Asset Health Cost Change 2026

Asset Health Business Case - Supporting Gravity Sewers

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Confidential

United Utilities

Water for the North West

Executive Summary

United Utilities Water (UUW) welcomes Ofwat's consideration of evidence-based proposals for additional asset health investment, focused on priority assets identified in the *Roadmap for Enhancing Asset Health Understanding in the Water Sector*. This case, which is a standard – single main submission, sets out our plans to address structural deterioration in gravity sewer assets, with a total expenditure claim of £188.0m. By intervening at the right time, we will protect service performance, reduce disruption over the long term, and strengthen outcomes for customers and the environment.

UUW has historically prioritised service reliability and targeted operational interventions to protect customers. While effective in managing in-period service risk, this approach has necessarily focused on short-term approaches rather than interventions that stabilise long-term asset health. AMP8 marks a shift towards more proactive, condition-led intervention. However, current base investment levels are not sufficient to achieve a sustainable rate of sewer renewal.

This case enables a further step-change, accelerating the transition towards renewal rates that arrest deterioration and improve asset health. This ambition aligns with our AMP8 strategic themes by strengthening how we use data to optimise asset management across the full lifecycle, enabling a fundamental shift from reactive recovery to proactive maintenance.

Description

The proposed investment will increase the scale and pace of proactive interventions on our gravity sewers by expanding proactive survey and condition assessment activities to identify assets suitable for cost-effective intervention, delivering targeted rehabilitation and infiltration reduction where surveys confirm structural deterioration, and implementing a representative random sampling programme in line with Ofwat's guidance.

UUW operates and maintains around 79,000 km of gravity sewer. In line with Ofwat's guidance, gravity sewers greater than 1,500 mm in diameter are excluded from this business case, reducing the total eligible network to 78,600 km. We are currently targeting to survey 3,741 km through existing base programmes in AMP8. This additional programme will enable proactive survey and remediation across a further 4,173 km of gravity sewers, allowing us to reach a sustainable survey rate of 10% of the network per AMP.

The total additional investment of £188.0m comprises £183.7m for targeted rehabilitation and infiltration reduction and £4.3m for representative random sampling, as detailed in Table 1 below:

Table 1: Cost and Activity Split – AMP8 Proposed Investment (£m, 2022-23 CPIH prices)

Activity	Purpose	AMP8 additional investment
Targeted rehabilitation and infiltration reduction	Condition-led relining and replacement to stabilise gravity sewer structural condition and prevent escalation to failure	183.7
Representative random sampling (c.0.5%)	Unbiased condition evidence to support sector-wide understanding of gravity sewer health, in line with Ofwat guidance	4.3
Total investment		188.0

Source: UUW analysis

Asset class strategy alignment
The proposed programme supports the Gravity Sewer Asset Class Strategy ambition to increase the proportion of our sewer network remediated to a sustainable level. Since the design life of current sewer lining techniques is fifty years and sewer lining is the most cost effective and least disruptive remediation approach, this would require us to survey and remediate (where a need is identified) approximately 10% of our network each AMP.

Need

The need to invest now is driven by three related factors:

- **Improved condition insight:** Enhancing the quality and coverage of gravity sewer asset health data enables more accurate risk assessment and better targeted, condition led intervention.
- **Long-term sustainability:** Transition to a sustainable remediation rate in AMP8 to prevent deterioration and risk to customers and the environment.
- **Delivery readiness:** Aligning with the accelerated delivery of the AMP8 base programme, making effective use of mobilised resources, delivery partners and supply chain capacity.

Expanded CCTV coverage, supported by AI-enabled defect classification, now shows a rapidly increasing number of gravity sewers entering structural Grade 3, the point of maximum whole-life value for intervention. Acting at this stage enables cost-effective trenchless rehabilitation that materially extends asset life. The proposed AMP8 uplift will help establish a credible trajectory toward sustainable long-term sewer asset health.

What Base Buys

The AMP8 base allowance delivers an uplift in proactive activity that supports PR24 performance assumptions, but it is designed to manage in-period risk, not to stabilise long-term gravity sewer asset health. Improved condition insight now shows that base investment alone is insufficient to intervene consistently at the point of maximum whole-life value. The proposed uplift addresses this gap, initiating an evidence-led transition to a sustainable renewal trajectory and preventing avoidable progression to higher-cost replacement beyond AMP8.

Benefits

The proposed investment reduces future risk to customers and the environment by enabling earlier, condition led intervention ahead of asset failure. This preventative approach reduces the likelihood of future flooding, pollution and emergency repair activity, protecting long-term service reliability rather than material in-period performance benefit. This will deliver a more resilient wastewater network with fewer disruptive incidents and lower future risk, beyond what can be achieved within existing base allowances.

This proposed investment programme targets a defined subset of the sewer network in AMP8 (c.10% surveyed, 0.44% anticipated to be remediated) and focuses on proactive interventions to address underlying condition and reduce the risk of failure. Given historic costs are dominated by reactive repairs and incident response, benefits are expected mainly through risk reduction and cost avoidance (reactive capital repairs and incidents), rather than material reductions in baseline maintenance costs. If reactive investment reduces, this will be redirected to fund delivery of the expanded AMP8 proactive programme.

Cost efficiency and best option for customers

The proposed investment is the lowest whole-life-cost option for customers, enabling planned, condition-led rehabilitation in place of reactive, failure-driven replacement. This preserves access to lower-cost trenchless solutions, avoids repeat repairs and emergency excavation, and reduces disruption for customers. Initial AMP8 evidence confirms this approach delivers lower cost and fewer repeat interventions, supported by proven unit rates and an already mobilised supply chain, ensuring efficient and value-for-money delivery.

Looking ahead

In line with Ofwat guidance, UUW anticipates returning in a future submission to address the approach for sewers above 1500 mm in diameter. Although this cohort is relatively small, it carries a disproportionately higher level of risk, alongside significantly greater cost implications and potential customer and community disruption associated with any survey or remediation work. Evidence generated through AMP8 delivery will improve understanding of gravity sewer condition, deterioration behaviour, efficient intervention, and any forecast performance benefit anticipated. While the proposed investment is not expected to deliver material additional performance improvements within AMP8, it is forecast to deliver wider asset health and risk-reduction benefits. Evidence from AMP8 costs, delivery experience and condition outcomes will be used to evaluate these benefits and to inform future performance targets, total expenditure and investment decisions at PR29.

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Appendices

1. Introduction

This section defines the scope, scale and targeting of the proposed gravity sewer investment. It sets out the activities, how these extend our current AMP8 base programme, and how intervention will be prioritised using risk-based, condition-led evidence. It also confirms the assets and delivery workstreams in scope, it explains our data-led approach to targeting our investment as our insights continues to mature. It also explains the key North West factors shaping risk and delivery.

1.1 What the investment will involve

1.1.1 The proposed investment case, which is a standard – single main submission, increases the scale and effectiveness of proactive surveying and rehabilitation across the wastewater network, while strengthening the governance and decision-making framework used to determine whether, when, and how individual gravity sewer assets are intervened upon. It supports a controlled transition during AMP8 towards a sustainable intervention rate of approximately 10% of the network per AMP, which we consider necessary to maintain long-term asset health and service resilience.

1.1.2 The business case seeks £188.0m of additional investment to extend the existing AMP8 planned survey and rehabilitation programme. This will enable delivery of a further 4,173 km of survey and associated remediation, in addition to the 3,741 km already included within the base plan. The additional activity will be prioritised using asset-health-driven risk assessment.

1.1.3 Increased survey coverage does not predetermine intervention. Inspection outputs will be used to confirm asset condition, validate risk, and screen intervention options in line with the established decision framework. Assets assessed as being in acceptable condition will receive no intervention; assets exhibiting moderate deterioration will be rehabilitated where this represents best value; and only assets that have deteriorated beyond rehabilitable thresholds will be considered for replacement.

1.1.4 The proposed investment is explicitly inspection-led. Increased survey does not automatically trigger intervention, and no sewer is renewed or replaced based solely on deterioration modelling outputs. All interventions are verified through CCTV inspection and optioneered based on confirmed condition, risk and consequence. The modelling is used at a system level to understand risk trajectories and inform programme scale, not to mandate asset-level replacement decisions.

1.1.5 The programme builds directly on the existing AMP8 approach, which emphasises early identification and management of deterioration in order to address the underlying causes of service failure rather than reactive symptom management. The resulting asset health and resilience benefits align with Ofwat's PR24 Gravity Sewers Investment Assessment Guidance[1]:

- Address known asset health risks identified through inspections;
- Improve structural condition and long-term resilience of the sewer network; and,
- Reduce reactive failures and interventions.

1.1.6 In response to Ofwat's requirement for enhanced condition evidence to support a more robust national understanding of sewer asset health, the proposal also includes inspection and associated remediation of a randomly sampled 0.5% (388 km) of the sewer network. This activity will provide an independent and representative dataset to complement risk-based surveys and inform future regulatory assessments.

1.1.7 Overall, the proposal set out in this document enables a material increase in the proportion of the sewer network surveyed and, where justified, remediated during AMP8, aligning with our targeted sustainable

[1] Ofwat-gravity-sewers-assessment-guidance-final-1.pdf

rate of 10% of our sewer stock per AMP. Table 2 identifies the additional investment proposed in this business case in relation to the relevant areas of our existing AMP8 plan.

Table 2: AMP8 Proactive sewer rehabilitation programmes – current and proposed (£m, 2022-23 CPIH prices)

	Proactive enhanced targeted on asset health related flooding	Proactive targeted on asset health related infiltration	Random sample to understand asset health	Proactive base survey programme
Base Programme Length surveyed **3,841km** Network coverage **4%** Length remediated **225km**	Length remediated **120km**	Length remediated **15km**	Length assessed **388km** (same 388km as below)	Length remediated **90km**
Cost Change Case **£188m** Length surveyed **4,173km** Network coverage **6%** Length remediated **345km**	**£114.1m** Length remediated **185km**	**£56.4m** Length remediated **128km**	**Surveying £4.8m (+ £12.7m remediation)** Length remediated **32km**	Total surveyed **7,912km** Network coverage **10%** Total remediated **570km**

Source: UUW analysis

1.2 Where we are planning to invest

1.2.1 The work supported by this additional investment is an extension of our existing AMP8 sewer survey and remediation programme. We are planning to target an additional 4,173km of our gravity sewer network for proactive survey and rehabilitation, selecting areas using the risk-based prioritisation approach developed for the existing programme as described below. Specific locations cannot be defined at this stage as the prioritisation process is linked to live data and therefore subject to change.

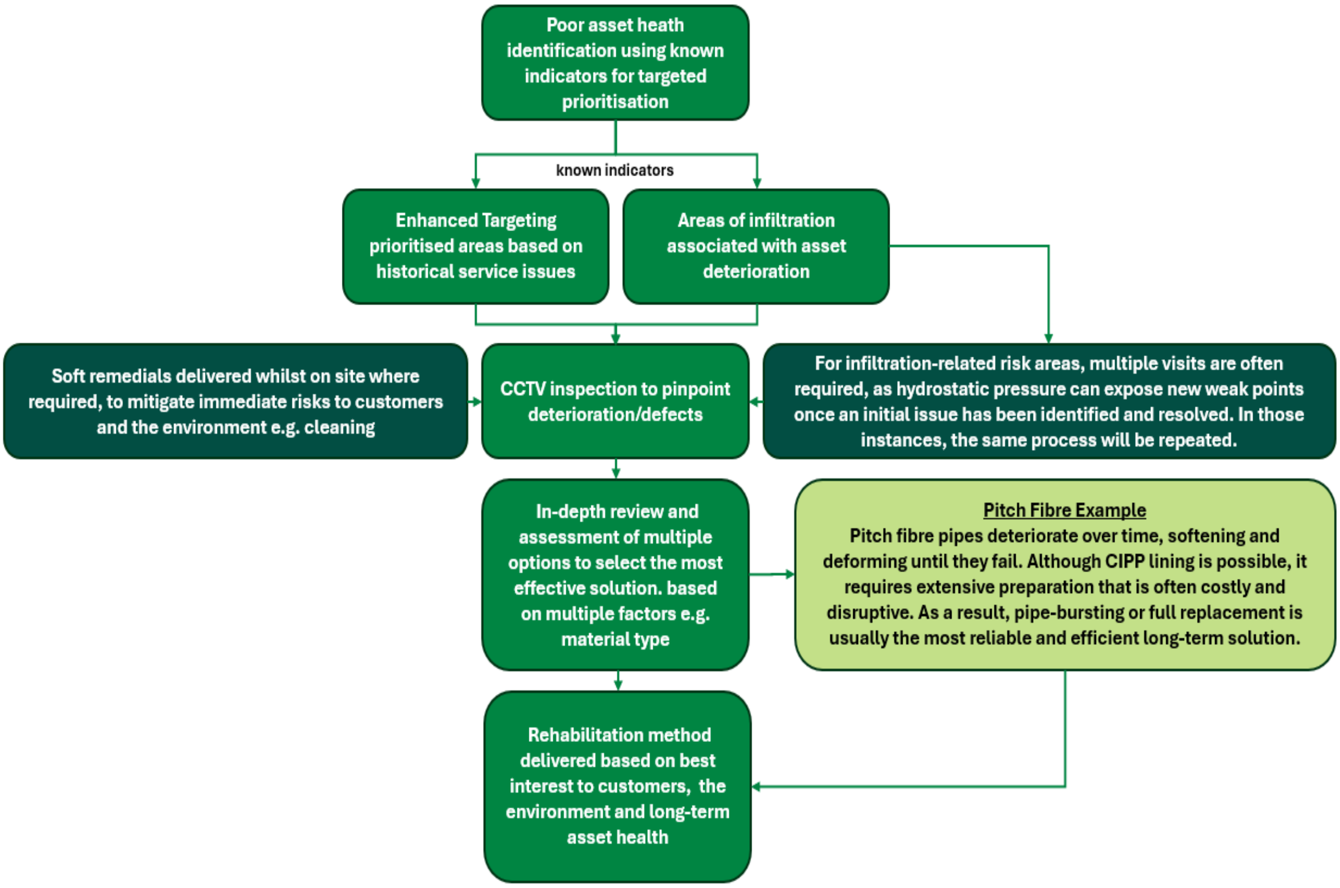
1.2.2 Service failures have historically been used by the industry to identify asset health issues affecting underground assets. Ofwat highlights this issue in its *Gravity sewers investment assessment guidance*[2], noting that existing data on gravity sewers is considered to be unrepresentative of the wider network due to it being heavily failure focused. Whilst we recognise the need to develop a more nuanced understanding, we also acknowledge that this will take time and waiting to deliver this required step-change in rehabilitation rates before taking further action will be detrimental to the interests of future customers. This is why we are proposing the use of established prioritisation approaches, drawing on sufficiently robust data to initiate necessary, no-regrets interventions, as demonstrated in this case. In parallel, we will continue to strengthen the data base and support ongoing improvement.

1.2.3 The assets covered by this investment are standard public gravity sewers (including privately transferred sewers) with a diameter of <1500mm as defined in Ofwat's *Gravity sewers investment assessment guidance*.

1.2.4 Figure 1 outlines the activities included in our existing AMP8 remedial programme, which also forms the basis of the proposed additional investment set out in this case.

[2] Ofwat-gravity-sewers-assessment-guidance-final-1.pdf

Figure 1: Flow chart showing proposed programme activity



Source: UUW analysis

1.2.5 Building on existing, well-established indicators of poor asset health, we are enhancing our approach to prioritisation to ensure investment and intervention are targeted. By using these known indicators as a foundation, we can move beyond reactive decision making. This prioritisation effort is being progressed through the two workstreams outlined below.

Enhanced Targeting

1.2.6 The Enhanced Targeting workstream identifies at-risk areas by combining multiple datasets to create a prioritised view of worst-performing postcodes. We have applied an annualised risk approach through modelling to ensure investment is prioritised where it delivers the greatest benefit for customers.

1.2.7 The AMP8 approach has been designed to ensure that both operational resources and capital investment are directed to areas with elevated current risk and a high likelihood of recurring service failures driven by ongoing asset deterioration. This business case applies the same core principles established for AMP8 but will focus exclusively on needs arising from asset health, ensuring that investment is targeted where it will have the greatest long-term benefit on the health of our network.

1.2.8 Enhanced targeting is not solely a prioritisation tool; it is a critical enabler of effective optioneering. By combining multiple datasets to identify areas of elevated and recurring risk, the approach focuses survey and investigation activity where deterioration is most likely to be present. This allows intervention options to be constrained early, ensuring that customers are protected from unnecessary or premature replacement and that the minimum effective intervention is selected at the point of best whole-life value.

Infiltration Reduction

1.2.9 For the purposes of this Asset Health submission, infiltration refers specifically to groundwater ingress arising from structural deterioration of gravity sewer assets, such as defective joints, fractures, material degradation or loss of structural integrity. This investment does not target point source inflows such as overland flow from rural areas, land drains, watercourses and illegal misconnections.

1.2.10 Infiltration to the sewer network through groundwater is estimated through sewer network hydraulic modelling but requires surveys to confirm location, issue, and remediation methods. We use a range of approaches to help us pinpoint where infiltration is entering the system, enabling us to better understand areas of poor sewer asset health. These include:

- **Event Duration Monitors (EDMs) on Emergency Overflows (EOs):** Monitoring that shows assets spilling outside of wet-weather conditions provides a clear indication of infiltration influencing overflow performance;
- **Operational Knowledge:** Our operational and field teams routinely recognise emerging infiltration issues through day-to-day activities such as reactive maintenance, CCTV surveys, and ongoing performance monitoring;
- **AMP8 WINEP delivery insights:** Hydraulic modelling undertaken in support of the delivery of the AMP8 programme demonstrates that infiltration and groundwater ingress are key contributors to baseline flows with the possible risk of significantly influencing the scale, design, and cost of proposed interventions; and,
- **StormHarvester:** Artificial intelligence driven tool helping improve the performance of wastewater networks through predictive analytics and automation. Intelligent monitoring and analytics support early identification of infiltration trends, enabling more targeted and proactive asset management.

1.2.11 Infiltration indicators identified through hydraulic modelling or operational intelligence will be verified through CCTV surveys to confirm the cause is structural deterioration, such as defective joints, fractures or material degradation. Where survey shows that infiltration is directly attributable to structural defects the assets affected will be fully rehabilitated to prevent further deterioration. In these cases, the presence of infiltration is a symptom of underlying deterioration that, if left unresolved, accelerates degradation of ground conditions and increases collapse risk.

1.2.12 By proactively rehabilitating structurally defective sewers we can prevent this acceleration of deterioration and extend the life of the asset. Infiltration reduction therefore occurs as a benefit of addressing underlying structural issues, not as a standalone driver.

1.2.13 We have ensured there is clear separation and no duplication between Asset Health related investment as set out in this case and growth and storm overflow related investment.

1.2.14 Where infiltration is identified, it is treated as a symptom of underlying structural deterioration rather than a standalone driver for intervention. Rehabilitation is therefore targeted at restoring structural integrity where defects are confirmed, ensuring that investment addresses asset health risk rather than capacity requirements, which are considered through separate growth related investment proposals.

1.2.15 The Asset Health investment proposed in this submission is targeted at structurally deteriorating assets that may not deliver immediate pollution, flooding or spill benefits, but where early rehabilitation is required to stabilise condition and prevent future escalation of risk. Regulatory reporting governance arrangements will ensure that costs and outputs for individual interventions are not double counted between other AMP8 activities and this Asset Health investment.

1.3 Regional and site factors

1.3.1 The regional and site-specific factors described in this section influence both the risk profile of the gravity sewer network and the value of intervening earlier in the deterioration lifecycle. While these factors do not change the fundamental principles of asset health management, they increase the importance of targeted, condition led intervention to protect customers from deterioration, avoidable disruption and higher long-term cost.

1.3.2 The unique climate, landscape and infrastructure of the North West present significant challenges for wastewater management. The average annual urban surface water runoff in the North West is 40%[3] higher than the average for England and Wales. Higher than average rainfall is driven by prevailing weather systems bringing more rainfall to the north and west of the UK, and the impact of the Pennines. The Pennines act as a barrier, forcing uplift of air and concentrating rainfall in western catchments, influencing runoff, and more water entering the sewer network in the North West. 54%[3] of public sewers in the North West are combined (conveying both wastewater and surface water), compared to industry average of 33%.[3] These factors increase hydraulic stress and infiltration risk, which can accelerate deterioration where assets are already structurally compromised. This reinforces the value of early, condition led intervention to stabilise assets before defects interact and escalate into more severe failures.

1.3.3 This was recognised by Ofwat accepting a company-specific PCL for UUW for internal sewer flooding at PR24 Final Determination.

1.3.4 Other factors specific to our region include:

- **Population growth and development:** population has grown by 8.6% since 2002 and around an additional one million people are forecast to live in the North West region by 2050[4], increasing demand for wastewater services;
- **Expansive or collapsible soils:** The North West of England has a significant coastal area which has extensive soft and loose tidal flat, peat and marine alluvial deposits which are typically prone to settlement. Extensive areas of peat are also located in the region, particularly along the Pennine Moors which are susceptible to settlement and collapse;
- **Soil voiding around sewers:** The North West of England is impacted by the legacy of the coal mining industry which means there is a great potential in the region for collapse of assets associated with historical mining in the region. The Lake District and Pennine areas have historically been impacted by underground and unregulated ore extraction leaving areas susceptible to unanticipated collapse. The southern part of the region (Cheshire) has been historically impacted by salt extraction. The use of wild brining techniques has resulted in long-term and ongoing regional settlement which can lead to void formation and general movement and collapse of sewers; and,
- **High groundwater increasing risk of infiltration:** The North West of England has a significant coastal area where high water tables are present. These high-water tables make the extensive soft and loose tidal flat, peat and marine alluvial deposits found in these locations more prone to settlement, which can cause sewer deterioration and lead to asset health driven infiltration.

1.3.5 Taken together, these regional factors do not alter the hierarchy of intervention options, but they do increase the importance of acting at the right point in the deterioration lifecycle. By identifying and addressing defects earlier, the programme preserves access to lower cost, lower disruption rehabilitation techniques and avoids escalation to more invasive replacement. This improves customer outcomes by reducing disruption, managing risk proportionately and protecting customers from unnecessary long-term cost.

1.3.6 These regional and site-specific considerations reinforce the need for the condition led, targeted approach as set out in this section and inform how risks are prioritised and mitigated through the proposed investment.

[3] UUW40 Operational resilience and asset health - our approach

[4] UUW02 Chapter 2: Provide great water for a stronger, greener, healthier North West

2. Guide to evidence

Table 3 below highlights where the key evidential components of our case are located within the document. It is designed to help readers easily navigate to the supporting information that underpins our assessment and justification and provide clarity on which key evidential requirements our document is focused on.

2.1 Asset health document signposting

Table 3: Signposting to key sections of document

Assessment area	Key requirements	Section reference
Need for step change in investment	Historical investment and asset management approach	3.5 and 3.6
	'What base buys' assessment	4
	Asset health risk to service environment	3.1
	Future asset health and risk	3.2
	Aligned long-term strategies	3.5
	Stakeholder engagement	5.5
Best option for customers	Unconstrained credible options	5.2
	Our proposed solutions	5
	Benefits versus the current position	5.4
	Customer engagement on options	5.5
Robust and efficient costs	Costing methodology for option and solution costs	6.1
	Efficient option and solution costs and good industry practice	6.1
	Cost benchmarking	6.2
	Solution costs	6.1
Customer protection	PR24 base expenditure plan	3.5 and 7.1
	Investment proposed in this cost-change	7.1
Investment delivery plans	Design and delivery risks log	8.3
	Aligned long-term asset strategies	3.5
	Stakeholder and supply chain engagement in delivery plan	8.1 and 8.6
	AMP8 investment delivery is on track	8.5
	Outline delivery schedule	8.4

Source: UUW analysis

3. Need for investment

This section explains why a step change in investment in gravity sewers is now needed. UUW owns 78,600 km of small diameter sewers (less than 1500 mm). Recent survey data shows that condition is worsening more quickly than before. In just three years, the share of sewers in poor condition (Grade 3) almost doubled, rising from 8.5% to 16.4%, while those in excellent condition (Grade 1) fell from 72.4% to 64.1%.

This shows that relying on past, failure led approaches is no longer effective nor sustainable. It also demonstrates that AMP8 base allowances on their own will not be enough to achieve our long term aim of surveying around 10% of the network each AMP. This section sets out how risks are increasing, what would happen if action is delayed, and how the proposed £188.0m uplift supports our long term asset strategy and customer expectations.

3.1 Risks mitigated by the investment

3.1.1 The following outlines the key risks that this investment will mitigate, arising from the progressive deterioration of gravity sewers. As assets continue to degrade, both the likelihood and consequences of failure increase, while cost-effective intervention options diminish rapidly over time. By enabling earlier, condition-led intervention, the proposal addresses deterioration before it escalates into higher-impact service, environmental and customer outcomes.

3.1.2 Risk assessment and investment prioritisation are informed by deterioration modelling and system-level risk analysis; however, no asset is selected for renewal or replacement based on modelled condition alone. All interventions are subject to verification through visual inspection, primarily via CCTV surveys, to confirm the presence, severity and nature of defects. Investment decisions are then optioneered based on verified condition, the likelihood and consequences of failure, and whole-life value, ensuring that higher-consequence assets are prioritised and that replacement is only undertaken where condition and risk have been confirmed through inspection.

Structural failure and collapse

3.1.3 Rehabilitation reduces the risk of structural failure and collapse arising from progressive deterioration in ageing gravity sewers. As defects such as cracking, joint separation and deformation worsen, both the likelihood and consequence of failure increase, narrowing cost-effective intervention options. Timely rehabilitation stabilises assets, preventing collapse, sinkhole formation and wider disruption, and securing long-term network integrity.

Infiltration and hydraulic stress

3.1.4 Structural deterioration allows infiltration that increases hydraulic stress and operating cost. Early, condition-led rehabilitation restores system tightness, reducing excess flows, improving wet-weather performance, and protecting customers from service and reputational impacts.

Flooding and service disruption

3.1.5 As structural defects develop, the tolerance of sewers to operational stress reduces. Blockages and collapses become more likely, increasing the risk of internal and external flooding, repeat incidents and prolonged disruption for affected customers.

Environmental protection

3.1.6 Rehabilitation reduces environmental risk by reducing leakage and pollution arising from deteriorating sewers, while also lowering infiltration-driven flows that increase energy use and treatment costs. Planned intervention improves resilience and delivers lower long-term operating cost than reactive maintenance.

Customer impact

3.1.7 For customers, these risks manifest as flooding, service disruption, emergency works and repeated visits to the same locations. These impacts are disproportionately higher when intervention occurs reactively following failure rather than proactively in response to emerging deterioration. By enabling earlier intervention, the proposed investment reduces the likelihood of avoidable customer harm and improves the predictability and reliability of wastewater services over the long term.

3.1.8 These risks are not static. As set out in Section 3.2, external pressures such as ageing infrastructure, climate change and growth are increasing the rate at which deterioration occurs. Section 3.4 provides evidence that a growing proportion of assets are entering critical condition states where timely intervention is required to prevent escalation of these risks.

3.2 How the risks are changing

3.2.1 UUW operates approximately 79,000 km of sewer network across the North West, ranging from small local pipes to major strategic pipelines. The risk profile of the gravity sewer network is dynamic. Ageing infrastructure, external pressures and improved condition insight are changing the likelihood, consequence and timing of asset health risks, increasing the importance of earlier intervention to manage risk efficiently and avoid escalating cost and disruption for customers.

Ageing infrastructure

3.2.2 Much of the sewer network is operating beyond its original design life. As assets degenerate, they deteriorate faster and are less able to absorb additional stresses, raising the probability of failure.

Climate change and groundwater pressures

3.2.3 Changes in rainfall and temperature tests the network beyond its original design assumptions:

- More frequent, intense rainfall increases hydraulic stress, blockages and collapse risk—amplified by UUW's high proportion of combined sewers;
- Extreme weather causes repeated flooding in vulnerable areas without targeted action;
- Rising groundwater levels and storm surges accelerate deterioration, particularly in older sewers; and,
- Hot, dry periods cause ground movement and cracking, increasing infiltration and structural compromise.

Growth and rising loading

3.2.4 Population growth increases baseline flows, reducing network resilience and accelerating deterioration where defects already exist. While not the primary driver of investment, growth acts as a compounding pressure, narrowing the window in which low-cost, low-disruption rehabilitation remains viable and reinforcing the need for timely, condition-led intervention.

Summary

3.2.5 These pressures (ageing materials, hydraulic loading and groundwater stress) interact collectively, accelerating deterioration and reducing tolerance for defects. Emerging asset health modelling shows deterioration is outpacing remediation, pushing more assets into higher-risk states and increasing reliance on reactive, disruptive and costly replacement. More details can be found in Section 3.4.

3.2.6 As assets deteriorate faster, the range of viable interventions narrows. Rehabilitation options become limited, and assets are more likely to require full replacement, increasing cost, customer disruption and residual risk.

3.2.7 The changing risk profile underscores the need for improved condition insight, enhanced targeting and earlier, condition-led decisions, which are explained in Sections 3.4 and 6. These capabilities ensure interventions remain proportionate, effective and aligned to whole-life value, protecting customers from unnecessary cost and disruption as asset health risks evolve.

3.3 Why this is the right time to invest

A demonstrable inflection point in gravity sewer condition

3.3.1 Recent condition evidence indicates that an increasing proportion of gravity sewers are entering structural condition states where intervention delivers maximum whole-life value.

3.3.2 This represents an inflection point in asset health: intervening now enables cost-effective rehabilitation, whereas further deterioration materially increases the likelihood of progression into condition states requiring more disruptive and expensive replacement, transferring costs to future customers.

3.3.3 The length of the gravity sewer system operated by UUW almost doubled under Section 105 of the Water Act in 2011, with the transfer of formally private sewers as shown in Table 4 below. These sewers had received little historical investment and in the fifteen years since adoption and that has resulted in a large proportion of reactive investment.

Table 4: Increased extent of gravity sewer network following transfer of private sewers

Gravity Sewer Lengths	
Before Private Sewer Transfer (2010/11)	After Private Sewer Transfer (2011/12)
43,743km	77,344km

Source: UUW 2010/11 & 2011/12 submission

3.3.4 Since privatisation the sewer system in the North West has been subject to major investment with substantial programmes to reduce Unsatisfactory Intermittent Discharges (UIDs), to reduce internal and external property flooding, to improve bathing water quality, and to significantly reduce the number and severity of pollution events adversely impacting the environment. These programmes—including the provision of additional network storage to reduce sewer spills—have been primarily focused on delivering service and environmental outcomes, rather than on upgrading existing sewer assets. Historically, asset health risks have been managed through the monitoring of performance indicators, with detailed asset condition assessments undertaken only where deteriorating performance indicated an emerging issue.

3.3.5 As a result, investment decisions have been driven predominantly by evidence of performance risk rather than by asset age or routine condition surveys, ensuring that interventions are targeted to locations where risk is demonstrably present. Consequently, this performance-led approach has meant that only a limited proportion of the gravity sewer network has undergone full asset renewal to date.

Time limited access to low cost, low disruption intervention options

3.3.6 The effectiveness and applicability of trenchless rehabilitation techniques are inherently condition-dependent.

3.3.7 Delaying intervention beyond the current condition window results in the permanent loss of these lower-cost, lower-disruption options, increasing whole-life cost and customer impact in a way that cannot be reversed through higher future expenditure.

AMP8 as the optimal delivery and mobilisation window

3.3.8 AMP8 provides a unique delivery window in which enhanced targeting, condition insight, analytical capability and supply chain capacity are already established and operational. There are significant benefits of this mobilisation, reducing delivery risk and cost in future periods while improving the efficiency with which asset health risk can be addressed. Additional allowances during AMP8 will allow existing programmes of work to be broadened to target more of the areas identified as being at-risk based on available condition data, enabling us to address issues across the sewer network that are impacting on our customers and the environment.

Initiating a sustained transition to a long-term rehabilitation trajectory

3.3.9 Our intention is that the proposed investment in AMP8 could commence to a sustained transition toward a rehabilitation rate that stabilises long-term gravity sewer asset condition. Initiating this transition in AMP8 minimises the scale, cost and disruption of future catch-up investment; deferral would materially increase the entry cost of reaching a stable, sustainable position.

3.3.10 Our ambition is to achieve a sustainable rate of remediation that prevents long-term deterioration and associated risk (see Section 1.1). Based on a typical 50-year design life for sewer relining (Section 6), a stable position requires surveying and remediating, where necessary, approximately 2% of the network per year — around 10% per AMP. While the AMP8 base programme represents an uplift on previous AMPs, it is not sufficient to reach this sustainable rate or achieve the long-term stable position set out in the Asset Class Strategy.

3.3.11 Additional investment in AMP8 enables this transition to begin, protecting customers from escalating asset health risk, improving long-term resilience, and reducing future reliance on costly and disruptive reactive intervention.

3.3.12 This ambition aligns with our AMP8 strategic themes:

- Better exploitation of data to optimise the management of our assets at all stages of their lifecycle;
- A permanent shift in the deployment of our maintenance activities from reactive recovery to proactive maintenance, meaning that maintenance is safer, quicker, less disruptive and efficient; and,
- Using data to support our decisions and activities with greater levels of insight.

3.3.13 Condition data (Section 3.4) shows ongoing deterioration despite previous investment. Without achieving the sustainable rate in AMP8, asset health will continue to decline, exacerbated by climate change and population growth, as referred to in Section 3.2. Continued deterioration of assets without targeted intervention will accelerate infrastructure decline, resulting in more frequent and extensive disruption to customers and a higher likelihood of failures, as well as potentially eroding the future benefits of strategic solutions identified through our DWMP23.

3.3.14 Intervening early allows us to maximise the value of technologies such as spray-lining, CIPP, and other trenchless methods. These are up to 40% cheaper and far less disruptive than full replacement, but only viable before assets reach advanced deterioration. Rising numbers of Grade 3 and 4 assets highlight the urgency, as evidenced in Section 3.4)

3.3.15 Increased inspections and use of AI will accelerate our understanding of network health, enabling richer, more accurate condition data. This supports better targeting of proactive rehabilitation and more effective optioneering, improving long-term value for customers and the environment.

3.3.16 This improved condition insight enables more effective optioneering by identifying where intervention is required and constraining the range of appropriate options before capital decisions are taken. The implications of alternative investment trajectories for long-term asset health are explored further in Section 3.4.

3.3.17 In summary, early investment through a sustained renewal programme aligned to our Asset Class Strategy protects long-term network health and avoids higher future cost, enabling more targeted, lower-risk capital delivery and maximising the benefits of emerging technologies in AMP9. This allows us to:

- Reduce risk by intervening before failures occur;
- Improve customer outcomes through fewer incidents and less disruption; and,
- Achieve long-term efficiencies by reducing unplanned maintenance and repeat failures.

International examples

3.3.18 National frameworks in countries such as Germany, France, and the Netherlands require—or strongly encourage—systematic sewer inspection. For example, in the Netherlands, the traditional approach mandated that every system be inspected every 15 years. However, this method is now being phased out in favour of more adaptive strategies.

3.3.19 One such strategy is the variable inspection method, which specifies that wastewater sewers should be inspected after 20 years of service and subsequently every 15 years, while stormwater sewers should be inspected after 40 years and then every 10 years thereafter.

3.3.20 A further evolution is the quality-driven, risk-based approach, which focuses on understanding how sewer condition deteriorates over time. This enables higher-risk assets to be inspected more frequently, while lower-risk assets can be inspected at longer intervals. Even within this model, certain boundaries are maintained—for example, inspections must not occur less than 5 years apart or more than 30 years apart.

3.3.21 Given the current limitations in available data, we are proposing a sustainable inspection rate of 10% per AMP cycle. This is based on the typical asset life associated with the most common rehabilitation methods planned for these programmes. As our data quality improves and our understanding of asset risk matures, we anticipate moving towards a more refined, risk-based methodology. This could lead to adjustments to the currently proposed sustainable rate of survey in future cycles. The outcome of this work will be incorporated into our PR29 submission.

3.4 Evidence of deterioration

3.4.1 This section brings together condition and performance evidence to assess underlying deterioration across the gravity sewer network. The combined evidence shows a growing proportion of assets entering condition states where timely intervention is required to prevent escalating risk, customer disruption and whole-life cost. This evidence underpins condition-led optioneering, ensuring intervention is proportionate and customers are protected from unnecessary or premature investment.

3.4.2 Given the inherent limitations on direct inspection of buried sewer assets, the assessment draws on multiple complementary sources, including condition surveys, performance data, age profiling, deterioration modelling and operational insight, to provide a robust, system-level view of asset health and investment need.

3.4.3 Artificial intelligence for sewer condition assessment helps us improve our sewer deterioration models for assessing future investment needs

3.4.4 In developing this submission, UUW considered a range of alternative and complementary approaches to gravity sewer condition assessment, including acoustic monitoring, sonar surveys for surcharged pipes, permanent in-sewer sensors, satellite based ground movement detection, and predictive analytics using surrogate performance indicators. These methods can provide useful system level information or targeted insights in specific circumstances but do not currently provide sufficiently reliable, asset specific structural condition evidence at scale to support optioneering and investment decisions.

3.4.5 CCTV inspection, supported by artificial intelligence enabled defect classification, remains the most mature and auditable method for verifying structural condition, informing intervention selection, and evidencing need in line with Ofwat's asset health guidance. UUW therefore adopts a blended approach, using innovation to enhance targeting and insight while retaining CCTV as the primary mechanism for condition verification and decision making.

3.4.6 We have led an industry team called the Ofwat ideas lab to develop Artificial Intelligence systems to quickly and simply classify sewer defects from operational camera surveys. This built on our work alongside a start-up company call Vapar within our annual 'Innovation Lab' process. We use Vapar artificial intelligence technology to identify structural conditions within a sewer network. The system can automatically code inspection footage by identifying and classifying defects.

3.4.7 As a result, we now have access to trained expert AI systems that automatically ‘watch’ and code defects from ‘fast pass’ camera survey video files uploaded by our routine maintenance and reactive operational teams, providing a growing library of condition data across our sewer network. As we capture more data, we will use this to further improve our sewer deterioration models for assessing future investment needs, both at a strategic and operational level.

3.4.8 During AMP7, a total of 1,129km of gravity sewer survey footage was coded using Vapar. The first full-year dataset is from 2022/23, for which 251km was surveyed and coded. We do not yet have a dataset for the equivalent year of AMP8, but comparison of 2022/23 with our most recent equivalent dataset (2025/26) highlights an overall deterioration in condition grade, in particular a noticeable increase in the percentage of sewers classified as grades 3 and 4[5]. **This suggests an overall deterioration in the asset health of our sewer network, despite our historical investment in this asset class (Section 3.6)**. Table 5 shows the percentage change from 2022/23 to 2025/26.

Table 5: Relative percentage of surveyed sewer per Grade showing change from 2022/23 to 2025/26

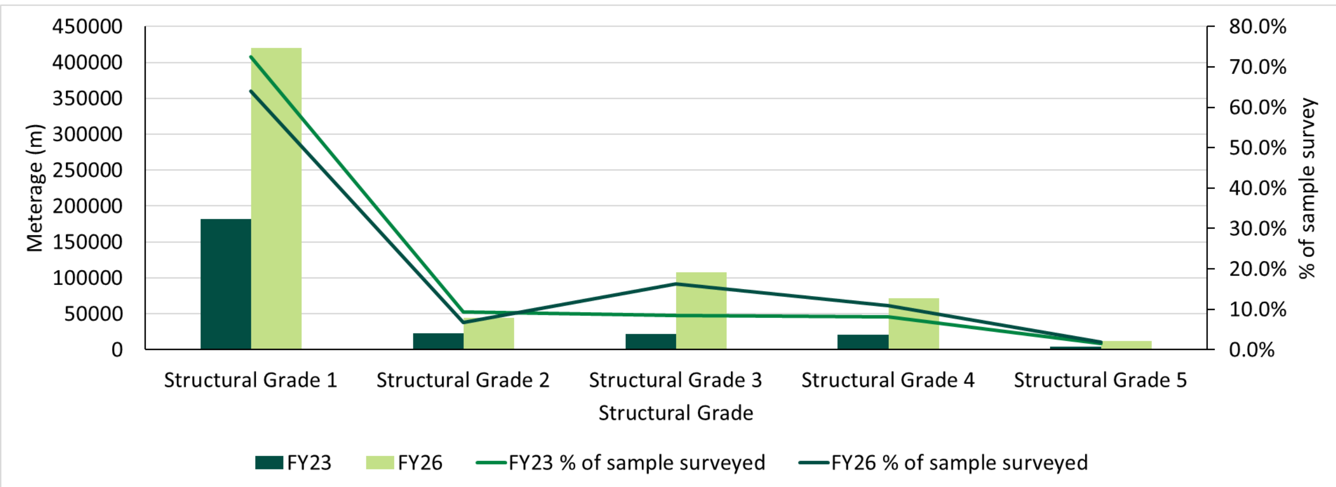
MSCC Structural Condition Grade	2022/23 sample %	2025/26 sample %	Overall change	Inferred average annual rate of change
G1	72.4%	64.1%	-8.3%	-2.7%
G2	9.3%	6.7%	-2.6%	-0.8%
G3	8.5%	16.4%	+7.9%	+2.6%
G4	8.2%	10.9%	+2.7%	+0.9%
G5	1.6%	1.9%	+0.3%	+0.1%

Source: UUW analysis

3.4.9 The observed shift towards structural Grade 3 is particularly significant. Assets in this condition are typically beyond the point where “do nothing” represents best value but have not yet deteriorated to the point where full replacement is required. This is therefore the optimum window for low disruption, cost-effective rehabilitation to stabilise condition and reduce future risk.

3.4.10 A comparison of the relative percentage within each structural grade is shown in Figure 2.

Figure 2: Graph showing proportion of surveyed sewers within each condition grade for 2022/23 vs. 2025/26



Source: UUW analysis

[5] WRc Manual of Sewer Condition Classification (MSCC) – see Appendix A Table 22 for definitions.

3.4.11 We recognise that condition datasets derived from operational and risk targeted surveys can be influenced by selection effects, as inspection activity has historically prioritised higher-risk or higher-consequence areas. We therefore use the AI based coded results as evidence of deterioration within surveyed assets and triangulate this with additional sources, including a representative random sampling programme to improve confidence in how condition is distributed across the wider network.

Base Asset Health

3.4.12 For gravity sewers, direct condition data is limited due to the buried, linear nature of the asset base and the scale of the network. Unlike discrete above-ground assets, condition information is available only for a subset of sewers, derived primarily from targeted CCTV inspections and operational interventions. As a result, assessment of asset health relies on a combination of observed condition, inferred deterioration behaviour, performance proxies and modelling, rather than comprehensive direct inspection of the full asset base.

3.4.13 Gravity sewer risk and investment forecasts are carried out using our system, which enables us to model our four million sewers to identify the optimum scale and build of a proactive programme under various investment or service risk constraints. Our system includes UUW specific;

- deterioration models;
- reactive and proactive cost models;
- consequence of failure models; and,
- intervention types

3.4.14 In addition, extremely flexible simulations can be defined to enable short, medium and long term forecasts to support strategic investment decision making and operational programme targeting.

3.4.15 Our system is loaded with our latest sewer inventory data on a regular basis after a comprehensive spatial cleanse and infill process. This ensures that we maximise the available data and minimise the impact of unknown key attributes in our modelling. In addition to the inventory data, all reactive work incident data for the previous five years is loaded into the tool. This legacy work data is also used to inform the inventory cleanse and infill process, e.g. where we have carried out root cutting we flag the local sewers with a risk indicator indicating the presence of roots.

3.4.16 The models are then used in defined optimisation scenarios to predict the likelihood of key service failures under different constraints. These service failures currently include:

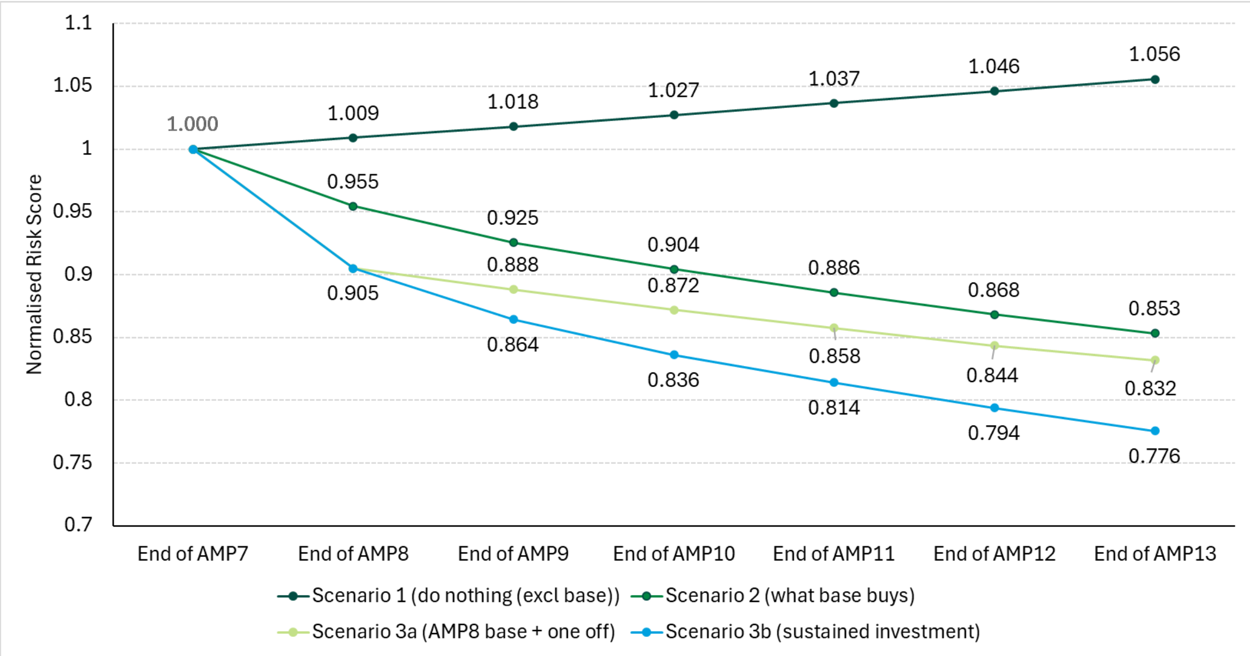
- Internal and external flooding;
- Sewer collapses;
- Sewer blockages; and,
- Pollution events.

3.4.17 The results of these scenarios have been used to assess the impact of the AMP8 base investment proactive programmes on the future risk of the system, and also the impact of the £188.0m accelerated investment included within this claim. We have also assessed the additional value of sustaining this enhanced level of investment for future AMPs.

3.4.18 In all cases, the forecast change in risk for each indicator has been weighted and normalised through our value framework in order to produce a single, aggregated risk position, as detailed in Figure 3.

3.4.19 Deterioration rates vary significantly across the gravity sewer network, influenced by pipe material, loading, ground conditions, construction quality and maintenance history. The dashboard therefore focuses on aggregate risk trends and scenario outcomes rather than predicting the behaviour of individual assets.

Figure 3: Normalised Risk Score Trends from optimised system investment scenarios



Source: UUW analysis

3.4.20 To support longer-term decision-making, deterioration modelling is used to assess how gravity sewer asset health is expected to evolve under different investment scenarios. The structure of the analysis considers four illustrative scenarios, as seen in Figure 3, reflecting realistic investment pathways for the asset base.

Scenario 1 – Do nothing (reactive intervention only)

3.4.21 Intervention is failure-led only, allowing deterioration to accelerate. Structural risk, customer disruption and whole-life cost increase as planned rehabilitation is displaced by emergency response and replacement.

Scenario 2 – AMP8 base expenditure only (what base buys)

3.4.22 Base investment manages in-period risk but does not stabilise asset condition. Deterioration continues to outpace remediation, increasing the proportion of assets progressing beyond cost-effective rehabilitation.

Scenario 3 – AMP8 base plus one-off additional investment

3.4.23 Supplementing the AMP8 base programme with the proposed one-off £188.0m investment delivers a short-term improvement in asset condition, addressing a proportion of accumulated deterioration and reducing near-term risk. However, without continued investment beyond AMP8 at a rate aligned to ongoing deterioration, asset health would progressively decline, converging back toward the base-only trajectory over time.

Scenario 3b – Sustained investment aligned to deterioration rate

3.4.24 Adaptive pathway from Scenario 3. Under a sustained investment scenario, with delivery maintained at the proposed rate beyond AMP8, deterioration and remediation are brought into balance. This stabilises long-term gravity sewer asset health, keeps assets within condition states where cost-effective rehabilitation remains viable, and minimises whole-life cost and customer disruption.

3.4.25 This is the only scenario that prevents the recurring accumulation of deterioration, managing asset health risk at source rather than through increasingly reactive and disruptive intervention. As illustrated in the chart, the greatest reduction in risk is delivered early as the highest-risk assets are addressed first, with progressively smaller incremental benefits as the network stabilises over time.

3.4.26 Further detail on the dashboard methodology is provided in Appendix B.

Preferred outcome

3.4.27 Modelling shows that without an increased rate of survey and rehabilitation, deterioration would continue to outpace remediation, driving a growing proportion of assets into higher-risk condition grades. This progressively reduces the scope for cost-effective rehabilitation and increases reliance on more disruptive replacement and reactive intervention. The modelling, used alongside inspection evidence, enables intervention to be targeted at the point of best whole-life value and to quantify the extent to which the proposed programme stabilises long-term condition relative to a base-only scenario.

3.4.28 Consistent with Ofwat's asset health guidance, *Scenario 3* is our preferred option for AMP8, with *Scenario 3b* representing the most cost-effective long-term outcome for the future. It avoids repeated cycles of catch-up investment, preserves access to lower-cost rehabilitation options, and delivers stable asset health over time. The proposed AMP8 investment is therefore positioned as a necessary step in transitioning to a sustainable asset health trajectory, rather than a one-off correction.

3.4.29 Delivery of the AMP8 programme will also materially improve the breadth and quality of condition evidence, strengthening understanding of deterioration behaviour and intervention effectiveness. Reflecting the changing risk profile shown in Figure 3, this evidence will inform the PR29 submission and the appropriate level of investment required in AMP9, which may be higher or lower than AMP8 depending on observed outcomes.

3.4.30 Improved condition insight does not predetermine solutions. Instead, it enables more effective optioneering, ensuring assets in acceptable condition receive no intervention, assets in moderate deterioration are rehabilitated, and only those beyond this point are renewed, protecting customers from unnecessary or premature investment while reducing long-term risk.

3.5 Our existing strategy and base programme

3.5.1 We have historically managed gravity sewer assets through a balanced mix of proactive and reactive intervention, reflecting the practical constraints of inspecting buried assets at scale and the need to prioritise known, high-consequence service risks. Reactive response remains essential for unpredictable failures, and the AMP8 base programme already includes an uplift in proactive inspection and rehabilitation.

3.5.2 Building on this established approach, improved condition insight from expanded surveying and analytics now enables a more targeted, preventative strategy. At the same time, external pressures and rising expectations mean that sustaining service performance increasingly depends on stabilising asset condition through a sustainable rate of renewal. The proposed additional investment therefore represents a logical evolution of strategy, shifting further toward proactive, risk-based renewal, rather than a departure from a previously appropriate approach.

3.5.3 Our Asset Class Strategy for gravity sewers is aligned with our Strategic Asset Management Plan (SAMP), and sets out our proposed approach for managing and enhancing our network as follows:

- Continue "first time fix" approach on reactive incidents.
- Increase condition assessment to 10% per AMP, leverage for increased sewer mapping of inferred sewers.
- Target opportunities for flow separation (foul/surface water), where cost effective, for growth or enhancement projects.
- Target inspections on high flood risk (other causes) and pollution risk assets.
- Continue deploying smart sensors where cost effective to increase Operational Intelligence capability.
- Reduce infiltration due to poor condition sewers.

- Replace non-preferred materials such as pitch fibre with polyvinyl chloride (PVC) or concrete were cost effective. There is industry wide evidence to show that pitch fibre is structurally weak, environmentally problematic and prone to failure[6].

3.5.4 We use modelling and condition assessment tools to strengthen decision-making and optimise investment across the wastewater network. These tools support four core capabilities:

- **Predict deterioration:** Using modelling techniques to understand how different asset types—such as pipes, pumps, treatment works, and mechanical/electrical components—are likely to degrade over time.
- **Prioritise renewal:** Investment optimisation by ranking assets based on risk, criticality, and cost.
- **Plan maintenance efficiently**: Targeted data-led interventions and optimised resource allocation.
- **Extend asset life safely:** Determine when life-extension is both viable and safe.

3.5.5 The existing AMP8 programme includes CCTV surveying and analysis of data collected, followed by remedial measures to address any issues identified. The most appropriate and cost-effective intervention in each case is selected from our options hierarchy, which encompasses a range of options including soft remedials such as root cutting, minor repairs, and longer-term remedials such as sewer lining and replacement.

3.5.6 Asset health inspections are a critical first step in the management of our gravity network. The results of these inspections inform our understanding of the condition of our sewer network, enabling us to prioritise routine maintenance actions across the system and to identify where critical maintenance interventions are required.

Routine Maintenance Programmes

3.5.7 We will continue to implement preventative operational measures such as regular surveying and cleaning of pipes to mitigate sewer flooding risk.

3.5.8 We will utilise technology and data solutions to enhance our system operation, including making optimal use of capacity to deliver service. We plan to regularly monitor and assess external risks such as flooding of assets, and erosion and act when required to maintain resilience. We will harness technology to assess the condition of sewer systems and support efficient repair/replacement to reduce the risk of sewer collapses.

3.5.9 We will continue to invest in appropriate property-level mitigation measures to help protect customers who are most at risk of hydraulic flooding, ensuring that support is targeted where it can deliver the greatest benefit.

Proactive sewer rehabilitation

3.5.10 Our AMP8 rehabilitation programme will deliver investigations and remedials in over 4,400 high risk postcodes. It comprises two workstreams focusing on different drivers, as detailed below.

Enhanced Targeting Programme

3.5.11 Our AMP8 Enhanced Targeting Programme aims to reduce flooding incidents across the wastewater network by applying a data-driven, risk-based approach. The programme focuses on identifying, prioritising and addressing flooding caused by blockages, sewer collapses, structural defects and other non-capacity-related issues in high-risk postcode areas. A key objective is to proactively reduce risk by targeting the underlying causes of service failure, including the early identification and management of sewer deterioration. By integrating condition assessment, historical performance, and deterioration indicators, the programme supports earlier interventions that minimise the likelihood of collapses, reduce reactive workloads and extend asset life.

[6] Sava (2018). Pitched Fibre Drains (Part 1). Available at: https://sava.co.uk/sava-edge/pitched-fibre-drains-part-1/.

3.5.12 Our AMP8 base plan for this programme aims to deliver the performance required to protect customers most at risk; whilst still ensuring we maintain and invest appropriately across our whole asset base. We recognise, however, that this does not get us to a stable risk position for the longer term.

Infiltration Studies & Sewer Rehabilitation Programme

3.5.13 To achieve long term resilience of the sewer network in a sustainable manner, it is essential to understand sewer condition to prioritise rehabilitation of assets at the right time. Our AMP8 Infiltration Programme focuses on identifying and addressing areas of our gravity sewer network affected by infiltration.

3.5.14 The existing AMP8 infiltration programme expects to deliver investigation and implementation of infiltration reduction measures (where required) for approximately 65 schemes (including an originally planned for schemes linked to the infiltration reduction plans published on our website).[7]

3.5.15 Infiltration to the sewer network through groundwater can be estimated through sewer network hydraulic modelling, but requires surveys to confirm location and remediation methods, often full-length rehabilitation of a sewer. The AMP8 Infiltration programme involves surveying gravity sewers to identify locations affected by infiltration. Assets found to be in poor condition will be fully rehabilitated.

3.5.16 The remedial activity is expected to deliver a wide range of benefits, including extending asset life and improving overall asset condition while reducing the risk of collapse. By stopping groundwater infiltration, the network will benefit from a reduction in infiltration causing premature deterioration, without the need for excavation, ensuring minimal disruption. These interventions free up capacity within the network, shift from reactive to proactive maintenance, and reduce the likelihood of sewer flooding, spills, and FOC flooding incidents across targeted postcodes. Ultimately, customers will experience fewer repeat flooding events and benefit from a more reliable, cost-effective, and resilient wastewater service.

3.5.17 Our routine maintenance programme focuses on surveying. However, if any remedial work is identified during these surveys, it will be scheduled through the appropriate programme based on assessed risk.

3.5.18 For the three remaining programmes listed above, the investigation activities will include:

- **CCTV surveys** - surveys to identify gravity sewers and associated assets in poor condition. Over 400km of CCTV has been surveyed to date in 2025/26, with the data shaping the remedial programme.
- **Soft Remedials -** such as cleaning and blockage removal, will be carried out during investigations to reduce operational risk. Over 3400 lengths of sewer have been found with silt above 10% and require cleaning.
- **Asset health -** assessment of structural integrity, operational performance, and future deterioration.
- **Hard Remedials** - findings inform prioritised remedial activity. Over 4000 defects have been found to date on the current programme; using a 4-week rolling average this represents a defect every 79 metres.

3.5.19 Where surveys identify the need for remedial interventions, we will select the most appropriate and cost beneficial solution from the hierarchy of options described in Section 5. remedial activities will deliver:

- **Sewer Lining** - install lining in sewer sections that have already failed or identified as high risk for future structural failure. This remedial activity will reduce collapse risk, improve hydraulic performance and minimise blockage formation. Where we can directly link defective manholes with

[7] Infiltration plans published on the UUW website. Available at: [Infiltration Reduction Plans | United Utilities - Better Rivers]

poor structural condition of sewers, we will include these in the scheme to ensure efficient delivery and longer-term asset health resilience.

- **Interceptor Trap Removal (Enhanced Targeting Programme only)** - Proactively remove traps with characteristics known to contribute to blockages. This remedial activity will reduce the likelihood of flooding.
- **Sewer Relay** - replacement or re-laying of existing sewer pipes to correct alignment issues, resolve structural defects such as displaced joints, or restore function where the pipe has collapsed or deteriorated beyond the point where lining is feasible.

Reactive Incidents

3.5.20 Whilst our AMP8 programme includes a significant increase in proactive inspection and rehabilitation activity, we still expect that a proportion of our base expenditure will be allocated towards reactive response. This expenditure remains essential for unpredictable failures and to protect customers quickly when incidents occur.

Summary

3.5.21 The scale of proactive remediation proposed for AMP8 represents a significant step change from historical delivery. In AMP7, we delivered 116km of sewer remediation, including a combination of reactive and proactive activity. In AMP8, our base programme includes 225km of proactive sewer remediation, with a further 345km proposed through this cost change submission. Taken together, the AMP8 programme would total 570km of proactive remediation, equating to more than three times the total remediation delivered in AMP7.

Risk Management

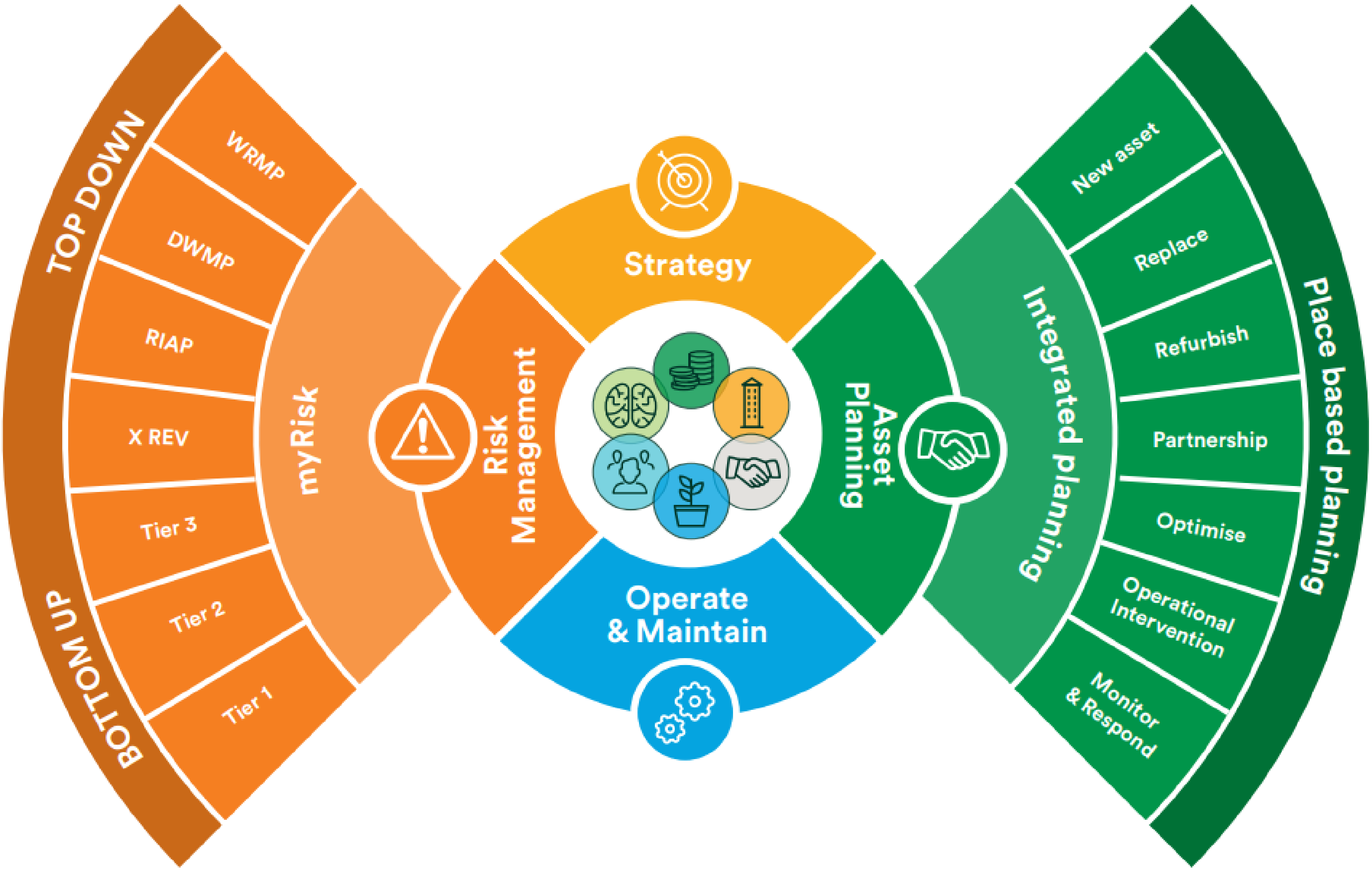
Risk identification, assessment and escalation

3.5.22 We manage operational and asset health risks through an enterprise-wide risk management framework that provides a clear golden thread from asset-level risk identification to Board-level oversight. This is delivered through our Risk and Asset Planning (RAP) process, as set out in our Strategic Asset Management Plan (SAMP), and was assessed by Ofwat through the PR24 Final Determination and AMMA processes.

3.5.23 Operational risks are identified at asset and site level through routine condition assessments, performance monitoring and operational experience. These risks are recorded in myRisk, UUW’s corporate risk management system, which assesses likelihood and consequence across safety, environmental, service and financial dimensions. Risks are scored against defined criteria and supported by documented controls and mitigation actions. Where risks exceed tolerance thresholds, they are escalated through formal governance routes for prioritisation and intervention.

3.5.24 An illustration of this approach is in Figure 4 below.

Figure 4: Risk and Asset Planning bowtie diagram



Source: UUW analysis

Integration with corporate risk governance

3.5.25 The myRisk system operates as the bottom-up risk capture mechanism and is fully integrated with our wider corporate risk framework. Operational risks recorded in myRisk are aggregated and reviewed through regular six-monthly risk review cycles, informing the strategic risks managed through our corporate risk system. This ensures alignment between operational reality and corporate risk appetite, enabling informed decision-making on investment prioritisation and risk trade-offs at both executive and Board level.

3.5.26 This integrated approach ensures that asset health risks are not considered in isolation, but alongside other material business risks, including regulatory compliance, environmental performance, health and safety, and resilience to climate change. The framework enables the company to identify where reliance on reactive or temporary controls is increasing, signalling the point at which proactive capital intervention represents the most efficient and lowest-regret response.

Alignment with asset management standards and PR24 commitments

3.5.27 Our risk management approach is embedded within our ISO 55001:2024 certified Asset Management System and is set out in our SAMP. The SAMP defines how risks are identified, evaluated, escalated and mitigated across the asset lifecycle, linking long-term strategic objectives to short-term operational decision-making. This framework underpins the company's AMP8 asset health and resilience strategy and provides assurance that investment decisions are evidence-led, proportionate and targeted at the highest-risk assets.

3.5.28 As described in Chapter 7 of our PR24 submission[8], we use asset risk modelling, operational risk management processes and structured assurance to manage current and emerging asset health risks. However, where deterioration becomes non-linear and constrains safe operation or maintainability, the effectiveness of operational controls reduces and reliance on reactive intervention increases. In these circumstances, proactive capital investment is required to restore risk to tolerable levels and maintain alignment with the company's stated risk appetite.

Proactive risk management

3.5.29 We work to avoid disruption that negatively impacts customers or the environment now and in the future. We do this by proactively managing risk associated with our assets, systems and processes, with control and mitigation focusing on preventing or limiting problems, while maintaining the capacity to respond effectively.

3.5.30 Many of our proactive risk management capabilities cut across multiple operational risks. More detail of our approach to risk management can be found in chapter 7 of our main PR24 submission, including details on asset risk modelling, managing operational risks, and our approach to asset health.

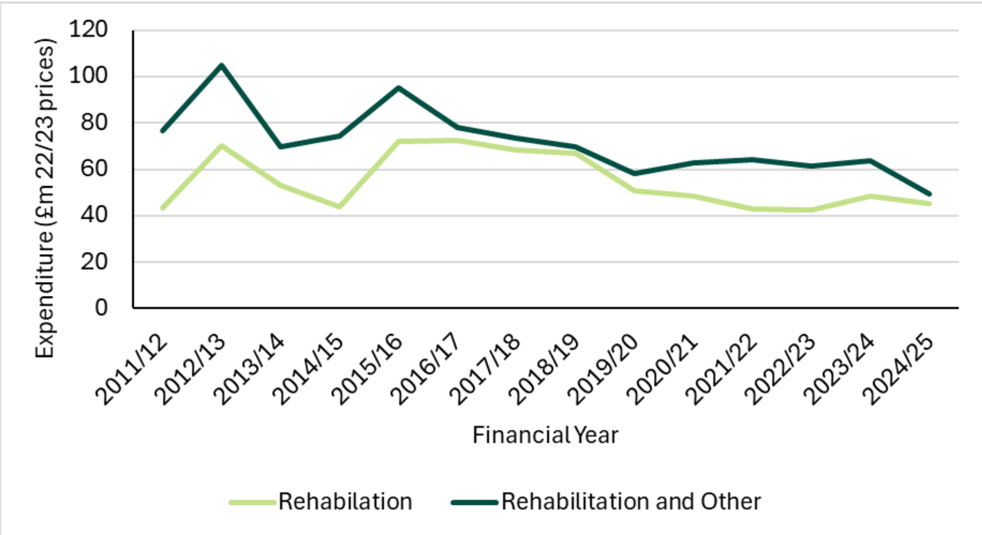
3.6 Our historical investment

3.6.1 Historically, investment in gravity sewers has focused on maintaining service and managing immediate risk, rather than stabilising long-term network condition. This reflected limited condition insight and the practical challenges of inspecting buried assets at scale.

3.6.2 Improved data now provides a clearer understanding of asset condition and the renewal rate required to be sustainable. In response, AMP8 includes a significant uplift in proactive sewer remediation. However, as growth and climate change continue to intensify pressure on an ageing network, this uplift alone is insufficient. A step-change in investment is now required to secure a permanent shift from reactive recovery toward proactive, condition-led maintenance and long-term asset stability.

3.6.3 Figure 5 provides a breakdown by year of expenditure on gravity sewers, provided in our October 2025 submission for Ofwat's *Sector workload and expenditure dataset*. As noted in our submission, the implied expenditure for sewer remedials is extremely varied over the reporting period and cannot be explained solely by cost inflation. This is mainly due to the inclusion of the costs associated with other gravity sewer related activities within the cost data return. Specific examples include the strategic decision to increase expenditure on proactive sewer cleaning during AMP7.

Figure 5: Graph showing expenditure for gravity sewers by year (as previously supplied to Ofwat)[9]



[8] UU PR24 Submission, Chapter 7, Section 7.6: UUW07 Chapter 7 Resilience and asset health

[9] Ofwat (2026) Sector workload and expenditure dataset v2 – for circulation.

Source: UUW analysis of Ofwat (2026) Sector workload and expenditure dataset v2 – for circulation.

3.6.4 Additionally, a change in accounting policy has influenced the treatment of gravity sewer renewals. These were reported against capitalised expenditure in the first four years of the reporting period and subsequently expensed for the remaining ten years of the period.

3.6.5 The adoption of private sewers led to a sustained increase in sewer investment during AMP6 as the legacy of severe defects associated with the recently adopted assets was addressed. As the initial backlog of defects were remediated in AMP6, investment reduced to a more typical level in AMP7.

3.6.6 Table 6 shows the categories of work that are typically reported under sewerage infrastructure and our approach to classification in line with the Ofwat workload and expenditure data request. Of these, only the activities in the 'Rehabilitation' category contribute to improving the structural integrity of the sewers and significantly extending the life of the asset.

Table 6: Categories of work typically reported under sewerage infrastructure

Data Return	Category
Rehabilitation	Adoption/diversion of sewer systems
	Planned rehabilitation of poor condition sewers
	Flooding other causes Planned or reactive renewal
	Reactive renewal in response to blockages, collapses and manhole issues
Other	New roads and street-works
	Combined sewer overflows and outfalls
	Planning for diversion works for major infrastructure such as HS2
	Sewer Serviceability proactive work
	Hydraulic flooding work
	Maintaining network models dominated by gravity sewer systems
	Inspecting the largely gravity fed sea outfall assets
	Contaminated surface water investigations
	Detention tank maintenance
Excluded	Infrastructure work on WwTW sites, typically associate with inlets and overflows
	Rising Mains - Pressurised sewer systems
	Flood mitigation works, typically non-return valves, gulleys or flood doors and barriers, or local pumped systems.
	Flood risk management schemes
	Other work

Source: UUW analysis

3.6.7 We used the best available data for this return; however, some elements of the request information are not stored within current or historic corporate systems. This limitation has the greatest impact upon the categorisation of workload activities into the defined broad classes of rehabilitation and other. This manual categorisation of the data has been factored into our confidence grades accordingly.

4. Determining What base buys (WBB)

This section explains how much investment is already implicitly funded through base allowances, and how the additional investment proposed ensures that customers are not paying twice.

4.1 Purpose of WBB

4.1.1 WBB represents the level of investment in asset maintenance and renewal that Ofwat assumes to be implicitly funded through PR24 base expenditure allowances. We calculate WBB in order to ensure that our investment proposals are not duplicative of those allowances and therefore represent genuine additional investment that has not been previously funded.

4.1.2 In developing asset health investment proposals, any additional asset health investment proposed through the cost change process should reflect the true incremental investment above and beyond WBB This is informed by an assessment of the capital maintenance activity planned for each relevant asset class in AMP8, and an evaluation of the extent to which this activity can reasonably be delivered within existing base allowances.

4.1.3 The value of the cost change claim therefore comprises of the incremental investment requested net of our implicit allowance WBB. This supports transparency and ensures that customers are not paying twice for the same investment.

4.2 Limitations of WBB

4.2.1 It is important to note that at PR24 Ofwat set allowances across the entire asset base. Under the current totex-based regime, companies are given discretion to allocate base allowances across their asset base in line with efficient operational priorities, rather than to deliver predefined levels of investment in each specific asset classes.

4.2.2 As a consequence, there is no established approach to estimating WBB for specific asset classes. It is therefore important to recognise the limits of any mechanistic approach used to assess WBB for individual asset classes. Importantly, Ofwat has acknowledged that “there is no perfect way to determine what base buys”[10].

4.2.3 Assessing WBB *ex-post* after the Final Determination for specific asset classes requires making several key methodological assumptions and apply some judgement. It is difficult to robustly estimate WBB because:

- Base expenditure allowances are set in aggregate across the asset base;
- There is a lack of consistent cost definitions across the industry;
- There is a lack of comparative data that can be used to perform robust benchmarking;
- The funding needs for a specific asset class vary over time reflecting companies’ specific asset cycles; and,
- The funding needs will depend on the asset strategy adopted by companies for each asset class.

4.2.4 In light of this, in assessing different approaches, we have set out the key risks and limitations associated with the data available for calculation of WBB in the supplementary document *UUW26-18 Asset Health – What base buys methodology.*

4.2.5 In applying any methodology, Ofwat should give significant consideration to the risk of an overstatement of WBB and the potential impacts this could have on restricting companies’ base

[10] Ofwat (2025). Asset Health Investment Assessment Guidance. Available at: https://www.ofwat.gov.uk/wp-content/uploads/2025/12/Asset-Health-Assessment-Guidance.pdf, pg. 21.

expenditure decisions in a way that would be inconsistent with the PR24 approach to base expenditure allowances.

4.2.6 Our view is that the methodology presented in this document very much represents the upper end of the range that should be considered for WBB and that, in view of the risks associated with over-estimation, Ofwat should consider whether lower limits should be binding on companies. This may be particularly appropriate in the event that Ofwat applies the same methodology broadly across all companies.

4.2.7 Examples of potential mitigations that Ofwat could consider are set out in the supplementary document *UUW26-18 Asset Health – What base buys methodology.*

4.3 Calculating WBB

4.3.1 Despite these limitations, we have calculated our WBB in line with the principles set out by Ofwat and ensured that industry benchmarking is used alongside externally verifiable data. This is set out in Table 7 below and explained in further detail in our full methodology which is set out in the supplementary document *UUW26-18 Asset Health – What base buys methodology.*

4.3.2 We present three potential approaches to calculating WBB in Table 8. Our assessment of each approach is also set out in the supplementary document *UUW26-18 Asset Health – What base buys methodology.* Following this assessment, we concluded that the bottom-up approach is most aligned to these principles. Therefore, all WBB numbers presented are calculated following this methodology.

4.3.3 Based on our approach to calculating the requirements as set out by Ofwat on WBB, the implicit funding allowance for Gravity Sewers is £205m over AMP8. As discussed in Section 4.2, this represents the upper end of a plausible range.

Table 7: Alignment with WBB principles[11]

Principles of WBB	Approach's alignment with principle
Avoid the risk of customers paying twice for investment, once through existing base allowances and once through any additional adjustments	✓
Have a clear rationale, and where possible, is consistent with the way allowances are set during the price review	✓
Acknowledges that companies receive long-term base allowances, and that spend on an asset class across periods is likely to vary over time	✓
Is informed by good quality information, and where there are limits to this, is aware of data limitations	✓
Uses externally verifiable data	✓
Relies on an industry benchmark rather than a company specific view	✓

Source: UUW analysis

[11] Ofwat (2025). Asset Health Investment Assessment Guidance. Available at: https://www.ofwat.gov.uk/wp-content/uploads/2025/12/Asset-Health-Assessment-Guidance.pdf.

Table 8: Summary of different approaches assessed[12]

Approach	Description
Bottom-up approach	Adjusting sector average/median outturn AMP6 and AMP7 capital maintenance expenditure related to the priority asset class to the increase in base expenditure allowances provided at PR24.
Econometric based approach	Remove historic capital maintenance expenditure related to priority assets from PR24 base expenditure econometric benchmarking models to estimate implicit level of funding in modelled allowances associated with priority asset classes.
Historic company-specific expenditure approach	Scale company-specific historic capital maintenance expenditure on priority asset classes to PR24 base expenditure allowances and use each company's historic expenditure shares rather than industry-wide averages to estimate the implicit level of base funding associated with those assets.

Source: Ofwat (2025). Asset Health Investment Assessment Guidance

4.3.4 The bottom-up approach (see Table 8) estimates the gravity sewer-specific WBB by identifying the industry average share of modelled base historical expenditure allocated to gravity sewer rehabilitation. This share is applied to UUW AMP8 wastewater network plus base allowance to derive an implicit sewer allowance. The mean and median estimates are triangulated to reduce sensitivity to outliers and provide a robust implicit allowance.

4.3.5 The approach involves the following steps:

- **Step One:** Sum historical asset expenditure
  - Sum all rehabilitation expenditure for gravity sewers across the full dataset period (2011/12–2024/25).
  - Source: Workload and Expenditure Dataset (06/02/2026).
- **Step Two:** Sum modelled historical base expenditure
  - Sum a company's modelled base expenditure over the same period for *Wastewater Network Plus*
  - Source: Ofwat PR24 Base Costs Wastewater Model 3 – 'Costs' sheet[13]
- **Step Three:** Calculate historical spend shares
  - Divide the summed gravity sewer historical expenditure (Step One) by the summed modelled historical expenditure (Step Two).
  - This allows us to obtain a percentage share of modelled base historical expenditure on gravity sewers for each company.
- **Step Four:** Calculate the industry mean of this percentage share
- **Step Five:** Apply the mean share to AMP8 allowances
  - Multiply each company's AMP8 base allowance by the mean percentage derived in Step Four.

[12] Ofwat (2025). Asset Health Investment Assessment Guidance. Available at: https://www.ofwat.gov.uk/wp-content/uploads/2025/12/Asset-Health-Assessment-Guidance.pdf.

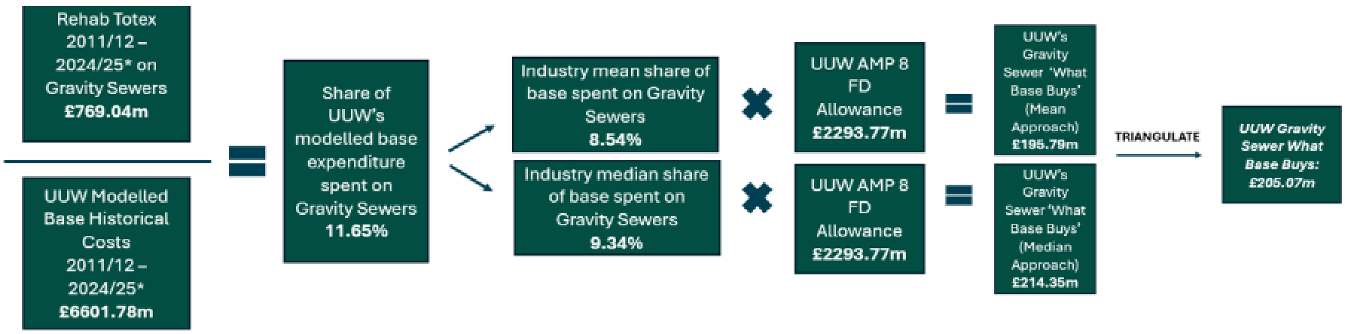
[13] Ofwat (2024). Cost assessment models: Base costs – wastewater model 3 (Network Plus), 'Costs'. Available at: Base costs – wastewater model 3 (Network Plus).

  - AMP8 allowances are taken from *Base Costs Wastewater Model 3 – 'final allowance'*[14], adjusted using the cumulative net price change for each year (from the *Base Costs Aggregator Model*[15]) to reflect post-frontier-shift and RPE-adjusted allowances.

- **Step Six:** Repeat step four for the industry median
- **Step Seven:** Apply the median share to AMP8 allowances
  - Multiply each company's AMP8 base allowance by the median percentage.
  - This follows the same process as Step Five.
- **Step Eight:** Triangulate results
  - Average the mean-based and median-based estimates to form the final AMP8 implicit allowance for gravity sewers.

4.3.6 Figure 6 provides the calculation process for the gravity sewer implicit allowance.

Figure 6: Calculation process for gravity sewer implicit allowance



Source: UUW analysis of Ofwat (2026) Sector workload and expenditure dataset v2 – for circulation.

4.4 Summary of our proposal

4.4.1 To demonstrate that our cost-change claim is incremental, we propose an output-based Price Control Deliverable in Section 7 that would protect customers from non-delivery and claw back a proportionate amount of WBB if we do not deliver the committed level of proactive remediation in our base PCD.

4.4.2 Given the limitations highlighted in Section 4.2 and the supplementary document *UUW26-18 Asset Health – What base buys methodology,* we consider that our assessment of WBB represents the upper end of a plausible range. In light of the risks associated with over-estimation, it is therefore important that Ofwat considers the potential implications for constraining companies' base expenditure decisions.

4.4.3 We will report expenditure for each relevant asset class in our Annual Performance Report as per Ofwat's latest proposals on companies' reporting requirements[16].

4.4.4 For the cost-change claim set out in this case (above and beyond our implied WBB allocation), we propose an output-based PCD as set out in Section 7. Overall, this approach provides transparency and accountability and ensures that customers are appropriately protected.

4.4.5 Due to the complex and highly aggregated nature of historic sewer expenditure data, it is not possible to reliably separate reactive and proactive maintenance activity. As a result, the WBB figure for gravity sewers reflects a blend of both AMP8 proactive investment and the underlying reactive run-rate.

[14] Ofwat (2024). Cost assessment models: Base costs – wastewater model 3 (Network Plus), 'Final Allowances'. Available at: Base costs – wastewater model 3 (Network Plus).

[15] Ofwat (2024). Base Costs aggregator model. Available at: Base costs aggregator model

[16] Ofwat, Consultation on regulatory reporting for the 2025-26 reporting year, December 2026 can be found here.

Section 3.5 provides a detailed breakdown of activity funded through AMP8 base allowances and Table 9 for a summary of WBB and this business case.

4.4.6 As set out in Table 9 below, our WBB estimate for gravity sewers totals £205m, and reflects a combination of proactive and reactive investment. We are proposing to explicitly deliver 226km of proactive sewer remediation funded from our implicit base allowance, at an average unit rate of £533.5 per metre, which equates to £120m over AMP8. This unit rate is aligned with the unit rate used for the incremental remediation work in this cost change proposal, providing consistency across our overall programme of remediation work.

4.4.7 The remaining £85m of the WBB allowance for gravity sewers is assumed to be delivered from reactive maintenance activity. As illustrated in Figure 7, UUW has consistently spent in excess of its WBB over the historical period of 2011/12 to 2024/25. This demonstrates our strong track record of investing allowances in this asset class and provides confidence that UUW is fully committed to spending its allowances in AMP8.

4.4.8 Further examples of potential mitigations that Ofwat could consider, reflecting the risk of over-estimation and the upper-bound nature of these WBB estimates, are set out in the supplementary document *UUW26-18 Asset Health – What base buys methodology.* We would be happy to discuss the merits of any such approaches with Ofwat.

Table 9: WBB and Cost Change Claim: Gravity Sewers over AMP8 (£m, 2022-23 CPIH prices)

£m	WBB	Cost Change Claim	Total Allocated Spend in AMP8
Gravity Sewers	205.1	188.0	393.1

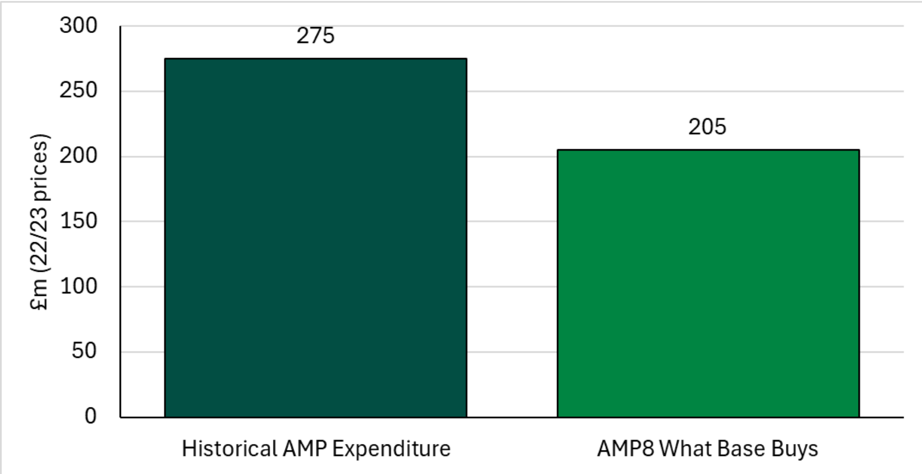
Source: UUW analysis of WBB using Ofwat (2026) Sector workload and expenditure dataset v2 – for circulation.

4.5 Comparison with historical expenditure

4.5.1 Historical expenditure reflects a blend of proactive and reactive interventions for gravity sewers. As a result, any what base buys figure will also include a proportion of reactive spend. As shown in Figure 7, our historical base expenditure exceeds our calculated WBB allowance, which represents the high end of the plausible range. This illustrates a strong track record of investing our base allowances, providing confidence that customers are not paying twice.

4.5.2 Details of our actual AMP8 planned expenditure can be found in Section 3.5.

Figure 7: Comparison of average annual historic expenditure per AMP with AMP8 WBB: gravity sewers[17][18]



Source: UUW analysis of Ofwat (2026) Sector workload and expenditure dataset v2 – for circulation.

4.5.3 Analysis of the historical base expenditure on gravity sewers (across planned and reactive maintenance activities as listed in Section 3.6) over the last 15 years equates to a median figure of £52.9m per annum. This is more than the calculated implicit allowance of £41m (£205m over the AMP), which reflects the priority given to gravity sewer maintenance and the asset health catch up journey which we have undertaken. This is in alignment with our asset class strategy outlined in Section 3.5.

4.5.4 Ofwat recognised UUW's company-specific circumstances with a PR24 FD company-specific PCL for the internal sewer flooding performance commitment. Ofwat stated its intention, in the PR24 FD, for UUW to progress towards the common PCL for internal sewer flooding performance and an even playing field for asset health and sewers, with the rest of the industry. Ofwat recognised in the PR24 FD that UUW has gone the extra mile in terms of investment in this area in AMP7, with a spend of £231 million against an allowance of £96.7 million. This indicates to Ofwat that UUW has made significant effort to address poor performance and achieve the common PR19 PCL in 2020-25. In the final determination, Ofwat also recognises that UUW has made significant efforts to address blockages in the current period to deliver the common PR19 PCL.[19]

[17] Historical AMP expenditure represents the average five-year expenditure on gravity sewer rehabilitation across 2011/12-2024/25.

[18] Ofwat (2026). Sector workload and expenditure dataset v2 – for circulation.

[19] "PR24 final determinations: United Utilities– Outcomes appendix", Ofwat, December 2024, [*PR24-final-determinations-United-Utilities-Water–-Outcomes-appendix.pdf] page 6

5. Best option for customers

This section demonstrates how we have developed the preferred programme via a robust optioneering process, tested our programme for value, assessed its benefits and how it has been informed by customer research and stakeholder engagement.

5.1 Our proposals are based on robust optioneering

5.1.1 We have undertaken structured optioneering to identify the most appropriate way to deliver a reduction in risk associated with our gravity sewer system. The purpose of this process was to ensure that the proposed AMP8 cost change programme for sewer asset health represents a proportionate, deliverable and efficient response to the need.

5.1.2 The proposed programme has been shaped by three primary considerations:

- Current levels of asset health risk: sewers have been prioritised where there is expected poor asset condition from either modelling, operational or customer experience.
- Deliverability within AMP8: a programme that can be designed and delivered within the AMP8 period have been developed.
- Alignment with asset strategy: consideration of the long-term level of sustainable investment in the assets and overlap with other drivers have been considered.

5.1.3 The optioneering process was undertaken in two stages:

- Unconstrained optioneering was used to the area-specific asset health needs and alignment to the requirements for inclusion within the asset health cost change process.
- Constrained optioneering was then applied to develop proactive programme options to represent a credible, proportionate and deliverable solution within AMP8.

5.2 Unconstrained optioneering – approaches considered

5.2.1 We have considered a range of proactive approaches for improving the structural integrity of our sewers, focusing on those which significantly extend the life of the asset. We have also considered a scenario of reverting to a programme of reactive maintenance and rehabilitation.

5.2.2 Below are the three main options we have considered when evaluating sewer asset health.

- **Reactive maintenance and rehabilitation.** Reactive maintenance (fix-on-fail) approach, addressing issues only when service failures occur. This results in higher long-term costs due to the need for open cut replacement or new installations rather than more cost-effective, less invasive structural techniques, and poses a significant risk of disruption to both customers and service delivery.
- **Proactive innovative rehabilitation** Proactive approach of identifying defects before they develop into service-impacting issues. This involves using trenchless structural techniques that restore functionality and extend the operational life of the sewer, providing a cost-effective and minimally disruptive alternative to a new installation.
- **Traditional trenched rehabilitation** Traditionally the majority of sewer remediation has been via open cut trenched replacement. Whilst this is still a necessary part of any remediation programme it is often possible to achieve a long life intervention with limited disruption via a trenchless approach. The benefits of trenched replacement include the ability to change both the size and the fall of the sewer, if either of these key attributes are a concern. The replaced asset is also expected to have a full asset life of at least 100 years.

5.2.3 Reactive maintenance and rehabilitation has been discounted as a viable approach, without a proactive complementary programme, as it does not align with the asset strategy by delivering a stable rate of remediation.

5.2.4 Proactive innovative rehabilitation is the preferred option, as this aligns with our long-term asset class strategy by maximising the life of existing infrastructure, reducing whole-life costs, and delivering solutions that are significantly less disruptive and more affordable for our customers than open cut replacement or new installation. While a one-off increase in rehabilitation reduces near-term risk, sustained investment aligned to deterioration rates provides the lowest whole-life cost and risk profile, as described in Section 3.4.

5.2.5 Table 11 below summarises the common material types used in gravity sewers along with the available rehabilitation and replacement options, indicating their relative suitability. It also provides an outline of the cost scale associated with each intervention. Our preferred programme is a blend of techniques, avoiding open cut replacement, where other techniques are feasible.

Table 10: Summary of common material types compared to different rehabilitation methods

Material	Rehabilitation/Replacement Method					
	CIPP	Structural Spray Lining	Sliplining	Segmental GRP	Open-Cut Replacement	Commentary / Justification
Vitrified Clay (VC)	✓✓✓	✓✓	✓✓✓	✕	✓✓✓	Typically small diameter (≤375 mm), preventing man-entry installation required for segmental GRP. CIPP and sliplining widely used; spray lining suitable for sealing and corrosion protection.
Concrete (RCP/PCC)	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	Susceptible to corrosion and infiltration. All rehabilitation methods applicable; segmental GRP suited to larger diameter, man-entry systems.
Brick	✓✓✓	✓✓	✓	✓✓✓	✓✓✓	Irregular geometry limits sliplining. Suitable for segmental GRP and spray lining in man-entry conditions; CIPP widely used.
PVC/uPVC	✓	✓	✓✓	✕	✓✓✓	Smooth, corrosion-resistant material limits benefit of rehabilitation. Bonding challenges reduce suitability of CIPP and spray systems.
Polyethylene (HDPE)	✓	✕	✓✓	✕	✓✓✓	Very low surface energy prevents effective bonding for spray or lining systems; rehabilitation rarely required unless deformed.
Pitch Fibre	✓✓✓	✕	✓✓	✕	✓✓✓	Very small diameter, hence why GRP is not suitable. Spray lining is not feasible because the pipe has deformed beyond rehabilitation.
	££ *(varies by diameter & resin type)*	**££** *(varies by diameter, access & condition)*	**£** *(typically, one of the lowest cost structural methods)*	**£££** *(used in large complex sewers)*	**£££** *(most expensive due to excavation & reinstatement)*	

Strong = ✓✓✓ **Limited** = ✓✓ **Moderate** = ✓ **Not suitable / rarely used** = ✕

Source: UUW analysis

5.3 Constrained optioneering – proactive rehabilitation approaches

5.3.1 For gravity sewers, intervention selection is inherently condition led. This condition led approach reflects established international sewer asset management practice, where systematic inspection is used to support lower whole life cost, lower disruption intervention strategies (see Section 3.3). Enhanced targeting and improved survey data are used to identify assets requiring intervention and to screen out inappropriate options early. For example, assets in moderate structural condition may be suitable for repair or renovation, while assets that have deteriorated beyond this point require replacement or a new installation, and assets in acceptable condition require no intervention. This ensures that solutions are proportionate to risk and that customers are not exposed to unnecessary cost.

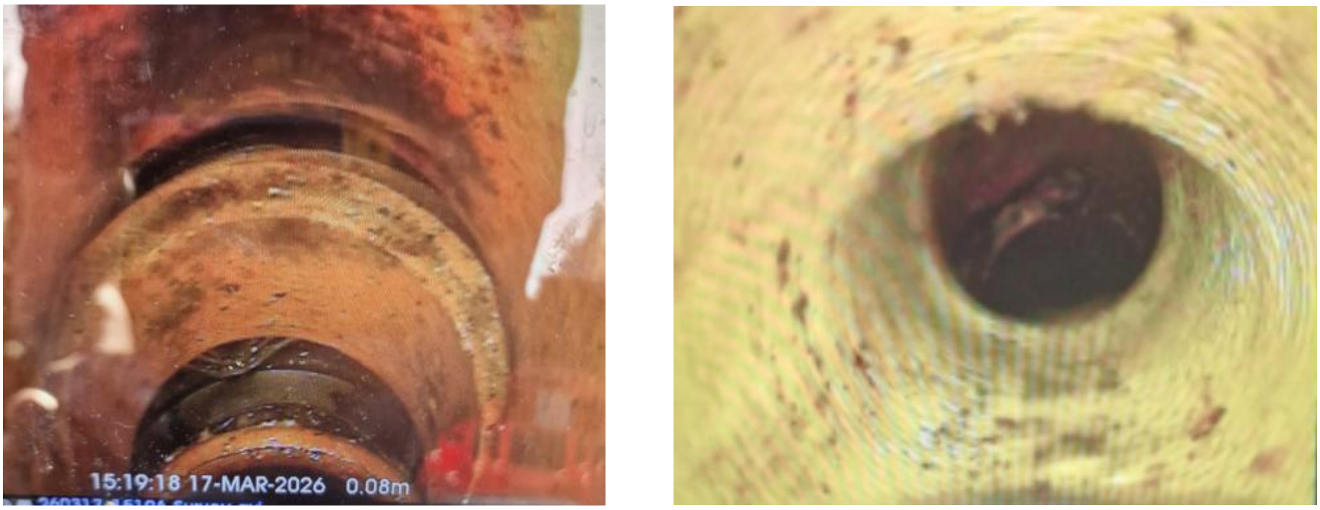
5.3.2 The following intervention options are considered within the preferred programme, these are all considered to provide a structural remediation solution with an expected asset life of at least 50 years.

- **Cured-in-Place Pipe (CIPP):** A flexible tube impregnated with resin is inserted and cured, creating a new "pipe within a pipe". Trenchless, cost effective, long service life and improved flow capacity.
- **Spray Lining:** A trenchless sewer rehabilitation method in which a polymer or resin-based coating is sprayed onto the inside of an existing pipe, forming a protective and often structural new layer. It creates a “pipe within a pipe” without excavation.
- **Slip Lining:** A smaller pipe is inserted into the existing host pipe. Trenchless, cost-effective but does reduce the diameter of the pipe, lowering the hydraulic capacity.
- **Segmental Glass Reinforced Plastic (GRP) lining:** GRP panels or segments that are assembled inside a deteriorated pipe to form a new, fully structural liner.
- **Open cut replacement sewer:** This technique will only be applied when the asset has deteriorated beyond the point where other rehabilitation approaches are technically feasible. This involves the full excavation and removal of an existing sewer, followed by the installation of a new pipe—either along the same route or in a new alignment—where trenchless (no dig) rehabilitation is not feasible.

Case Study - Cured-in-Place Pipe (CIPP)

5.3.3 During proactive survey works, a defect was identified within the sewer that presented a significant risk of structural collapse if left without intervention (see Figure 8). As the defect was detected before deteriorating beyond repair, the pipe was successfully rehabilitated using a cured-in-place pipe (CIPP) liner. This trenchless repair technique involved installing and curing a resin-impregnated liner within the existing pipe to form a new, structurally independent internal lining. As a result, the service life of the asset was extended and normal operational conditions were restored, with minimal disruption to customers and service.

Figure 8: Photos of defects that have been remediated



Source: UUW CCTV images

Case study – Open cut replacement

5.3.4 During proactive works, a defect was located which had deteriorated past of the point of rehabilitation being a suitable method to resolve, see Figure 9 for details. Open cut replacement enabled complete removal of the failed section and installation of new pipework, providing a permanent repair and restoring the asset to its full design life. However, earlier detection and intervention could have allowed a less invasive and more cost-effective rehabilitation solution to be implemented, reducing disruption and extending the asset life at a lower whole-life cost.

Figure 9: Open cut replacement example

Source: UUW Photography

5.3.5 Table 11 summarises the anticipated breakdown of the programme by intervention type and delivery technique. The split is informed by recent operational intervention data and is therefore indicative of the expected programme mix. It provides a transparent view of how activity is expected to be distributed across rehabilitation and replacement approaches, including the balance between trenchless and excavated delivery.

Table 11: Programme breakdown by intervention type

Intervention	Technique	Proportion of programme
Cured-in-place-pipe (CIPP)	Ambient	48%
Cured-in-place-pipe (CIPP)	UV	41%
Cured-in-place-pipe (CIPP)	Heat cured	1%
Open cut replacement		11%

Source: UUW analysis

How our innovative delivery approach minimises whole-life costs

5.3.6 Table 12 summarises the key benefits associated with different innovative rehabilitation methods, including reduced disruption, improved efficiency and better long-term asset health outcomes. The worked example below illustrates how these delivery approaches translate into practical cost differences when intervention is undertaken proactively rather than after failure.

Table 12: Benefits from different innovative methods for rehabilitation

Category	Key Innovation	Benefit
CIPP advancements	UV/LED cure, faster resins, automated inversion	Faster installs, stronger pipes
Robotics & AI	Autonomous crawlers, AI inspections, laser profiling	Higher accuracy, reduced cost
Alternative trenchless	Sliplining, pipe bursting	Upsizing, corrosion protection
Lateral rehabilitation	Robotic cutters, boundary-to-property liners	Reduces infiltration at critical points
Digital monitoring	Sensors, digital twins, automated reporting	Predictive maintenance

Source: UUW analysis

5.3.7 During the current Enhanced Targeting Programme, a 225mm vitrified clay pipe at a depth of 2.1m was identified as having multiple severe fractures along its 39m length. Following assessment, the recommended remediation was to install a full-length liner. The cost of undertaking a trenchless 39m full length liner proactively was £5,935.

5.3.8 If the pipe were left to fail before intervention, although a collapse would likely occur at a single point, once a sewer has deteriorated to the point where this type of failure occurs, we would expect there to be severe fractures along the remaining length as well. These would not be resolved by the reactive spot repair, leaving a high residual risk of further failures on the same length. To avoid this, it would be operationally and financially sensible to install the full-length liner at the time of excavation. The cost for comparison of reactive repair therefore needs to include the cost for a 39m full length liner as well as the spot repair itself, which would total £10,094[20].

5.3.9 Figure 10 below illustrates an example of a defective sewer that was suitable for proactive rehabilitation. If no intervention were undertaken and the sewer were instead allowed to fail before repair, based on the above, the cost of rectification would be almost double. This has now been rehabilitated and asset life improved.

Figure 10: Screenshot of CCTV footage showing multiple severe fractures in sewer before rehabilitation was completed

Source: UUW CCTV images

5.4 Best value assessment

5.4.1 For this submission, we have used a valuation tool that evaluates the most cost-beneficial approach out of the constrained options identified through the optioneering process. This analysis draws on our work to develop a broader "six capitals" based valuation approach to reflect changes in regulatory and government approaches to valuations of service, the environment and amenity values.

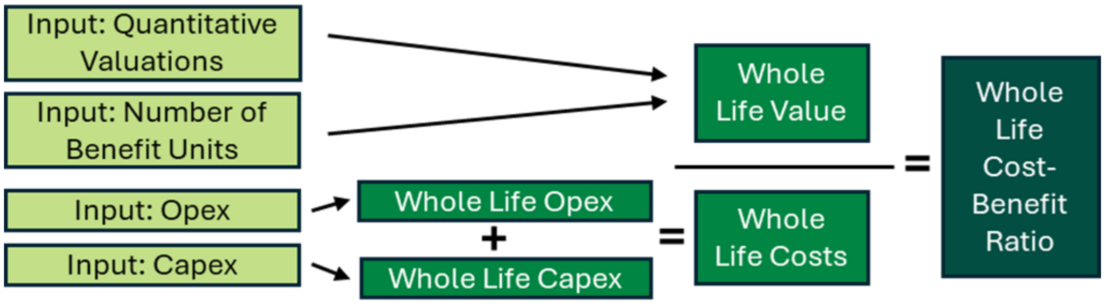
5.4.2 Our approach comprises three key steps as summarised below.

- Calculating the whole life value;
- Calculating the whole life cost; and,
- Comparing the whole life cost-benefit ratio across different solutions.

5.4.3 These steps are described in further detail in Figure 11 below.

[20] These are direct civils costs only and do not consider the whole life costs and benefits.

Figure 11: Whole life cost benefit ratio calculation



Source: UUW analysis

Whole life value

5.4.4 We calculate whole life value of an investment solution as the present value of the total benefits accrued over a 30-year assessment period. This is derived by:

- Multiplying the number of projected benefit units from the investment solution by the annual quantitative valuation; and,
- Calculating the compounded value over the investment horizon and discounting it using the Social Time Preference Rate, in line with the HM Treasury Green Book.

Whole life cost

5.4.5 We calculate the whole life cost of an investment solution by adding the whole life capital expenditure and the whole life ongoing operating costs. Capital expenditure includes capital overheads but excludes the effect of taxation. Whole life cost has been calculated on a consistent basis to the approach taken for PR24 investment appraisal. The present value of capital expenditure has been converted to a stream of annual costs over a 30-year appraisal period. To calculate the present value of these costs, and associated operating costs, the Social Time Preference Rate was used for discounting, consistent with the HM Treasury Green Book. Costs are in 2022/23 price base, using the CPIH financial year average.

Cost benefit ratio

5.4.6 The cost benefit ratio of an option is then calculated by dividing whole life value by whole life cost.

Value Assessment

5.4.7 We have carried out a programme level assessment of delivering a proactive sewer remedial programme using traditional open cut techniques for sewer relaying alongside our preferred programme of innovative techniques for sewer remediation.

5.4.8 The non-preferred alternative programme would involve a more traditional trenched replacement approach to the renewal of the sewers, rather than the current innovative mix of techniques that we are utilizing during AMP8 and propose to extend for this programme of work. Rates for traditional sewer replacement are typically between two and four times those for a lining. The innovative techniques are also less cost dependent upon the depth of the sewers than traditional trenching, where deeper sewers often incur higher costs from shuttering etc to support the trench. However, the advantage of the trenched approach is that modern replacement sewers can be expected to achieve at least twice the life of a structural liner. The traditional alternative programme build assumed an identical programme targeting and surveying programme, but with a different more intrusive structural intervention.

5.4.9 This assessment has been used to compare the constrained options identified through the optioneering process and to help to define a proportionate and deliverable preferred AMP8 gravity sewer programme for the asset health cost assessment process. The outcome of the best value assessment supports a proactive programme of innovative remediation techniques. Whilst this doesn't always deliver the longest remediated asset life, the whole life cost assessment indicates that it is preferential to a traditional remediation programme. This helps to maximise the value from existing assets and to protect customers from unnecessary cost, risk and disruption.

5.4.10 The values for the assessment were predicted using our deterioration modelling approach, see Section 3.4.13. We carried out assessments of the scale of service risk reduction against key modelled indicators; internal and external flooding risk, repeat internal and external flooding risk, pollution risk, disruption due to blockages and collapses and finally spill risk. These measures, or close surrogates, were all predicted under different investment scenarios in order to assess the potential service risk reduction associated with programmes with different scales of remediation. Two proactive programmes were assessed; a traditional programme of open cut sewer renewal and a more innovative programme using a blend of techniques for sewer remediation, as detailed in Section 5.3.2 These approaches are faster, more efficient and minimise social disruption during the work. Table 13 summarises quantified cost benefit ratios between these proactive programme options and clearly shows that our preferred programme of innovative renewal is the most cost beneficial.

Table 13: Preferred option assessment summary (£m, 2022-23 CPIH prices)

System	Option	Selected	Capex	Cost benefit ratio
Gravity sewer proactive programme	Innovative renewal	✓	188	2.52
	Traditional renewal		494	1.09

Source: UUW analysis

5.4.11 Given the preventative nature of asset health investment, the majority of benefits relate to avoided future deterioration rather than immediate performance uplift. Customer protection is therefore provided through output-based PCDs focused on delivered intervention volumes, alongside systematic tracking of cost, condition and risk outcomes during AMP8, details of which can be found in Section 7.1 (PCD). This evidence will be used to inform future investment requirements and performance expectations at PR29. While a sustained programme is the preferred long-term approach, the appropriate AMP9 investment level will be determined through PR29 using the improved condition and cost evidence generated through AMP8 delivery, which may be higher or lower than the AMP8 level.

Specific service improvements

5.4.12 The primary benefit of this investment is a reduction in underlying asset health risk rather than an immediate in-period performance uplift. Benefits will accrue progressively as deterioration is arrested and condition stabilised. AMP8 delivery will provide the evidence base to inform future performance expectations at PR29.

5.4.13 The proposed investment reduces risk by addressing the causes of gravity sewer deterioration rather than continuing to manage its consequences. Increasing proactive inspection and rehabilitation enables intervention earlier in the deterioration lifecycle, reducing the likelihood of structural failure, infiltration-driven hydraulic stress and repeat service incidents. This shifts risk management from a predominantly reactive, performance-led approach to one focused on sustaining asset condition and long-term resilience.

5.4.14 The investment is not expected to deliver material in-period improvements against existing performance commitment levels for gravity sewers. Instead, the primary service benefit is the prevention of future deterioration by addressing underlying asset health risks that would otherwise manifest as increased failures, service disruption and environmental impact over time.

5.4.15 By increasing the rate of proactive inspection and remediation, the programme reduces the likelihood of structural collapse, infiltration-related incidents and repeat failures that drive sewer flooding, pollution risk and operational disruption. These impacts are avoided rather than newly created, and therefore support the maintenance of service performance assumed within the PR24 final determination, rather than enhancing current performance positions.

5.4.16 Increasing proactive survey and rehabilitation therefore targets assets at the point of greatest cost-effectiveness, limiting progression to higher-risk conditions associated with collapse, infiltration-driven stress and repeat service failures. As shown in Figure 3, this directly addresses observed deterioration trends and prevents further accumulation of risk. If intervention rates remain insufficient, deterioration will continue to outpace remediation and a growing share of assets will progress beyond cost-effective rehabilitation. Acting now preserves the option to extend asset life using trenchless techniques, avoiding the higher disruption, higher cost and residual risk associated with reactive replacement.

5.4.17 Resilience benefits are long-term and structural. Improved condition increases the network’s ability to withstand, absorb and recover from external stresses (e.g. extreme rainfall, groundwater pressure and operational variability). Healthier sewers are less prone to collapse, less sensitive to infiltration and more predictable in performance, reducing the frequency and severity of customer and environmental impacts during adverse conditions. These benefits depend on sustaining investment at a level sufficient to match the underlying rate of deterioration: without continued intervention at this scale, the network would revert to net deterioration, eroding resilience gains and increasing long-term cost and disruption.

5.4.18 Consistent with the proposed output-based Price Control Deliverable (Section 7.1), benefits are realised through the delivery of physical remediation activity, specifically the length of sewers rehabilitated, rather than through direct performance outputs. This reflects the preventative nature of asset health investment, where value is delivered through risk reduction and preservation of asset condition, even where avoided service impacts are not directly observable within the AMP period.

5.4.19 The investment therefore underpins, but does not change, existing performance commitments for sewer flooding, collapses, pollution and storm overflows. Without intervention at the proposed scale, continued deterioration of gravity sewers would be expected to place increasing pressure on these measures over time. The programme plays a critical role in offsetting that deterioration and supporting stable performance into AMP9 and beyond, rather than delivering incremental improvements within AMP8.

Wider benefits

5.4.20 In addition to reducing asset health risk and supporting stable service performance, the proposed investment delivers wider benefits for customers, communities, the environment and the long-term operation of the wastewater system. These benefits arise from addressing deterioration at source and embedding a more sustainable, data-led approach to asset management.

5.4.21 By intervening earlier in the deterioration lifecycle, the programme reduces societal disruption by avoiding reactive emergency repairs and repeat interventions. This minimises customer disruption, traffic impacts and environmental disturbance typically associated with failure-led excavation. Planned, proactive intervention, particularly through the use of trenchless rehabilitation techniques applied at scale, enables asset renewal with significantly lower surface disruption than traditional replacement, delivering broader societal benefits beyond the immediately affected locations.

5.4.22 The investment also improves the quality, coverage and representativeness of sewer condition data across the network. Increased inspection activity, combined with enhanced analytics and artificial intelligence enabled defect classification, strengthens our understanding of deterioration patterns and risk drivers. This improved insight supports more effective prioritisation, enables continual refinement of deterioration models, and underpins more efficient, targeted investment decisions in future AMP periods.

5.4.23 From a system perspective, stabilising the condition of the gravity sewer network supports the delivery of wider strategic programmes, including drainage and wastewater management planning, storm overflow reduction and long-term resilience planning. By reducing infiltration related stress and structural vulnerability, the programme helps preserve existing hydraulic capacity and operational flexibility, supporting efficient system operation without increasing reliance on reactive or capital intensive responses.

5.4.24 These wider benefits align with our asset strategy objective of transitioning from reactive recovery to proactive stewardship. By embedding a sustainable rate of renewal, the investment manages the costs and risks associated with ageing infrastructure more efficiently over time, reducing the likelihood that future customers face higher disruption or cost as a result of deferred intervention. Evidence from AMP8 delivery, including cost profiles, intervention effectiveness and emerging performance trends, will be reviewed to inform our PR29 business case and future performance assumptions. While these benefits are not expected to translate into material additional performance improvements within AMP8, they will accumulate over time.

5.4.25 Taken together, these wider benefits reinforce the value of the proposed investment as a long-term, preventative intervention that supports customer outcomes, environmental protection and system resilience, while improving the efficiency and sustainability of future asset management decisions.

5.5 Customer and stakeholder views

5.5.1 It is vital we engage with our customers and stakeholders across the entire region about their water and wastewater services. We have undertaken an iterative research approach to understanding customers' views on Asset Health. For this submission, we therefore reviewed recent and relevant research from our established body of customer research, including key projects which informed the PR24 business plan. Building on this existing knowledge base, we then undertook targeted bespoke research using both qualitative and quantitative methods. We have taken steps to ensure our customer research approach is proportionate and comprehensive, with the quantitative survey elements using a robust sample allowing for sub group analysis, and qualitative research using members of our existing research community.

5.5.2 Further information on the methodology, Independent Challenge Group engagement and the application of our insights can be found in the appendix *UUW26-26 Customer Research Approach – Regional Growth and Asset Health.*

5.5.3 The research programme shows strong customer support for intergenerational equity and a clear expectation that UUW invests proactively to address major long-term challenges. Customers consistently prioritise safety, service reliability and regulatory compliance as core outcomes. In particular, the findings indicate that:

- Customers expect investment decisions to be fair, future-focused and environmentally responsible.
- There is strong support for approaches that avoid transferring costs and risks to future generations. Customers want UUW to take early, responsible action on long-term risks, ensuring that expenditure is targeted at what matters most and delivers value for money. The Asset Health proposals have been developed in direct response to these expectations.
- Customers support increased investment to protect drinking water quality. They want UUW to stay ahead of high-impact, long-term risks, while retaining the flexibility to respond quickly to emerging issues and emergencies. The proposed investment reflects this balance and acknowledges customer sensitivity to bill impacts.

5.5.4 We have proactively sought the views of key statutory and customer stakeholders, in line with our programme wide engagement plan. This has ensured that our proposals are grounded in customer expectations and aligned with regulatory priorities. Engagement to date includes:

5.5.5 **Your Voice** – the Independent Challenge Group for the North West. We presented our findings from the recent customer research and welcomed input. The panel was broadly supportive of our plans.

5.5.6 **The Environment Agency** – we held a meeting with the Environment Agency on 17 March to explain our intentions to submit asset health investment cases across a range of water and wastewater assets. We followed this up with a letter setting out our proposals and high-level indications around cost. We received a response on 25 March explaining that the Environment Agency will be working jointly with Ofwat to assess the proposals where those proposals are relevant to the Environment Agency. Due to the collaborative model of business case assessment, the Environment Agency will not provide additional supporting comments ahead of the submission deadline.

6. Robust and efficient cost

This section explains how the costs of the proposed gravity sewer investment have been developed and provides assurance that they are robust and efficient. It sets out the costing methodology used to derive unit rates and overall programme costs, drawing on market tested contractor rates, delivery experience from existing AMP8 programmes, and lessons learned to date. The section provides evidence of efficient costs through external benchmarking.

6.1 How we developed our cost estimates

6.1.1 This section explains how we developed our cost estimates. As a general principle, our costs are based on commercially tendered market rates or actual costs incurred carrying out similar work in AMP8. We have used our experience of delivering similar work to develop an output based PCD rate for sewer remedial activity. This PCD rate incorporates the costs associated with identifying and designing sewer specific interventions into the rate for delivering a unit length of remediation. The following section uses our delivery experience to build up the PCD rates for remediation.

6.1.2 The assumed split of intervention types used to inform the costing approach in this section is consistent with the indicative programme mix set out in Section 5.

Enhanced targeting

6.1.3 The foundations of our enhanced targeting costs are commercially tendered rates for intervention. These rates vary by sewer size (larger sewers are associated with higher cost) and region (Cumbria rates are higher than Merseyside rates due to the additional complexities associated with carrying out work in extremely rural/mountainous areas) they also vary by surface coverage (i.e. reinstatement or traffic management required), some interventions vary by depth or predicted operating pressures. The estimate also includes for key activities such as customer and stakeholder management.

6.1.4 An element of our sewer network is inferred. We have used the cheapest rate for these sewers (relating to the smallest sewer size), which reflects a conservative estimate of cost for work on inferred assets. We consider that this will add additional stretch into our cost estimate to the benefit of customers.

Infiltration

6.1.5 We have based the costs of our infiltration programme on actual work carried out in AMP8. Infiltration is difficult to resolve on the first visit because the problem is usually complex, hidden, and variable, rather than one single obvious defect. Therefore, we deliver work in these areas against a three-stage programme.

- **Stage 1 – Investigation and 65 percent conversation rate to remediation.**
  - Our investigation costs have been informed by strong delivery experience from AMP8. We successfully completed 65 AMP8 projects, covering 48 km of sewer investigation. This experience has informed the average project cost adopted within our estimates.
  - Based on this proven track record, we anticipate that approximately 65% of investigations will progress to remediation. Remediation costs are likewise based on AMP8 outturn data, demonstrating efficient delivery on a per-project basis.
- **Stage 2 and 3 – Investigation and 47 percent conversation rate to remediation**
  - The costs for the second and third surveys have also been derived from robust AMP8 outturn performance, reflecting typical project delivery at these stages.
  - Our AMP8 experience shows that 47 percent of surveys at these later stages lead to remediation, with remediation costs informed by established outturn data.

– Investigations and remediations at the second and third stages typically address more complex requirements and additional scope. This increased complexity is reflected in the higher unit rates and demonstrates our capability to effectively manage and deliver more demanding works.

Random sample surveying

6.1.6 We developed our estimate for this work from our commercially tendered rates for cleaning and surveying applied to Ofwat's required volume for each sewer size band, as requested we have absorbed the costs associated with analysing the survey data into our base programme.

Our programme costs

6.1.7 Table 14 splits out direct and indirect costs by each element of the programme set out above. The low ratio of indirect costs reflects the fact we intend to absorb a large proportion of the indirect support costs in our existing cost base.

Table 14 : Split of direct and indirect costs by project (£, 2022-23 CPIH)

Project	Direct costs	Indirect costs	Total
Enhanced targeting	88,997,716	25,150,755	**114,148,470**
Infiltration programme	43,944,030	12,418,583	**56,362,612**
Ofwat survey sample	13,675,366	3,864,659	**17,540,025**
Total	**146,617,112**	**41,433,996**	**188,051,108**

Source: UUW analysis

6.1.8 Table 15 shows the cost build across the different indirect cost categories.

Table 15: Programme level cost build (£, 2022-23 CPIH)

Cost category	Value
Direct costs	146,617,112
Risk	14,743,763
Cost to serve	9,594,677
Corporate overhead	17,095,555
Total	**188,051,108**

Source: UUW estimates

6.2 Cost Benchmarking

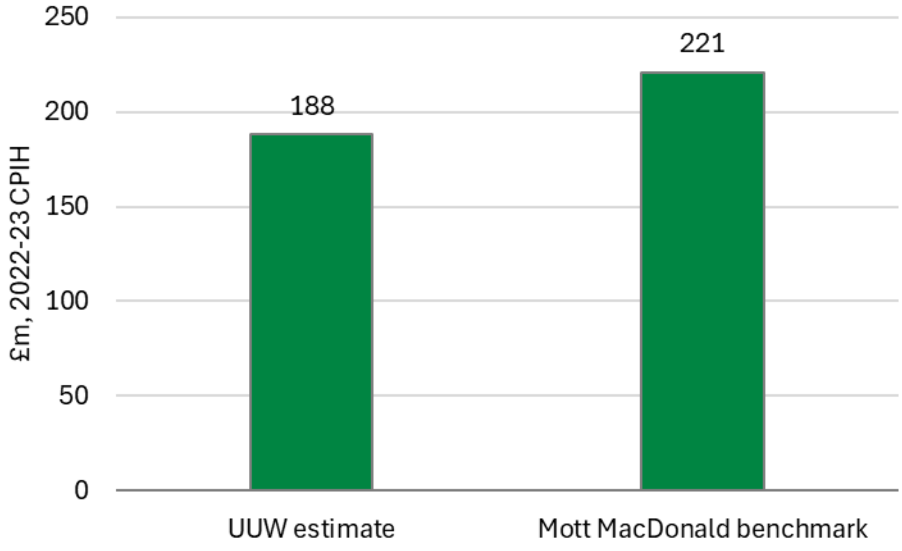
6.2.1 We have engaged a third-party specialist, Mott MacDonald (Motts), to assess our costs against the costs incurred by similar companies when carrying out this type of work.

> *"The objective was to develop a robust benchmark using a hybrid estimation approach. For most scope items a benchmarking approach was implemented based on top-down industry models. In instances where a top-down approach could not be applied, such as complex elements and custom/bespoke assets, a bottom-up cost estimating approach was implemented where possible. In instances where neither a top-down nor bottom-up approach were appropriate, costs were substituted from the UU scope using a 'like-for-like' approach to develop a full direct works estimate.*
>
> *Each benchmark incorporates Direct Works Costs, Contractor and Client Indirect Costs, as well as a provision for Biodiversity Net Gain, Risk and Estimating Uncertainty and Corporate Overheads. A benchmark of each was incorporated to allow comparison between the UU scope costs and industry averages across different cost attributes."*

Source: Mott MacDonald

6.2.2 Mott MacDonald identified a cost benchmark for the work we are proposing within this business case. This benchmark is set out in Figure 12. As illustrated, UUW's cost estimates are 15% below external benchmarks from comparable companies. This demonstrates our cost estimates are efficient.

Figure 12: UUW's cost estimates are efficient compared to external benchmarking (2022-23 CPIH)



Source: UUW estimates and Mott MacDonald

6.2.3 We provide a full overview of our benchmarking approach and associated reports in *UUW26-28 Benchmarking reports*.

6.3 How we accounted for repair costs associated with the proposal

6.3.1 Sewer expenditure data is highly aggregated and complex, with proactive and reactive maintenance activities closely intertwined. As a result, it is not possible to validly and robustly isolate a standalone WBB allowance for gravity sewers that excludes repair activity.

6.3.2 Unlike other asset classes within the cost change process, for gravity sewers, we have therefore calculated the WBB including repair expenditure.

6.3.3 We do not consider it appropriate to assume any operating expenditure savings on gravity sewer reactive spend during AMP8 resulting from our investment for the following reasons:

- Our approach to calculating WBB for gravity sewers already fully incorporates repair expenditure.
- The proposed investment programme targets only a small defined subset of the sewer network (c.0.44% remediated) and focuses on proactive interventions to address underlying condition and reduce the risk of failure. The benefits are not expected to be realised in AMP8 and are likely to be proportionally small.
- Given historic costs are dominated by reactive repairs and incident response, benefits are expected mainly through risk reduction and cost avoidance (reactive capital repairs and incidents), rather than material reductions in baseline maintenance costs.
- If reactive repair and maintenance costs reduces, this would be redirected to fund delivery of our expanded AMP8 proactive programme. We have a strong track record of having over-invested relative to our allowances: we have historically overspent by 35% of our implicit allowances for the asset classes in scope of the cost change over AMP6 and AMP7.
- Our implicit WBB allowance for gravity sewers reflects a blended rate of historic expenditure, comprising both reactive spend and proactive maintenance. Importantly, this reactive expenditure is

embedded within our implicit allowance which is subject to accountability through the base expenditure PCD. This PCD already provides appropriate customer protection by enabling clawback of allowances if we do not deliver on our base output commitments.

6.3.4 In conclusion, we believe that it would not be appropriate to assume additional repair cost savings in AMP8 resulting from our proposed investment nor to net those off our proposed investment.

7. Customer Protection

The programme includes strong safeguards to ensure customers only fund efficiently delivered work. Output-based PCDs apply clear unit rates and recover costs for any non-delivered interventions both for the base programme and for the programmes of work associated with the cost change. Annual APR reporting will provide full transparency and accountability.

7.1 Price Control Deliverables (PCDs)

7.1.1 We are proposing three output based PCDs to ensure efficient delivery of this sewer investment proposal as well as the base programme. These will explicitly cover:

- the base proactive remediation programme,
- the 0.5% random sample sewer survey, and,
- the sewer remediation funded through this cost change submission.

7.1.2 In each case this will involve an output-based PCD with a rate for the volumetric (per metre) deliverables. Any non-delivery would be subject to the PCD clawback mechanism as set out below in Table 16. This would offer appropriate customer protection as it would claw back allowed costs in the event of non-delivery of the planned outputs.

Limitations of WBB

7.1.3 In our calculation of WBB, we have highlighted the limitations of any mechanistic approach used to assess WBB for individual asset classes and the data issues associated with the assessment. In applying any methodology, we believe that Ofwat should give significant consideration to the risk of an overstatement and the potential impacts this could have on restricting companies' base expenditure decisions in a way that would be inconsistent with the PR24 approach to base expenditure allowances.

7.1.4 We therefore believe that our WBB estimates very much represents the upper end of the range that should be considered for WBB and that, in view of the risks associated with over-estimation, Ofwat should consider whether lower limits should be binding on companies. We have therefore proposed potential mitigations that Ofwat could consider in the *UUW26-18 Asset Health – What Base Buys* document.

Gravity Sewers cost change PCD

7.1.5 We propose that the PCDs should hold UUW to account for the delivery of sewers remediated and, in the case of the 0.5% random sample, the length of sewers surveyed.

7.1.6 Both the base PCD and the remedial PCD proposed in this cost change submission are aligned to Ofwat's FD PCD Mains Renewal. In this example, Ofwat holds companies to account for delivering a determined length of mains renewals, rather than performing the survey work required beforehand to assess which mains require renewing. The customer benefits primarily from the remediation work carried out, rather than the assessment or survey work.

7.1.7 We calculate that the survey work proposed will result in the sewer lengths requiring remediation shown in Table 16. The unit rate proposed for the proactive remediation from the base programme is aligned to the unit rate proposed in Table 17, demonstrating consistency across the overall remediation programme.

Table 16: Base PCD cost build-up

	2022/23 price base £m	PCD deliverable (metres)	Unit rate model for PCD (2022/23 cost base) £ per metre
Proactive Remediation from base programmes	120.3		
Length of remediated sewers (metres)		225,507	
PCD non-delivery rate £			533.5

Source: UUW analysis

7.1.8 Table 17 sets out the PCD for proactive remediation proposed in this cost change submission. This work includes all structural remediation techniques such as CIP lining, slip lining and dig down replacement.

7.1.9 The unit rate for the remediation PCD presented in Table 17 has been calculated by dividing the total remediation cost set out below, by the length of sewer remediated. The resulting unit rate of £545 per metre ensures that £184m of the investment proposed under this submission is fully protected.

Table 17: Remediation PCD cost build-up

	2022/23 price base £m	PCD deliverable (metres)	Unit rate model for PCD (2022/23 price base) £ per metre
Proactive Remediation from targeted programmes	184.0		
Length of remediated sewers (metres)		344,902	
PCD non-delivery rate £			533.5

Source: UUW analysis

7.1.10 Table 18 sets out our proposed PCD for the random survey programme. The random survey PCD unit rate of £10.3 per metre ensures that the remaining £4m of the investment programme is protected, such that all elements of proposed expenditure in this cost change submission would be fully subject to clawback in the event of non-delivery (Table 19).

Table 18: Random survey PCD cost build-up

	2022/23 price base £m	PCD deliverable (metres)	Unit rate model for PCD (2022/23 price base) £ per metre
Random survey programme	4.0		
Length of surveyed sewers (metres)		388,000	
PCD non-delivery rate £			10.3

Source: UUW analysis

7.1.11 Table 19 presents a summary of each of the three output based PCDs proposed in this submission.

Table 19: PCD deliverables and non-delivery rates

Intervention type	Number in AH plan (metres)	Unit of delivery	Unit rate model for PC PCD (2022/23 price base) £ per metre	2022/23 price base £m	Reference
Proactive Remediation from base programmes	225,507	Length (metres)	533.5	120.3	Table 16
Proactive Remediation from targeted programmes	344,902	Length (metres)	533.5	184.0	Table 17
Random survey	388,000	Length (metres)	10.3	4.0	Table 18

Source: UUW analysis

PCD reporting, assurance and other conditions

7.1.12 This section provides further details underpinning our approach to this proposed PCD. This includes parameters such as the measurement, reporting and assurance of the PCD, any timing incentives proposed and any additional conditions of the PCD mechanism on the proposed allowance.

7.1.13 This is an output-based PCD mechanism that applies to the expenditure, this would be above and beyond our base programme expenditure.

7.1.14 The base programme would be assured as part of the APR process to confirm base outputs each year against the sewer priority class.

7.1.15 The APR assurance for Asset Health would confirm there has been no overlap between the base programme and the additional Asset Health expenditure.

7.1.16 Any changes to the list of sites / interventions arising from new information as set out in the agreed Asset Health cost change would be presented alongside the APR PCD data. Commentary would provide a clear explanation for the change(s) and demonstrate how it would not increase risk to customers.

7.1.17 The length of sewers reported under the PCD will be the length identified during the survey which then requires remediation, rather than the length of the resultant remediated sewer. This is in line with Ofwat's response to UUW's PR24 Final Determination Inbound Query to Ofwat, OFW-FD-UUW-030, on UUW's sewer pumping mains renewals base PCD:

"For the avoidance of doubt, using the example in the company's query, if 2 kilometres of poor rising condition mains is replaced with 1 kilometre of gravity sewer, this should be reported as renewing 2 kilometres in the company's PCD. The company must clearly set out in its delivery plan and annual performance reports the length of rising mains that have been replaced with a gravity sewer."

Source: OFWAT response to UUW query

7.1.18 PCD outputs, progress and expenditure would be reported each year as part of our standard Delivery Plan reporting arrangements applied to all existing PCDs. Overall delivery against this PCD will be assessed at the end of year five AMP8 (i.e. 2029/30). If we have spent at least 60% of the allowed expenditure for this PCD due in AMP8, then there would be no claw back provided that the remaining delivery takes place by the end of AMP9 (i.e. 2034/35). This is in line with Ofwat's current PCD guidance (February 2026).

7.1.19 The delivery of the interventions is not anticipated to have any impact on existing PR24 FD PCDs. We therefore do not propose any adjustment to the existing FD PCDs.

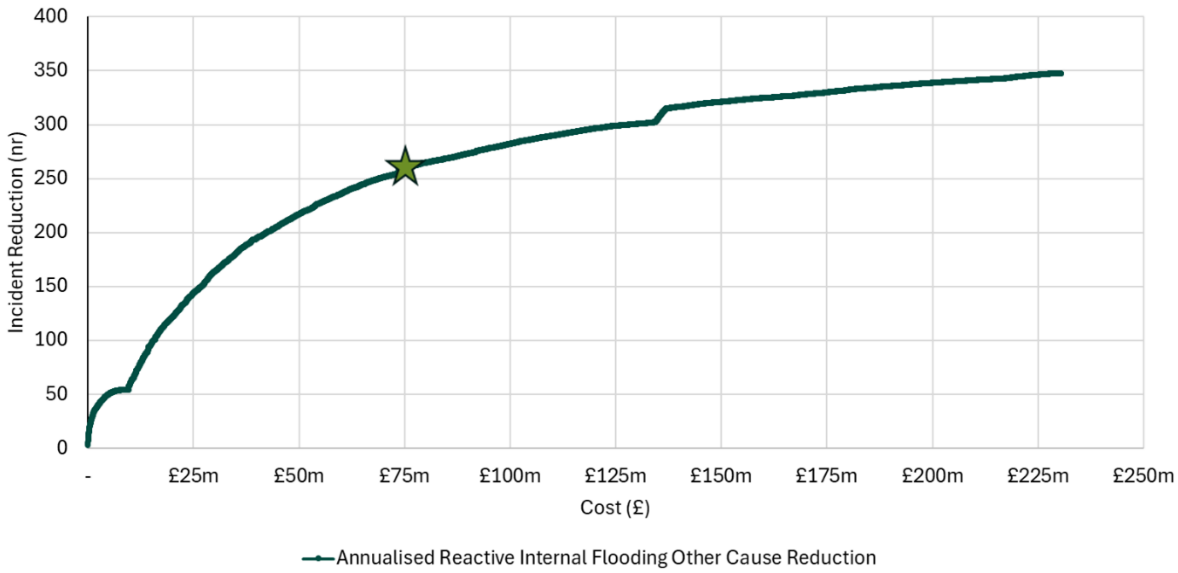
7.1.20 **Timing incentives:** Ofwat's PR24 Final Determination sets out where timing incentives apply. These are restricted to water supply, supply and resilience interconnectors, metering, phosphorus removal, storm overflows and mains renewals. These incentives are designed to promote timely delivery of benefits. With the exception of mains renewals, these are scheme-level PCDs that allow greater flexibility in deliverables, therefore reducing the financial risk created by the application of timing incentives. Within UUW's PR24 FD, the mains renewals PCD is the only asset-health-related PCD with AMP8 timing incentives, measured by annual pipe-length delivery profiles. We considered the application of a similar timing incentive to the PCDs proposed in this sewer investment proposal. However, given that the investment will necessarily be constrained to a three year window – rather than the five year window allowed for the AMP8 mains renewals PCD – we do not consider that it is necessary or appropriate to apply incentivisation to the delivery of a programme in such an already restricted timeframe. For this reason, we do not propose applying timing incentives, except in the scenario of post-AMP8 delivery.

7.2 Impact on Performance Commitments

7.2.1 The additional investment from this business case will address the performance deterioration expected throughout this AMP and into AMP9 rather than enhancing the current performance position assumed by the PR24 final determination for the wastewater network measures.

7.2.2 The existing PR24 allowance for sewer rehabilitation will enable us to make improvements in performance to flood risk from flooding other causes (FOC) (not hydraulic) for customers. The expected improvement in performance from this can be seen in Figure 13 below. This demonstrates that once we complete this investment programme across the AMP, we will have significantly reduced FOC flood risk. Incremental investment above this, results in diminishing performance improvements, rather than a step change.

Figure 13: Predicted cumulative internal FOC flood risk reduction from enhanced targeting business model

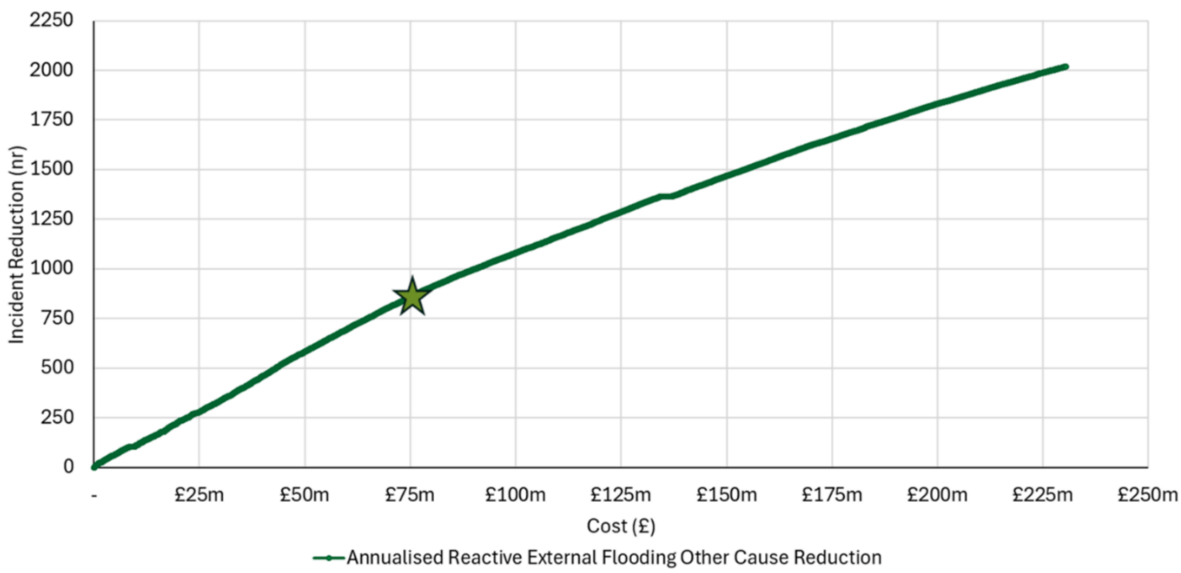


Source: UUW analysis

7.2.3 This diminished return is due to the incremental gains being offset by the deterioration of sewer assets over the course of time. As explained in Section 3.3, there is a 50-year asset life design using current techniques, therefore requiring 10% of our network to be surveyed and remediated (where appropriate) per AMP which if not achieved will mean that there is existing deterioration in AMP8 and AMP9.

7.2.4 A similar trend can be seen for external flooding in Figure 14. Whilst we don’t see such diminished returns from investment above the current rate, it is the cumulative effect for both internal and external flooding that needs to be taken into consideration with additional investment. It must be noted that rainfall, its location and intensity is the key driving factor on flooding performance. Improving the resilience and consequential asset health of the wastewater network therefore supports the reduction in flood risk, but will only see a benefit if investment is at a rate greater than deterioration of the asset base.

Figure 14: Predicted cumulative external FOC flood risk reduction from enhanced targeting business model



Source: UUW analysis

7.2.5 Ofwat is currently consulting on reform of the FD Outcomes framework for the pollution incidents due to changes in the EPA. Ofwat proposes to change the measure to having a dynamic PCL, negating the need for any further consideration of the impact on performance and the FD PCL in this submission.

7.2.6 Ofwat recognised UUW's company-specific circumstances with a PR24 FD company-specific PCL for the internal sewer flooding performance commitment. Ofwat stated its intention, in the PR24 FD, for UUW to progress towards the common PCL for internal sewer flooding performance and a more even playing field for asset health and sewers, with the rest of the industry. Ofwat recognised in the PR24 FD that UUW has gone the extra mile in terms of investment in this area in AMP7, with a spend of £231 million against an allowance of £96.7 million. This indicates to Ofwat that UUW has made significant effort to address its performance and achieve the common PR19 PCL in 2020-25. In the final determination, Ofwat also recognises that UUW has made significant efforts to address blockages in the current period to deliver the common PR19 PCL.[21].

7.2.7 The combination of these and other factors resulted in Ofwat recognising the need for UUW to have an AMP8 company specific PCL for internal sewer flooding. This additional investment will build on this track record on flooding and further improve our understanding of the condition of our assets. This will therefore allow for targeted, appropriate and efficient remediation ahead of additional deterioration, rather than enhancing performance as measured by the current suite of performance commitments.

7.2.8 The additional investment proposed to target infiltration will also help to bring the company onto an even playing field for asset health and sewers with the rest of the industry. The unique conditions in the North West mean that our network is subject to increased pressures, faster asset condition deterioration and therefore more extensive rehabilitation requirements (see Section 1.3). These factors contribute to higher-than-average maintenance and renewal pressures in wetter catchments. This additional investment will address infiltration by improving the health of the sewers, removing cracks or lining joints. It is therefore not anticipated that this investment will not have any additional benefit to the network performance commitments. While this programme will target areas of potential high infiltration, it is not anticipated that this would be on a scale that would materially benefit flooding or storm overflow performance.

[21] "PR24 final determinations: United Utilities– Outcomes appendix", Ofwat, December 2024, *PR24-final-determinations-United-Utilities-Water–-Outcomes-appendix.pdf page 6

8. Investment Delivery Plan

We are actively managing all key delivery risks, including outage availability, access constraints and interfaces with live assets, through early operational engagement, and flexible outage planning. Delivery planning draws on evidence from existing AMP8 delivery to demonstrate that programmes are on track, capacity has been built, and productivity has improved, providing confidence that the additional work is deliverable within the AMP. It also outlines stakeholder engagement, customer communications, and the high-level delivery profile for the programme.

8.1 Deliverability

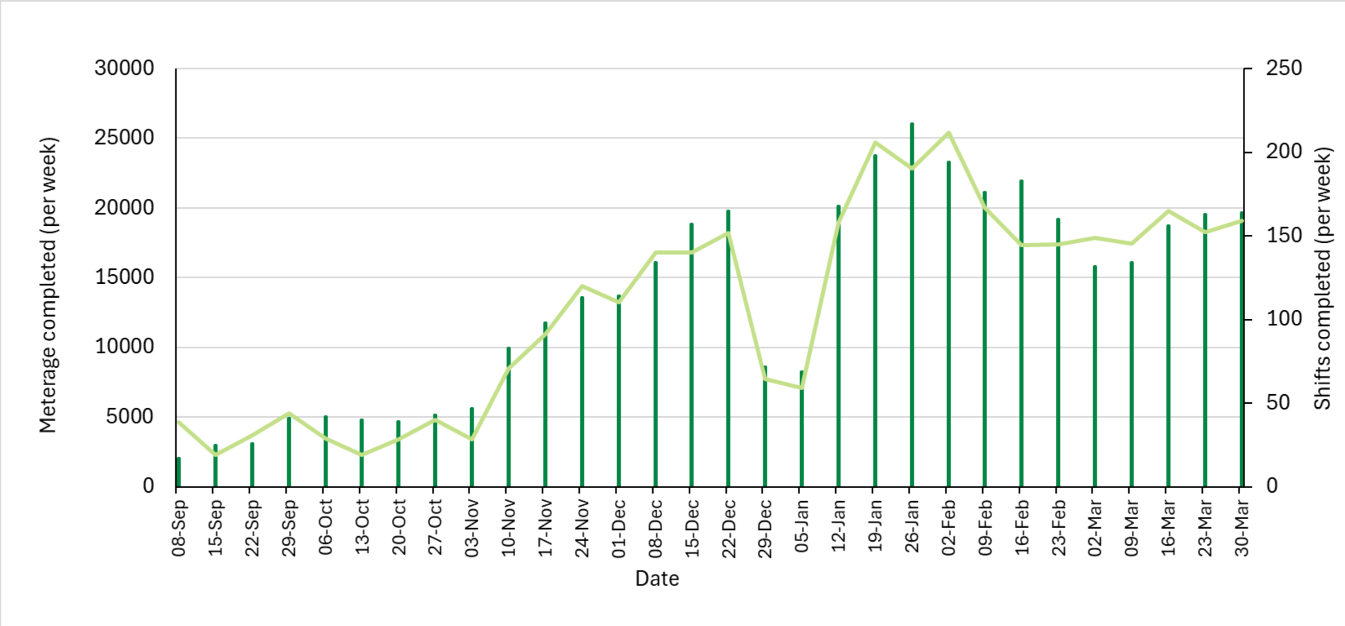
8.1.1 Building on mobilisation and delivery learning from 2025/26 of AMP8, we are confident that the proposed additional gravity sewer inspection and remediation activity is deliverable within the period. The programme is an extension of established workstreams, using proven methods, an already mobilised supply chain, and a resourcing model that has demonstrated the ability to scale and sustain higher productivity. Our delivery approach will continue to apply structured governance, performance oversight and adaptive planning to manage constraints and maintain efficient, customer-focused delivery.

8.1.2 The main delivery risks to our proposed additional sewer inspection and remediation plans are:

- **Ageing infrastructure complexity:** Older wastewater networks often contain a mixture of materials, unknown construction methods, undocumented changes, and high levels of deterioration. There is a risk that assets have deteriorated further than anticipated, leading to a more expensive rehabilitation programme.
- **Permit restrictions and Local Authority constraints:** Tight permitting regulations, limited allowable working windows, seasonal embargoes, and long lead-in times can create significant scheduling and delivery risks, particularly in urban areas or on strategic road networks. Local authorities frequently impose restrictions to manage community impact, coordinate with other utilities, and maintain traffic flow, meaning that rehabilitation works may be delayed, re-sequenced, or constrained by limited hours of operation.

8.1.3 During 2025/26 of delivering the Base Enhanced Targeting Programme, we identified an opportunity to further accelerate progress by increasing resource levels. By working closely with our contractors, we have successfully strengthened capacity and enhanced supply chain resilience, enabling a more consistent and efficient operating model. As a result, programme delivery has continued to build momentum, with productivity improving month on month, as shown in Figure 15.

Figure 15: AMP8 Enhanced Targeting Programme Yr1 performance (shifts completed vs. meterage delivered)

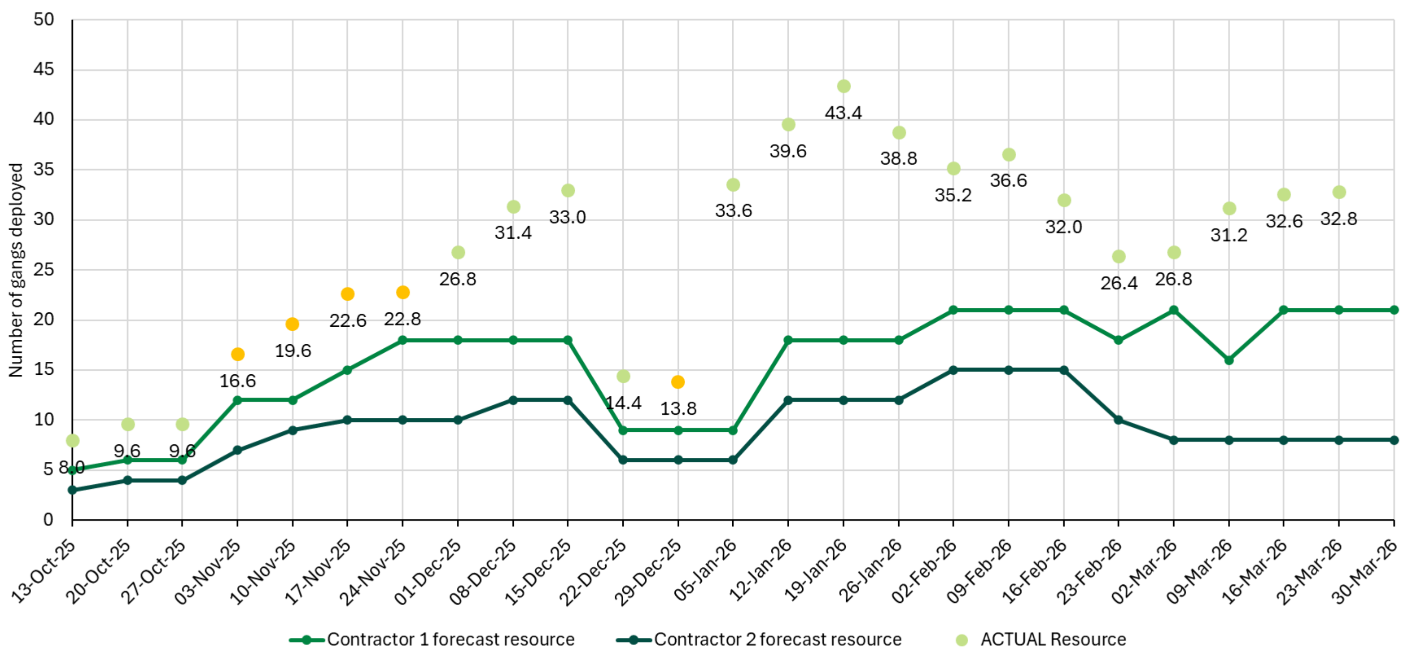


Source: UUW analysis

8.1.4 The revised resourcing model has now been fully implemented and as a result the programme has seen a 700% increase in the number of gangs deployed, which has driven a significant uplift in productivity: average CCTV completed has risen from 1,107m per week to 8,677m per week.

8.1.5 Figure 16 below shows ramp up activity since October 2025 – the green dots show where we have exceeded our resource target that month, whilst amber shows where resource numbers have come in at 80% or above the target set.

Figure 16: AMP8 enhanced targeting programme resource ramp up activity – gangs deployed



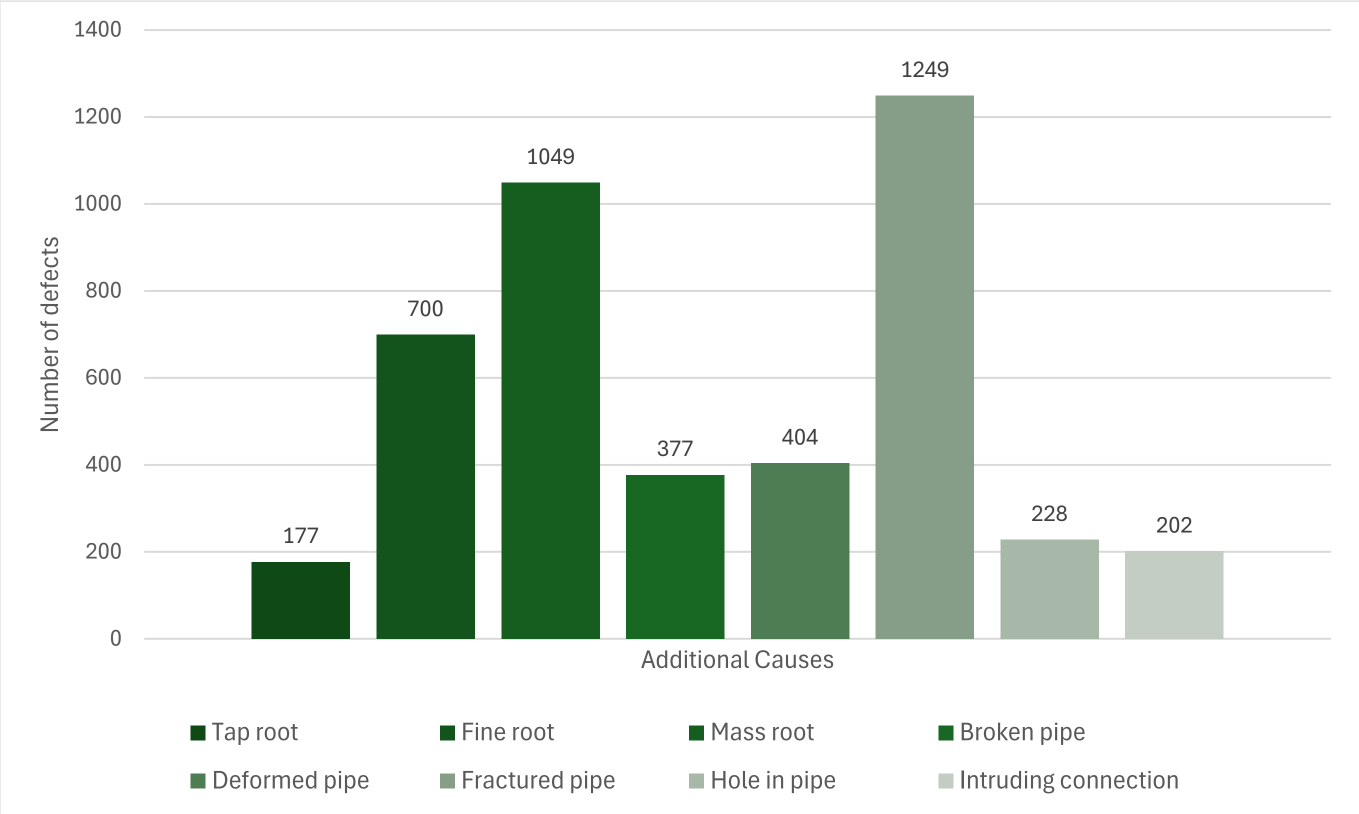
Source: UUW analysis

8.1.6 The improved resource model has demonstrated that it can meet the volume of work required to achieve the AMP8 remedial programme targets. It has not only increased overall capacity but also reduced bottlenecks within the programme and improved responsiveness, which previously caused delays and contributed to a growing backlog.

8.1.7 Figure 17 below shows the predicted yearly benefits of the existing AMP8 enhanced targeting programme for internal, external and collapse measures. Year 1 shows the actual underperformance against the original planned profile, while the profile for subsequent years includes planned adjustments to recover this throughout the remainder of the AMP. Looking ahead to PR29, AMP8 delivery will provide robust evidence on the sustainable rate of survey and remediation that can be achieved in practice, and we will assess this against international cycle and risk based approaches (Section 3.3). This will allow us to work proactively with our supply chain to plan the capacity and capability required to deliver a steady state rate for our future programme.

8.1.8 To date the year 1 enhanced targeting programme has delivered 388km of CCTV inspections, identifying over 4000 defects (an average rate of one defect for every 97m of sewer inspected).

Figure 17: Range of defect types identified during Year 1 of existing AMP8 enhanced targeting programme



Source: UUW analysis

8.2 Supply chain readiness

8.2.1 Our strategy is to deliver the projects within this case via the most appropriate delivery "runway" in our newly established AMP8 runway-based delivery model, which is described in more detail in Section 7 of *UUW26-02 Growth Unlocked: Water for the New Economy.*

8.2.2 Assessment of supply chain capacity and supply chain deliverability risk should not be considered in the context of any one case in isolation. Instead, we have considered the impact of all cases with our Growth and Asset Health submissions in aggregate on the baseline AMP8 programme. We have engaged with our supply chain partners and undertaken a thorough programmatic assessment of capacity in our new AMP8 supply chain, to assure ourselves that the overall investment proposal is deliverable, and that there is sufficient headroom in capacity and availability of resource within our design consultants and construction & wider supply chain, in addition to our internal programme management capacity, to accommodate the additional investment.

8.2.3 Please refer to Section 7 of *UUW26-02 Growth Unlocked: Water for the New Economy* for the programmatic assessment which considers all projects proposed for investment across all cases within our Growth and Asset Health submissions, with the supporting evidence that all such investments are deliverable.

8.3 Delivery risk: design and delivery risks with mitigation

8.3.1 Key delivery risks have been identified, including access constraints at rural or remote sites. Mitigation measures are in place, such as early site access planning, use of specialist offroad equipment where required, and flexible scheduling to avoid seasonal access restrictions. Additional mitigations include multi-supplier frameworks to reduce dependency on single contractors and contingency allowances within the delivery plan.

8.3.2 Based on the evidence of need, the maturity of the delivery plan, and the confirmed capability and capacity of the supply chain, the programme is considered fully deliverable within AMP8.

8.3.3 A programme risk register has been developed for Asset Health (see *UUW26-27: Deliverability risk register*). Some of the key risks associated with gravity sewers are shown in Table 20 below.

Table 20: Key delivery risk

Risk Description	Mitigation	Opportunity / Threat	Risk Impact Score Maximum 25
Interface with existing assets - There is a risk that a number of the projects will require significant modifications to existing live assets - this could result in additional cost and programme impacts relating to over pumping to enable any modifications or upgrades.	Sites where the interface with existing assets has been identified as a high risk have additional allowances in place to cover temporary treatment and over pumping to mitigate. Initial discussions have commenced with operational teams to ascertain likely requirements and timescales	Threat	9
Contract resource to deliver volume at this scale. There is a risk that the current framework partners are unable to meet the increased demand this could have an impact on current delivery profiles increasing time and cost.	We currently operate with around 150 shifts per week across approximately 40 contract gangs. The delivery model we've established for our core AMP8 programmes is intentionally designed to flex, allowing us to scale resource up or down as needed. We are working closely with our partners to increase capacity; initial phase of base programme ET programme has involved outsourcing. Plans are in place with our partners to move to DLO (Direct Labour Organisation) for 2026/27 giving us an opportunity to maintain gangs through subcontractors. Further discussions on a commercial tender dedicated to delivery if required.	Threat	6
Information Management. There is a risk that the scale of investment introduces additional challenges around management of information across multiple programmes to ensure consistent, efficient, and streamlined operations across the UUW estate. This could lead to increases in cost and time.	Implementation of regular cross programme reviews and validation processes to prevent duplication, promote alignment, and identify opportunities to drive efficiencies across workstreams	Threat	6

Risk Description	Mitigation	Opportunity / Threat	Risk Impact Score Maximum 25
Access & site constraints, along with customer impact. There is a risk that many of our smaller diameter sewers are located on private property and require customer permission to enter. If we are unable to contact the customer or secure timely approval for access, this can lead to programme delays and jeopardise our ability to meet key targets.	An escalation process has been established with our contractors, operating on a three strike basis. After the third escalation, the issue is referred to UUW for a decision on the appropriate next steps.	Threat	6

Source: *UUW26-27 Deliverability risk register*

8.4 Outline delivery schedule

8.4.1 The proposed increase in gravity sewer survey and rehabilitation builds directly on delivery models already mobilised under the AMP8 base programme. The investment does not rely on new asset types, novel delivery approaches or untested supply chains, but represents a controlled scaling of established survey, optioneering and rehabilitation activities that are already being delivered across the network.

8.4.2 Given the scale and linear nature of the gravity sewer network, delivery is inherently flexible. Survey activity is distributed across the network, allowing resources to be reallocated dynamically in response to access constraints, emerging risks or local delivery issues. Rehabilitation activity is similarly modular, enabling intervention lengths and techniques to be adjusted without compromising overall programme objectives.

8.4.3 Early AMP8 delivery has provided valuable learning on mobilisation, productivity and sequencing, particularly in relation to survey throughput, traffic management and coordination with local authorities. These lessons have already been incorporated into revised delivery plans, contributing to improved productivity and confidence in scaling delivery. The proposed additional investment benefits directly from this learning, reducing delivery risk relative to a stand-alone programme.

8.4.4 Delivery of the proposed additional gravity sewer interventions is supported by the acceleration of the AMP8 base programme, which has enabled us to reach and sustain the levels of productivity required to deliver increased survey and rehabilitation volumes. Following an initial mobilisation period, AMP8 delivery rates have improved materially as resourcing models, sequencing and coordination with local authorities have been optimised. This has resulted in stable, repeatable productivity across survey and trenchless rehabilitation activities, using established supply chains and delivery approaches. As a result, the proposed increase in investment represents a controlled extension of delivery at proven rates rather than a step change into untested capacity, providing confidence that the additional interventions can be delivered efficiently and without compromising quality or customer outcomes. Letters of support from key organisations within our supply chain can be found in *UUW26-25 Letters of support*.

8.4.5 Programme governance ensures that delivery rates are aligned to capacity, that quality standards are maintained as scale increases, and that outputs can be flexed between survey and rehabilitation activity without increasing risk to customers or delivery confidence.

8.4.6 As part of delivery, we will capture and quality-assure: (i) condition distribution from expanded CCTV and random sampling, (ii) intervention selection rates (no-intervention/rehabilitation/replacement), and (iii) unit cost and productivity evidence from scaled delivery. This evidence will directly inform our PR29 view of the efficient AMP9 requirement for gravity sewers.

8.4.7 By PR29, we will have materially stronger evidence from AMP8 delivery on the sustainable rate of survey and remediation (including observed condition distribution, conversion rates from survey to intervention, unit costs and productivity at scale). We will use this evidence to reassess the appropriate long-term intervention rate and benchmark it against established international cycle-based approaches referenced in Section 3.3. This will provide a robust basis to work with our supply chain and industry partners to plan capacity, capability and delivery runways, ensuring that the required steady-state rate is deliverable in practice across the UK.

8.5 AMP8 delivery evidence

8.5.1 UUW remains broadly on track to deliver against its PR24 FD PCDs. As explained in the *UUW26-02 Growth Unlocked Water for the New Economy* we are delivering against the requirements of the FD PCDs whilst spending in line with UUW's AMP8 enhancement allowances in the final determination. The delivery evidence generated through AMP8 (productivity, unit costs, and survey-to-intervention conversion) will be used at PR29 to confirm an efficient, sustainable rate of survey and remediation. We will then test that rate against international cycle-based practice (Section 3.3) and use it to inform supply chain capacity planning for delivery across the North West.

8.5.2 The mains renewals base PCD in the PR24 FD is of most relevance to this submission case as it helps monitor improvements in the asset health during AMP8 by imposing a PCD on set outputs. Our performance illustrates how we are successfully delivering against our current FD PCD commitments. In the FD, Ofwat expects the sector to move towards a sustainable mains replacement rate to maintain and improve asset health during the period. It therefore set a PCD on all companies to deliver the specified output of the PCD (a company specific length of mains). In the May 2026 Delivery Plan progress update we are reporting delivery against this PCD as Green, showing that we are on track with delivering the requirements of this base investment to Ofwat's FD requirements.

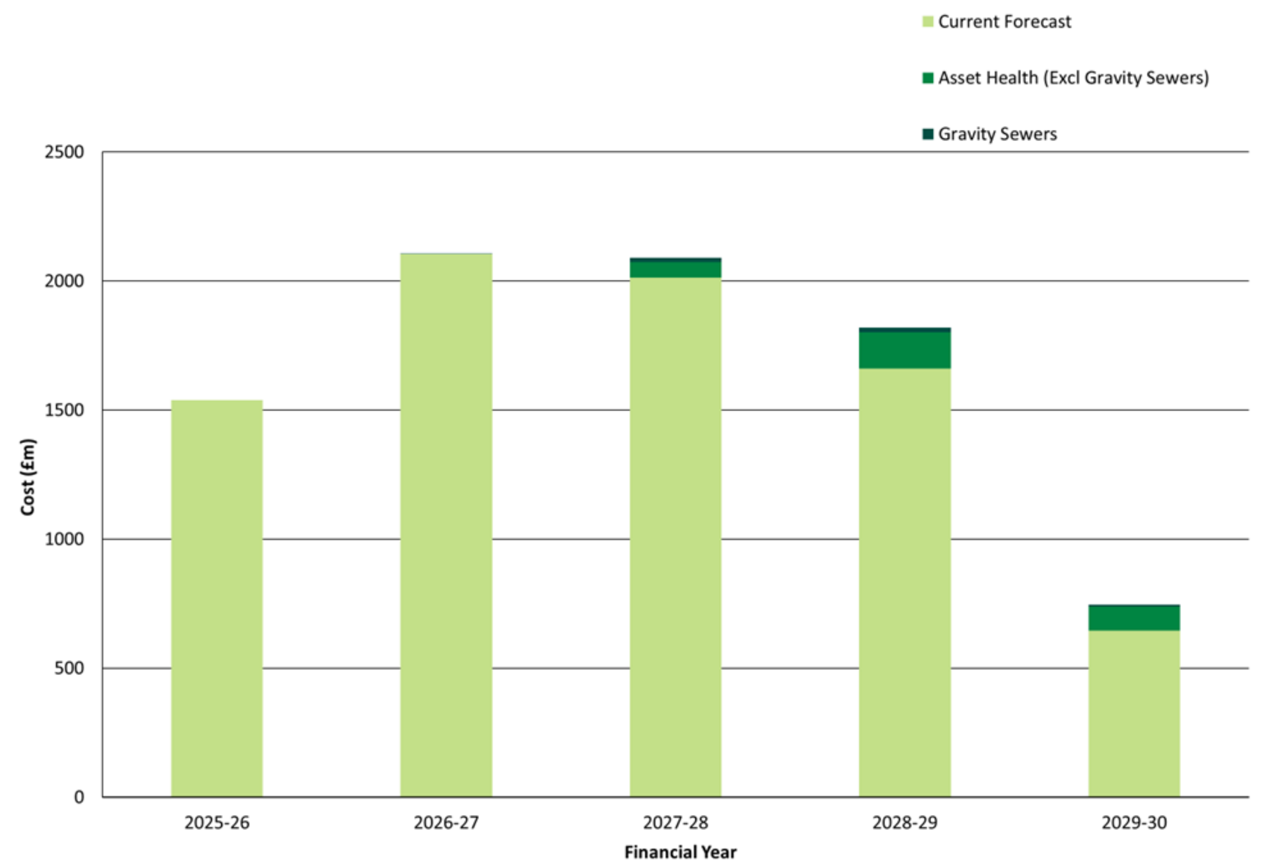
8.5.3 Table 21 and associated chart (Figure 18) illustrates the investment for asset health in the context of the Asset Health submission and the existing AMP8 programme. We are confident that the full programme is deliverable.

Table 21: AMP8 Gravity Sewers Capital expenditure profile (£m, 2022-23 CPIH prices)

Cost Change Category	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Asset Health	0.0	1.28	20.75	94.05	32.20	151.28
Gravity Sewers	0.0	0.0	55.11	64.30	64.30	183.70

Source: UUW analysis

Figure 18: AMP8 Forecast investment per year (22/23 Price Base)



Source: UUW analysis

8.6 Stakeholder engagement and permissions

8.6.1 Each year, UUW delivers a wide-ranging programme of infrastructure investment, spending around £800 million annually across its asset base, based on average capital expenditure over the past three financial years. Most of this work, including the gravity sewers activities set out in this proposal, takes place within our site boundaries and has minimal impact on customers or local stakeholders. Where communities may be affected, for example by increased traffic movements associated with deliveries, we proactively manage impacts by streamlining traffic routes, using screening to reduce visual and noise disruption, and offering community drop-in sessions for nearby residents. These measures ensure stakeholders are well informed, supported, and able to raise concerns at an early stage.

8.6.2 When investment is required on the wider sewer network, we initiate our established business-as-usual processes. This includes engagement with the Highways Authority to provide the necessary notices, agree traffic management requirements, and minimise disruption to road users. Where possible we coordinate with other infrastructure providers to reduce cumulative disruption to communities.

8.6.3 For example, through ongoing engagement to support our mains rehabilitation programme, we have identified limited capacity in rural parts of Cumbria. As a result, sewer rehabilitation in these areas will be carefully planned to avoid overloading local infrastructure.

9. Assurance

The submission meets Ofwat's requirements for third-party assurance, with independent review of technical scope, cost robustness and customer protection mechanisms. This provides strong confidence that the programme is justified, efficient, deliverable, and aligned with PR24 asset health expectations.

9.1.1 This section summarises UUW's approach to assuring this submission and the outcomes of the third-party assurance. It is supported by *UUW26-19 Asset Health assurance report.*

9.1.2 Ofwat requires cost changes submissions to include a third-party assurance report in line with the requirements set out in *PR24 final determinations: Expenditure allowances - assurance requirements for delivery of enhancement schemes appendix*[22]. This includes technical and commercial assurance across the content of the submission.

9.1.3 The Technical Assurance confirms that the proposed investment meets the requirements set out in Ofwat's guidance for the following areas:

- Need for a step change in investment;
- Best option for customers; and,
- Investment delivery plan.

9.1.4 The Commercial Assurance provides a view on the robustness of the costs proposed by the company and whether they are efficient and represent industry best practice, this includes an assessment of cost estimation approach.

9.1.5 The Commercial assurance also confirms that the proposed investment meets the requirements set out in this document for the following areas:

- Robust and efficient costs; and,
- Customer protection.

[22] PR24-final-determinations-Expenditure-allowances-Assurance-requirements-for-delivery-of-enhancement-schemes-appendix.pdf

Appendix A Condition grade description

Table 22: Condition grade description

Grade	Acceptability	Condition	Intervention	Description
1	Acceptable	Excellent	None	Minimal or no deterioration, with only minor surface flaws or slight wear.
2	Acceptable	Good	None	Minor, localised defects such as light corrosion, hairline cracks, or slight joint displacement.
3	Review	Poor	Maintenance / construction required	Moderate deterioration with defects that, while not immediately critical, require attention within the medium term.
4	Review	Bad	Urgent action required	Significant deterioration, such as large cracks or serious joint separation, indicating a high likelihood of impending collapse.
5	Unacceptable	Risk of immediate failure	Urgent replacement	Severe structural failure (collapse) or damage requiring immediate intervention to avoid total failure

Source: Sewer Rehabilitation Manual (https://www.geocadra.com/en/standards/wrc-mscc5-sewer)

Appendix B Method for sample selection for proactive sewer inspections

B.1 Objectives of the Sampling Approach

B.1.1 Our sampling methodology follows Ofwat's Gravity Sewers Investment Assessment Guidance (February 2026) and is designed to provide a representative, unbiased view of the structural condition of gravity sewers across our network. The approach reflects network diversity while avoiding bias towards historically surveyed or high-incident areas. This approach is consistent with established international practice for sewer asset management, as set out in Section 3.3.

B.2 Cohort Framework Used for Sampling

B.2.1 Sampling has been based on Ofwat's PR24 cohort characteristics: material, age, diameter and sewer type, excluding the specified (less common) material types and the sewers greater than 1500mm. We then selected as many of the specified 2400 potential cohorts as are present in our network, where the individual cohort exceeds the specified minimum length of 5km. As this resulted in more cohorts than could be accommodated in the targeted length of 0.5% of the network, we further aggregated cohort bands to achieve a balanced representation of our network. We specifically retained a pitch fibre cohort as we recognise the importance of better understanding the condition of this material.

B.3 Allocation of Sample Lengths to Cohorts

B.3.1 We calculated the total network lengths for each of the retained cohorts from our asset management sewer dataset. We then used these lengths to prorate the individual retained cohorts in proportion to our network length, but with a minimum cohort length of 5km constrained to a total survey length of 388km as specified in the Ofwat guidance for our company, see Table 23 for details.

B.4 Selection of specific sewers to survey

B.4.1 We followed a structured 2 stage process to select the sewers for the survey: stage 1 we calculated the length of the retained cohorts within each of our 1436 sub-drainage areas; stage 2 we then randomly selected drainage areas to survey for each cohort until we had selected sufficient drainage areas to achieve the target length for each cohort e.g. "survey all combined sewage, brick sewers of a given size band and age in a drainage area".

B.4.2 This approach should enable us to retain the required representative and random aspects of the survey, whilst ensuring an efficient delivery programme.

B.4.3 The steps of the process are laid out below:

Step 1 - Sum length of gravity sewers in Asset Management data for the 2400 Ofwat specified cohorts

Step 2 - Where a UUW cohort is less than 5km, exclude from the sample

Step 3 - If there are more than 77 cohorts retained, aggregate age and size bandings and return to step 1

Step 4 - Group sewers by drainage area for the retained cohorts, calculate the length for each Drainage area cohort

Step 5 - Sum length of retained cohorts for UUW's network

Step 6 - Calculate sample length for retained cohort to represent UUW's network, where minimum cohort length is 5km and total sample length is at least 388km

Step 7 - Randomly select drainage areas for each cohort until representative length is obtained

Step 8 - Check total survey length is at least 388km.

B.4.4 The above proposed approach provides cohort coverage for over 95% of UUW's sewer network via the following 38 cohorts.

Table 23: Summary of sewer sample lengths

Laid Date Band	Diameter Band	Material code	Survey sample length (km)
1921 to 1960	<=165mm	VC	54.0
1921 to 1960	>165mm and <=320mm	CO	5.6
1921 to 1960	>165mm and <=320mm	PV	5.1
1921 to 1960	>165mm and <=320mm	VC	23.8
1921 to 1960	>320mm and <=625mm	BR	5.3
1921 to 1960	>320mm and <=625mm	CO	7.4
1921 to 1960	>320mm and <=625mm	VC	7.5
1921 to 1960	>625mm and <=1500mm	BR	5.4
1921 to 1960	>625mm and <=1500mm	CO	6.8
1921 to 1960	>625mm and <=1500mm	VC	5.2
1961 to 2000	<=165mm	CO	5.4
1961 to 2000	<=165mm	PF	5.0
1961 to 2000	<=165mm	PV	5.3
1961 to 2000	<=165mm	VC	58.2
1961 to 2000	>165mm and <=320mm	BR	5.0
1961 to 2000	>165mm and <=320mm	CO	6.7
1961 to 2000	>165mm and <=320mm	PV	5.2
1961 to 2000	>165mm and <=320mm	VC	19.2
1961 to 2000	>320mm and <=625mm	BR	5.5
1961 to 2000	>320mm and <=625mm	CO	9.2
1961 to 2000	>320mm and <=625mm	VC	6.4
1961 to 2000	>625mm and <=1500mm	BR	5.5
1961 to 2000	>625mm and <=1500mm	CO	7.7
2001 onwards	<=165mm	PV	5.7
2001 onwards	<=165mm	VC	7.0
2001 onwards	>165mm and <=320mm	PV	5.4
2001 onwards	>165mm and <=320mm	VC	5.7
2001 onwards	>320mm and <=625mm	CO	5.7
2001 onwards	>625mm and <=1500mm	CO	5.8
pre-1920	<=165mm	VC	23.3
pre-1920	>165mm and <=320mm	CO	5.4
pre-1920	>165mm and <=320mm	VC	17.2
pre-1920	>320mm and <=625mm	BR	5.5
pre-1920	>320mm and <=625mm	CO	6.4
pre-1920	>320mm and <=625mm	VC	7.4
pre-1920	>625mm and <=1500mm	BR	5.5
pre-1920	>625mm and <=1500mm	CO	6.2
pre-1920	>625mm and <=1500mm	VC	5.2

Source: UUW analysis

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Water for the North West