not consider that a 'partial' delivery of each site is a likely scenario. **Table 19** below sets out the proposed costs associated with each site.

Table 19: Borehole replacement PCD

Definition	Full asset replacement by redrilling new borehole and updating associated headworks as described in Section 5

PCD outputs (cumulative)	Cost	Intervention	2025-26	2026-27	2027-28	2028-29	2029-30
Content is redacted due to it containing commercially sensitive information.	**£4.90**	Replacement					1
	£1.74	Replacement					1
	£2.14	Replacement					1
	£3.28	Replacement					1

Summary

The below Table 20 shows a full summary of our proposed PCDs for our programme including the sites forming part of our uplift and the element of our base costs to which we are committing a PCD. It also shows the planned existing base expenditure to which we do not consider a PCD applies.

Table 20: Summary of proposed PCDs for boreholes submission

Borehole Site	Intervention	Cost (£m)	Nr of BHS	Proposed PCD	PCD Delivery Date

Content is redacted due to it containing commercially sensitive information.

	PCD For Uplift
	PCD For Implicit Base
	No PCD proposed

6.2 Interaction with existing PR24 PCs and PCDs

There is no direct interaction with our existing Performance Commitments (PCs) or PCDs.

This investment prevents deterioration in WAFU and Water Quality Compliance risk but does not contribute to any improvements or existing PCDs committed to within our plan. This investment is proactive intervention prior to service impact and will be treated as a standalone PCD.

7. Investment Delivery Plan

This section provides evidence of a robust delivery plan to ensure that we successfully deliver the required investment. Here we will demonstrate how this business case meets Ofwat's core evidential requirements:

- Evidence of design and delivery risks
- Evidence of engagement with relevant stakeholders
- Evidence of agreement of plans with stakeholders
- Evidence of engagement with supply chain
- Outline delivery schedule
- Proposal of a proportionate financial incentive

7.1 Design and construction delivery strategy

Yorkshire Water has framework contracts for the design and build of capital schemes, procured through best-in-class, capability and commercial competition. These take the form of three primary frameworks:

- AMP8 Non Infra Complex
- AMP8 Non Infra Minor
- AMP8 Infrastructure

The expenditure requested in this submission will be delivered through the AMP8 Non Infra Complex framework which consists of seven appointed Capital Delivery Partners, as follows:

Barhale	Galliford Try	Glanua	Kier	Mott MacDonald Bentley	Tilbury Douglas	Ward & Burke

The Non Infrastructure frameworks are five-year framework appointments, with the option to extend a further five years, commencing in March 2025, giving confidence in both competitive appointment and continuity of delivery. The frameworks include the option to either directly award, or run mini competitions for the allocation of work, and we have a commercial tool to assess this for each project.

We also have an awarded framework agreement with Stantec to be our Strategic Planning Partner (SPP). Their role is to work collaboratively with Yorkshire Water's Engineering, Asset Management and Capital Delivery teams to develop solutions across various stages of our project and programme lifecycles. They offer additional design capacity which could be utilised for this submission's delivery, especially for highly complex or high-risk schemes.

Procedures referenced in ***7.1 Delivery governance and management approach*** ensure continual engagement between asset management staff, operational staff and delivery partners to ensure the timely and safe delivery of the projects. Continuous delivery of service to our customers is also ensured, as well as making sure the environment is not impacted.

7.2 Delivery programme and key milestones

We have produced a delivery Gantt Chart for each of the proposed sites, to show the sequencing of the trickle filter interventions and key delivery milestones through the different phases of the delivery process: Definition (Investigation and Outline Design), Tender, Detailed Design, Construction, Completion. The delivery programmes are submitted in ***APPENDIX D: Delivery timelines***.

The overall delivery period for each intervention falls entirely within AMP8 Years 3-5. This gives confidence of delivery within the AMP8 period (by 31/03/2030). Although, working backwards from the end-of-AMP completion date, the specific milestone dates may alter following completion of the preceding phase of delivery, for example, Investigation and Design may start sooner than initially programmed.

The individual site delivery programmes align with our committed delivery completion date of 31/03/2030 proposed in section ***6.1 Proposed price control deliverables (PCDs)***.

7.3 Delivery risks and mitigation measures

Specific risks in relation to borehole activity have been identified below with action taken to mitigate them. Outside of these we expect usual project risks to be present that will be managed through business-as-usual processes e.g. monthly at Senior Leader level and weekly at a Project Manager/Sponsor level.

- Securing specialist contractor resource

  Due to limited suppliers in the market in relation to drilling rigs and specialist knowledge, required we have already made contact with these suppliers to ensure our activity can be accommodated within their planned workload during the AMP8 period. We have received assurance the workload can be accommodated when the order is received. To secure our slots in their national workload register, we have taken action to proactively promote the schemes ahead of the Ofwat December 2026 decision point.

- Geological data for new boreholes

  Proactive promotion of the programme will facilitate activities for detailed feasibility investigations thereby enabling design activity to be undertaken.

  - Outage constraints, we will need selective outage during works on each borehole.
  - Land purchase, risk of planning/landowner permission difficulties.
  - Environment Agency permit requirements.
  - Aquifer contamination may occur due to shallow borehole sites with hydraulic connectivity, which could potentially lead to production challenges.

7.4 Stakeholder and consent strategy

The Drinking Water Inspectorate (DWI) has been engaged as part of our proactive business-as-usual engagement to ensure awareness of this borehole asset health reopener submission and its linkage to the Drinking Water Safety Plan. DWI was informed that the submission is not driven by drinking water quality compliance but relates to asset health and resilience.

7.5 AMP8 delivery performance and confidence

The table below shows the company actual Base expenditure against the Final Determination value (excluding Retail). This demonstrates good progress has been made Content is redacted due to it containing commercially sensitive information.

Table 21: AMP8 Year 1 Base expenditure actuals (£m at 22/23 price base)

Content is redacted due to it containing commercially sensitive information.

8. Assurance

8.1 Overview of assurance approach

We use a way of working called the three levels of defence. We call this our methodology. It's a process for checking activities and information. We apply this across all work. This methodology gives us consistency in our assurance as some of our activities happen across several areas and our data can be from several sources. By putting our assurance activities into three levels, we make sure that we apply the right amount of assurance, at the right time.

We have appointed AtkinsRéalis as the independent external assurance provider for this Asset Health submission.

As per Ofwat's requirements "PR24 Cost change process - Asset health investment assessment guidance", dated December 2025, our appointed independent assurance provider, AtkinsRéalis, will provide Ofwat with an actionable duty of care in relation to the quality of the report. This means that the report will be provided to the requisite professional standard and that we have conducted sufficient verification and independent assessment. As part of this appointment, we can confirm that we have fully investigated with AtkinsRéalis whether actual, potential, or perceived conflicts of interest could arise in the event of the assurance provider's appointment.

8.2 Independent technical assurance statement

AtkinsRéalis confirm that they were given free access to relevant staff and information on request, including unrestricted access to all systems, files and documents requested.

Overall AtkinsRéalis found that the approach taken by the Company is reasonable. AtkinsRéalis note that:

We consider the investment proposed to be sound and supported by sufficient and convincing evidence. It is clear that the health of the boreholes is adversely affecting the resilience of the service and that this is likely to deteriorate.

During the assurance process we challenged a number of areas including the clarity of the benefits and logic behind borehole selection, the unconstrained options considered and the details of delivery risk mitigation. We believe that the Company has addressed these concerns effectively.

The areas we have classified as "Amber" issues against the assurance requirements relate to:

- The guidance requires an assessment of current and future risk. The submission focused on asset condition and replacement profiles and does not set out risk in a structured way i.e. in terms of probability multiplied by consequence.

- The guidance also requires that the proposal is supported by a long-term asset class strategy. The Company considers that its submission contains the key components of an asset class strategy. However, we consider that a long-term asset class strategy would go beyond the contents of the submission.

We do not consider this undermines the case for the proposed investment.

8.3 Independent commercial assurance statement

We consider the costs to be reasonable for this stage of project development.
During the assurance process we challenged a number of areas including the variance from the benchmarks, need for cost breakdowns and clarity of definitions in the PCDs. The Company has addressed these concerns effectively. We have classed all of the commercial assurance requirements as 'Green'.

Cost change tables

AtkinsRéalis confirm that they have assured the cost change tables and are satisfied that they are consistent with the guidance. They note that Yorkshire Water's calculation of the implicit allowance in the tables takes account of real price effects and frontier shift whereas the proposed investment costs do not. In the absence of specific guidance, AtkinsRéalis do not consider this is unreasonable.

9. Appendices

APPENDIX A. Detailed asset information and condition assessments

Content is redacted due to it containing commercially sensitive information.

Site	Asset	Date of Survey	Document Type	Document Reference

Content is redacted due to it containing commercially sensitive information.

Site	Preferred Intervention	Need and Risk Description	Rationale & Description of Solution

Content is redacted due to it containing commercially sensitive information.

Content is redacted due to it containing commercially sensitive information.

Content is redacted due to it containing commercially sensitive information.

APPENDIX B. Solution details and benchmarking scope

Content is redacted due to it containing commercially sensitive information.

Site	Document Type	Document Reference

Content is redacted due to it containing commercially sensitive information.

APPENDIX C. Solution cost breakdowns

Content is redacted due to it containing commercially sensitive information.

Document Type	Site Name	Document Reference

Content is redacted due to it containing commercially sensitive information.

APPENDIX D: Delivery timelines

Content is redacted due to it containing commercially sensitive information.

Document Type	Site Name	Document Reference

Content is redacted due to it containing commercially sensitive information.

APPENDIX E: Assurance Report

A supplementary folder containing the Assurance Report is provided titled '**YKY Boreholes – Appendix E'**.