# UUWR26-04R

# Cost Change Draft Determination: UUW Representation

# Area of representation: WwTW capacity for new homes

## September 2026

This case sets out UUW's response to Ofwat's draft determination on wastewater treatment capacity for new homes and provides further evidence on efficient costs, dry weather flow adjustments and scheme-specific investment needs. It sets out adjustments to the allowances on the basis of updated evidence of maintenance activity and revised growth requirements to better reflect demand for future growth.

**Reference to Draft Determination documents:**

'Notification of the PR24 cost change process draft determination for United Utilities'
'PR24 cost change process - Price control deliverables appendix'
'CCP 2026 DD Cost Change models'
'PR24CCP14 Cost Change Draft Determinations 2026 - Growth PCDs'

United Utilities

Water for the North West

# 1. Key points

- **We provide site-specific deep dive evidence at Warrington North WwTW to demonstrate cost efficiency and robust optioneering. In light of this evidence, we ask that Ofwat allows £54.2 million of investment to support Wastewater Treatment Works (WwTW) capacity at Warrington North.**
- **We have reassessed investment requirements at Fazakerley WwTW and revised the future Dry Weather Flow (DWF) permit and associated investment. In light of this we ask that Ofwat allows a £24.4 million of investment to support increased wastewater treatment capacity.**
- **Following a review of Ofwat's published Growth at STW assessment criteria, we have included Sale WwTW within the scope of our submission and ask that Ofwat allows £12.8 million of investment to support increases in wastewater treatment capacity to meet growth.**
- **We have provided additional analysis and evidence of performance in support of changes to Ofwat's DWF adjustment in certain circumstances. We propose an overall DWF adjustment of £38.0 million across seven sites.**

# 2. UUW's Cost Change proposal

In our "*Growth case - UUW26-03 Growth at Sewage Treatment Works WwTW*" our enhancement case proposal identified 34 wastewater treatment works (WwTW) where, as a result of increases in, or acceleration of, forecast population growth, enhancements to treatment capacity are required to meet future demand.

Our case proposed to invest £309.4 million at 34 WwTWs, delivering additional capacity equivalent to 116,498 population equivalent (PE) by 2050, supporting approximately 49,000 new homes across the region. The programme was designed to ensure that the identified WwTWs can appropriately treat projected flows and loads arising from growth, maintaining DWF, flow to full treatment and final effluent permit requirements while continuing to support long-term environmental compliance.

The proposed investment has been identified through our Drainage and Wastewater Management Plan (DWMP) assessment process, using updated local planning data, population forecasts, and aligning consumption forecasts with our Water Resource Management Plan (WRMP).

All sites included in the scope were compliant with the Environment Agency's DWF assessment under the "3-in-5-year" criterion and distinct to those funded at PR24 Final Determination.

To demonstrate efficient costs, we aligned our methodology as closely as possible to the econometric modelling framework established by Ofwat at PR24, with 20 of the 34 sites' costs in line with modelled allowances. For the remaining 14 sites, an adjustment was made to reflect the Environment Agency's revised approach to infiltration. In particular, the maximum infiltration measured in dry weather infiltration ($I_{max}$), used in the calculation of permitted pass forward flow (PFF), is a key driver of future treatment requirements but is not fully reflected within Ofwat's growth cost assessment methodology.

UUW proposed a new Price Control Deliverable (PCD) aligned to the existing PR24 PCD set out in Ofwat's published document "*Growth at STWs PCDWW27*"[1]. We also proposed an adjustment to the PCD model to reflect the proposed uplift for $I_{max}$ to ensure that customers remain protected while allowing recovery of efficient expenditure associated with enhanced infiltration requirements.

[1] PR24-final-determinations-Price-control-deliverables-appendix.pdf

# 3. Draft determination position

**Summary of the adjustments**

In the draft determination Ofwat identified three issues which resulted in an overall downward efficiency adjustment of the allowance of around £84.6 million. Most of this reduction relates to the DWF adjustment and a specific challenge applied to Warrington North and Rochdale.

Table 1 below summarises Ofwat's tests and assessment.

***Table 1: Ofwat's DD criteria assessment for UUW***

| Ofwat criteria | Ofwat assessment | Summary |
|---|---|---|
| Need for a step change in investment | Partial Pass | Sufficient evidence provided to demonstrate the investment need. Some challenge where forecast growth is below 10%. |
| Best option for customers | Pass | Requested costs for 32 of the 34 schemes were assessed at a programme level as being in line with the PR24 Growth at STW modelled cost benchmark. No further adjustment. |
| Robust and efficient costs | Some concerns | 1.28% efficiency applied to 32 sites with additional efficiencies applied to Rochdale and Warrington North. |
| Customer protection | Adequate | An appropriate mechanism to protect customers aligned to PR24 Growth PCD WW27. |
| Investment delivery plan | Adequate | Sufficient and convincing evidence that the programme is deliverable. |

*Source: UUW analysis*

Table 2 below summarises Ofwat's Draft Determination decisions in light of the issues identified.

***Table 2: Totex allowance for growth at sewage treatment works (£m, 2022-2023 CPIH)***

| | AMP8 | AMP9 | Total |
|---|---:|---:|---:|
| UUW's cost change proposal | 286.334 | 23.064 | 309.398 |
| *Efficiency-related reductions:* | | | |
| Cost model 1.28% efficiency across 32 sites | (2.595) | (0.104) | (2.699) |
| DWF adjustment for 8 sites | (49.292) | (2.723) | (52.014) |
| Deep dive challenge for 2 sites - Warrington North & Rochdale | (25.259) | (4.601) | (29.860) |
| Total efficiency challenge | **(77.145)** | **(7.428)** | **(84.573)** |
| **Draft determination allowance** | **209.189** | **15.636** | **224.825** |

*Source: UUW analysis of Ofwat's "CCPCA 2026 DD Growth at STWs model"*

As summarised in Table 2 there are three main adjustments:

- **Cost model -** Ofwat made a programme level efficiency adjustment of 1.28% to 32 schemes (excluding Warrington North and Rochdale) in light of the fact that UUW's total scheme cost request exceeded overall triangulated model allowances by 1.28%.
- **Rochdale and Warrington North –** these two sites were subject to an Ofwat deep dive due to the significant cost gap to their modelled allowance. Ofwat noted that UUW did not provide sufficient evidence of options or benefits for these schemes nor did it identify network infiltration reduction measures and as a result a 30% cost challenge was applied to these schemes. Ofwat stated that to achieve a 'pass' for robust and efficient costs at final determination, UUW must provide evidence of site-specific benchmarking for the two sites and supporting evidence that costs are efficient.
- **DWF exceedances -** Ofwat identified eight sites that exceeded their DWF permit levels at least three times within the last five years (2020–24) and applied a downward adjustment of £52.0 million to account for these DWF permit exceedances and avoid customers paying twice.

# 4. Issues and implications

In this section we discuss:

- UUW's deep dive representation on Warrington North – section 4.1;
- Changes to scope – section 4.2; and,
- Revisions to Dry Weather Flow adjustments – section 4.3; and,

## 4.1 Deep dives - Warrington North and Rochdale efficiency challenge

### 4.1.1 Draft Determination outcome for Warrington North and Rochdale

We have considered the draft determination outcome for Rochdale and, having reviewed opportunities for further efficiencies, do not intend to provide further evidence in support of an alternative allowance. We therefore accept the allowance of £26.6 million set out in the Draft Determination for this site.

At Warrington North we have further reduced our estimates by approximately £3.3 million since our original submission. However, this site remains fundamentally different in nature to a typical growth scheme, and we do not consider that the modelled allowance adequately reflects the additional investment required at this site. As such, we have provided additional evidence and request a deep-dive uplift of £12.9 million through this representation. Table 3 below summarises our response.

***Table 3: UUW Draft Determination response: Warrington North (£m, 2022-2023 CPIH)***

| Scheme | UUW submitted costs | UUW revised costs | UUW's response to DD |
|---|---|---|---|
| Warrington North | 57.418 | 54.156 | Provide deep dive |

*Source: UUW analysis*

A full assessment of Warrington North, including detailed optioneering, cost assurance, benchmarking and supporting evidence, is set out in "*UUWR26-04a Representation: Growth at Sewage Treatment Works – Warrington North – Deep Dive*". We have provided a summary of the key points below.

### 4.1.2 Summary of Warrington North solution

The Warrington North solution proposes using Mobile Organic Biofilm (MOB) technology to intensify the existing biological treatment process within the site's constrained footprint, enabling the works to accommodate forecast population growth to 2050 while meeting flow and treatment requirements. The scheme includes a substantial increase in aeration capacity, upgrades to final settlement processes, additional storm storage and associated hydraulic improvements, providing a resilient long-term solution without the need for major site expansion.

**Infiltration management**
Following the draft determination, we have re-examined whether there are opportunities to design to a lower maximum infiltration value, while remaining compliant with the Environment Agency's expectations. This has identified a lower infiltration value of 60,531 $m^3$/day, below the submission value of 88,032 $m^3$/day. This has reduced the required FFT increase to 188 l/s. Nonetheless, this reduction in FFT does not translate into a proportionate reduction in scheme cost due to the high proportion of fixed-cost infrastructure and growth-driven scope, such as the additional storm tank capacity.

We also reassessed whether greater network-level infiltration reduction could provide an alternative solution. While such measures may reduce infiltration, they would not remove the need for treatment

enhancements or provide sufficient certainty of compliance with Environment Agency $I_{max}$ requirements within the required timeframe. Consequently, treatment works investment remains necessary irrespective of the infiltration assumption adopted, and the proposed solution represents the most effective and deliverable option for accommodating growth, while meeting permit requirements.

**Atypical factors**

Warrington North has several characteristics that are not fully captured by Ofwat's growth at STW model and which result in efficient costs above the modelled allowance. The two principal drivers are the additional PE growth requirements at the site and the selection of an innovative biological treatment solution.

Ofwat's modelled allowance reflects population equivalent (PE) growth between the 2025 baseline and the 2050 design horizon. However, Warrington North's current design capacity is below the 2025 PE forecast. As a result, the required investment must accommodate both the increase to the 2025 planning baseline and subsequent growth to 2050.

The resulting actual increase in PE of approximately 17% demonstrates that population growth is a material driver of investment at Warrington North. Reflecting this additional growth requirement within the model increases the modelled allowance by approximately £6.5 million.

The intensification of the existing treatment capacity at Warrington North using an innovative biological treatment process, MOB, as opposed to the use of a conventional alternative, is a key driver of costs.

Robust optioneering has demonstrated that a chemical dosing solution could be delivered at a cost in line with the modelled allowance. However, the preferred biological treatment solution has a lower whole life cost and was selected following a robust optioneering assessment representing the more sustainable approach and best value outcome for customers. The additional upfront capital expenditure associated with selecting the biological treatment solution amounts to approximately £13 million of costs above the modelled allowance.

**The additional evidence provided in the deep-dive document supports the revised cost estimate for Warrington North. We therefore request that Ofwat allows £54.2 million of investment for the identified WwTW solution.**

## 4.2 Changes to the original scope

**This section sets out two changes to the original scope of the investment proposal: requirement changes at one of the existing sites and the inclusion of one new site.**

We have reviewed the scope of sites and existing requirements and have now made two changes from our original submission:

1. Fazakerley WwTW – we have reassessed future DWF requirements at Fazakerley resulting in a higher future DWF permit and a revised enhancement allowance at this site; and,
2. Sale WwTW – a new site that has been included following review of Ofwat's published Growth at STW assessment criteria and methodology.

### 4.2.1 Updating the DWF requirements for Fazakerley WwTW

#### 4.2.1.1 Draft determination outcome

In the draft determination, Fazakerley WwTW received a DWF adjustment in excess of 100% of the enhancement allowance, effectively removing entirely this site from the list of growth schemes. This adjustment highlights that the original proposed solution was not appropriate as it would not meet future demand nor address future DWF performance risk, and the site would continue to exceed DWF even after the scheme had been delivered.

We have reassessed future DWF requirements at Fazakerley using the latest available evidence to ensure that any future investment represents the most efficient long-term outcome for customers. We have updated our DWF methodology for Fazakerley WwTW and revised the DWF permit in this submission from 42,486 $m^3$/day to 46,949 $m^3$/day.

Importantly, this specific adjustment does not arise from a challenge to the DWF adjustment percentage applied by Ofwat. Instead, it reflects a revision to the underlying future DWF permit requirement and the associated modelled enhancement allowance against which Ofwat's eventual DWF adjustment would subsequently be applied.

#### 4.2.1.2 Existing approach and future DWF uncertainty

Our approach to managing growth seeks to ensure that investment remains proportionate to the best available evidence of future need. This protects customers from both under-investment and the risk of funding infrastructure that ultimately proves larger than required.

Forecasting future DWF need inherently requires a range of assumptions regarding future catchment conditions. These include:

- Future per capita consumption (PCC);
- Population growth forecasts and local development assumptions;
- Trade effluent growth; and,
- Future levels of infiltration.

While these assumptions should reflect the best available evidence at the time of planning, they are inherently subject to uncertainty and may change as new information becomes available. We have tested alternative planning scenarios for each of the DWF formula components, but the results do not appear to represent the observed performance at this site or an appropriate future DWF forecast. Consequently, where observed site performance diverges materially from the original planning assumptions, it is appropriate to reassess both the scale of future risk and the most efficient investment response.

Following review of the draft determination and the latest operational evidence available at Fazakerley, we have revised the original planning assumptions to ensure that future investment requirements continue to reflect the growth and DWF requirements.

The approach set out in the draft determination demonstrates that, even if the original growth scheme were delivered as proposed, the resulting future DWF permit would continue to attract a DWF adjustment under Ofwat's methodology. This is demonstrated in Figure 1 below. In other words, the existing DWF need would not be adequately addressed. This indicates a material divergence between the future DWF requirement derived through the original DWF formula, and that implied by observed site performance. As a result, progressing the original DWF increase would not represent the most appropriate outcome for customers. This is because customers should not fund investment that is subsequently shown to be insufficient to address the identified future need. Progressing such an approach would increase the risk of further intervention being required at a later date and would not represent efficient long-term planning. We have reassessed the DWF requirements to ensure that proposed solution meets growth and permit needs.

#### 4.2.1.3 Alternative approach to DWF assessment

The Environment Agency guidance recognises two approaches for calculating future DWF at existing wastewater treatment works[2]. One of the established approaches uses the following DWF calculation methodology:

DWF = PG + I + E

Where:

- P represents the catchment population;
- G represents the per capita domestic flow;
- I represents the dry weather infiltration; and,
- E represents the trade effluent flow.

While this approach supports long-term planning because it explicitly considers the key drivers of future wastewater flows and provides a robust framework for forecasting future needs it is inherently dependent on a number of long-term assumptions. However, observed DWF performance can materially diverges from the theoretical assessment (calculated using the equation above) and therefore we have taken an alternative approach.

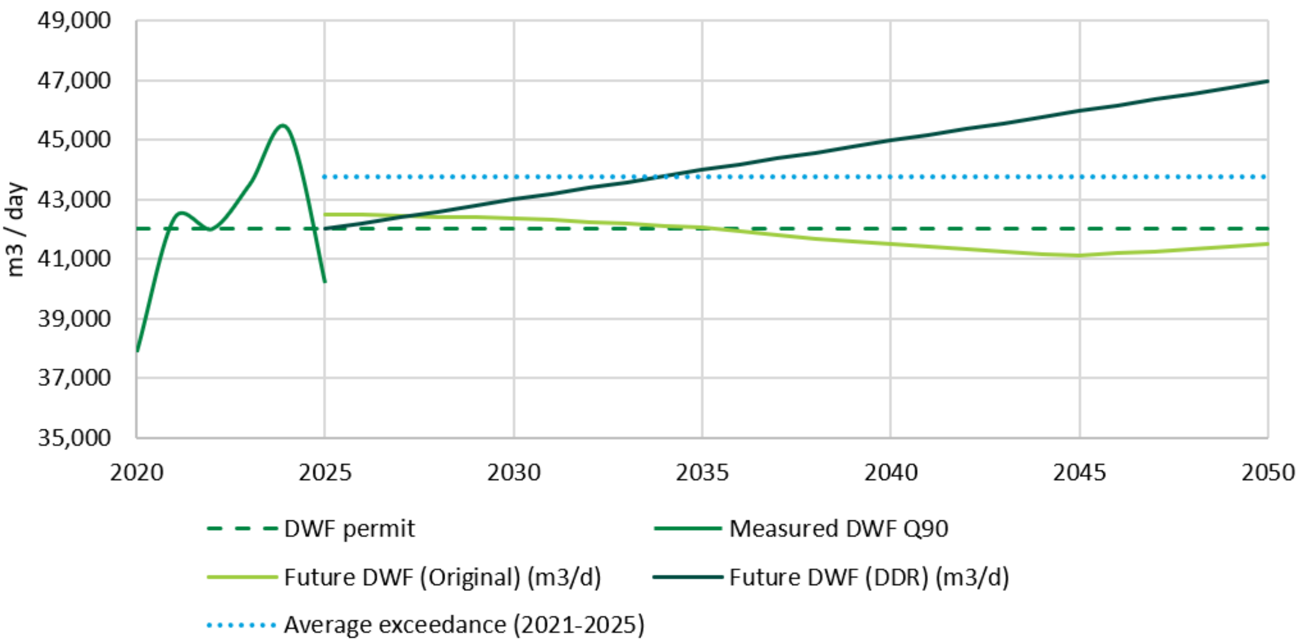
[2] Calculating dry weather flow (DWF) at waste water treatment works - GOV.UK

This alternative approach is recognised by the Environment Agency for estimating future DWF based on measured site performance data, using the estimated population growth to forecast a change in the future Q80 dry weather flow (where total daily flows are exceeded 80% of the time). This methodology reflects actual operating conditions and provides a recognised mechanism for calculating future DWF for existing discharges where the original planning assumptions may not be representative of likely future performance.

Figure 1 shows the measured and forecast DWF at Fazakerley between 2020 and 2025. The two alternative methods for calculating future DWF of existing discharges, the original DWF calculation or the alternative method based on measured site performance data, are represented by the lines 'future DWF (original)' and 'future DWF (DDR)' respectively.

Figure 1 demonstrates that the alternative method based on measured site performance data provides a more appropriate basis for assessing future performance requirements than the original DWF calculation method. While the original method forecasts a gradual reduction in DWF over time, the alternative method reflects the observed trend in measured site performance and projects continued growth in DWF. Consequently, the alternative method identifies a higher future DWF requirement and is more likely to ensure that the future permit accurately reflects expected future site conditions, thereby reducing the risk of future permit exceedances.

***Figure 1: Fazakerley WwTW DWF (2020–2050)***




*Source: UUW analysis of measured and forecast DWF*

By contrast, calculating future DWF using the original calculation method would result in only a marginal increase to the future DWF permit which would not result in additional capacity beyond the average measured Q90 DWF. In comparison, the alternative method proposed in this submission identifies a higher future DWF permit requirement and provides additional capacity above that recorded historically. This indicates that the calculated permit requirement is unlikely to reflect expected future conditions and may not provide a sustainable basis for achieving future capacity requirements. We therefore consider that the alternative method based on measured site performance data provides a more appropriate basis for determining the future DWF permit requirement at Fazakerley and represents the more efficient long-term outcome for customers.

Importantly, this approach continues to forecast future growth-related requirements but does so using observed site performance as the starting point for the assessment.

#### 4.2.1.4 Revised future DWF assessment and investment requirement

The revised assessment using the alternative DWF methodology results in an updated future DWF permit at Fazakerley that is materially different from that adopted within our original submission. This is shown in Table 4 below.

***Table 4: DWF permit change***

| Site name | Current DWF permit (m3/day) | Expected DWF permit in original submission (m3/day) | Expected DWF permit in DD representation (m3/day) |
|---|---|---|---|
| Fazakerley WwTW | 42,000 | 42,486 | 46,949 |

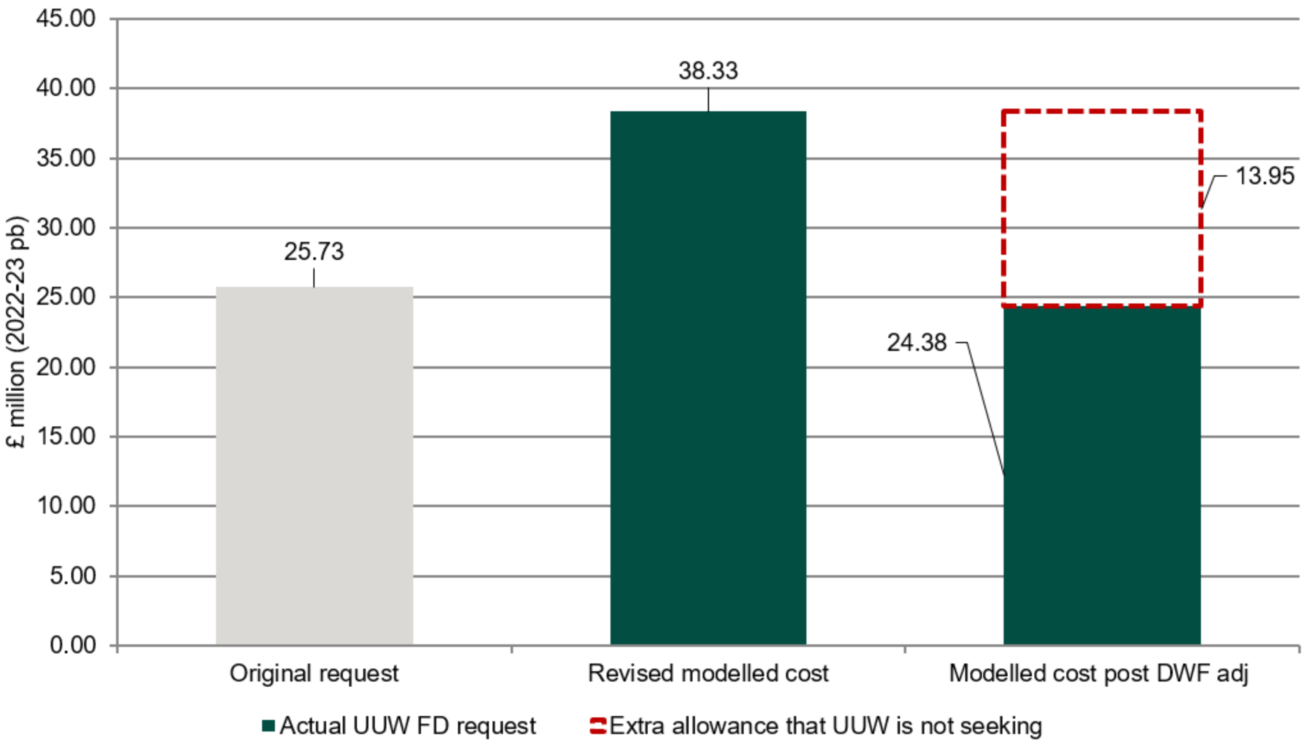
*Source: UUW's Growth at STW data table*

The revised assessment increases the future DWF permit requirement from 42,486 m³/day to 46,949 m³/day. As a consequence of the higher future DWF permit requirement, the modelled enhancement allowance increases from £26.3 million in our original submission to approximately £38.3 million under the revised assessment.

Figure 2 below summarises the changes to the requirements:

- The first column (in grey) represents our original scheme request (£25.7 million);
- The second column represents the revised allowance based on the updated DWF requirements (£38.3 million) – this is based on the modelled cost using the revised DWF permit value; and,
- The third column (green element) represents the investment based on the modelled allowance of £24.4 million after applying Ofwat's existing DWF adjustment methodology (using 2021–25 DWF data).

***Figure 2: UUW's revised modelled allowance for Fazakerley***




*Source: UUW analysis*

The updated growth assessment for Fazakerley identifies a modelled allowance of £38.3 million. Following application of Ofwat's Draft Determination DWF adjustment methodology, updated to reflect inclusion of 2025 DWF data, the resulting allowance is £24.4 million.

The revised requirement at Fazakerley reflects a future DWF permit of 46,949 m³/day (compared to original 42,486 m³/day in our original submission) and we therefore propose that the revised permit requirement is included as an adjustment within our PCD non-delivery rate to ensure we remain fully accountable for delivery of this additional output.

### 4.2.2 Inclusion of Sale WwTW

As part of our review of Ofwat's draft determination, we have reconsidered a number of sites that were excluded from our original submission. This review has been undertaken in light of Ofwat's clarification of its assessment approach on DWF exceedances.

In preparing our original submission, UUW excluded sites that were identified as failing the Environment Agency's "3-in-5" DWF compliance test, as we prioritised only sites that are fully compliant with this test. As a result, Sale WwTW was removed from the submitted programme as part of our screening exercise, despite experiencing growth-related needs that would otherwise have supported inclusion within the growth assessment and therefore, our submission.

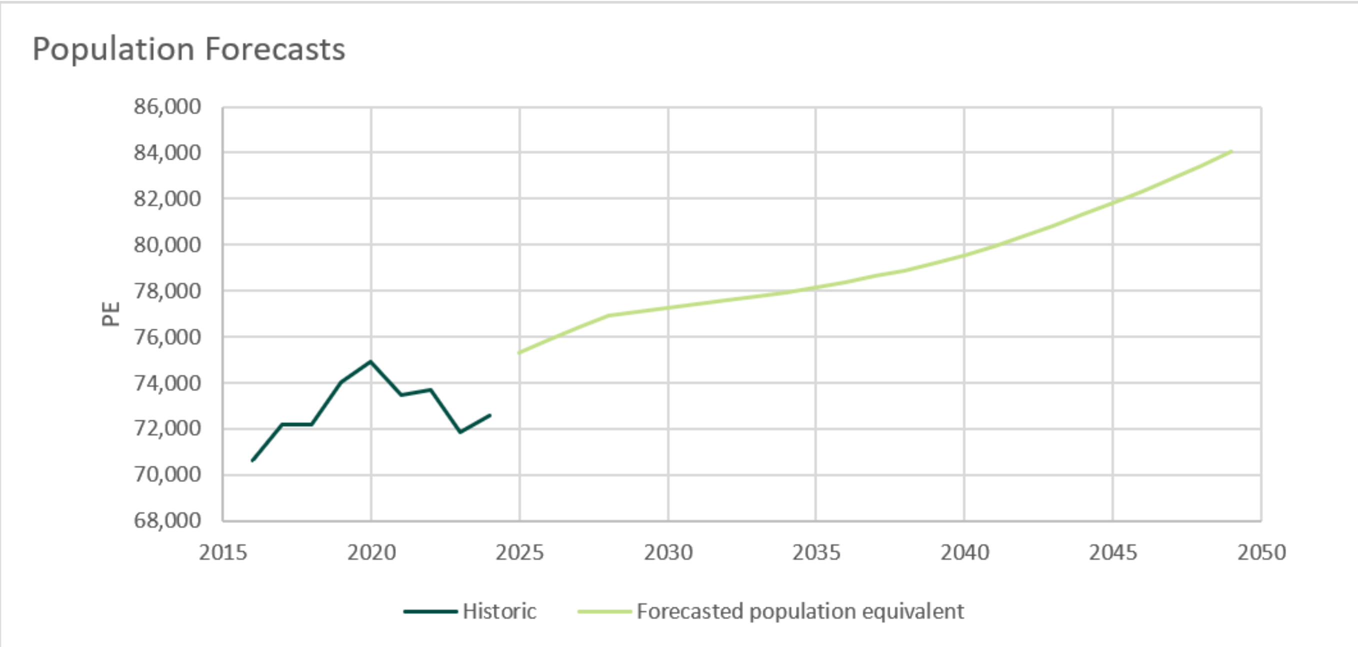
On reviewing the draft determination, we now understand that Ofwat's assessment methodology can include sites exceeding their DWF permit levels in the year of assessment, with a DWF adjustment applied where appropriate. Given this, we consider that Sale WwTW is eligible for inclusion within Ofwat's Growth at STW methodology, despite being originally screened out based on our own application of the Environment Agency's "3-in-5" DWF compliance test.

We have therefore now included investment at Sale WwTW. This will also enable us to achieve efficiencies in delivery by incorporating delivery of the growth driver into the existing AMP8 sanitary parameters and storm overflow environmental improvement solution. This will maximise the long-term benefit to customers.

#### 4.2.2.1 Identification of growth requirements at Sale WwTW

The forecast population equivalent (PE) within the Sale catchment is shown in Figure 3, with an anticipated increase in population equivalent of 8,006 between 2025 and 2050.

***Figure 3: Sale WwTW PE forecast***



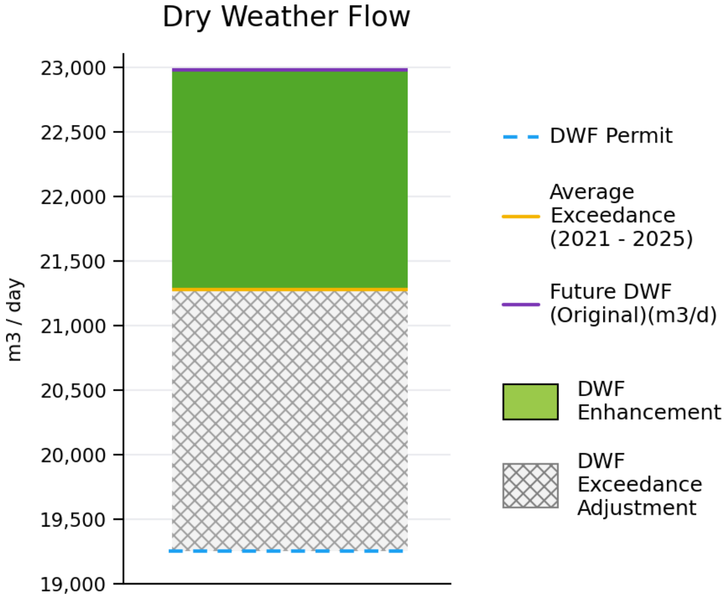

*Source: UUW analysis*

A review of the catchment requirements, following network infiltration surveys and analysis of the current and future capacity requirement at the works, identified growth as the primary driver for increased flows received at the WwTW and therefore an 18% growth in the permitted DWF is required in order to accommodate the future demand at this site.

Some growth has already materialised within this catchment, resulting in past DWF Q90 exceedances. UUW acknowledges that an adjustment for past exceedances can help to protect customers from paying twice. Therefore, we have applied Ofwat's existing DWF adjustment (using 2021-25 data) in full to ensure that our request for Sale reflects the incremental difference between existing performance and design performance.

This adjustment is illustrated in Figure 4, whereby the grey hashed area represents the downward adjustment made to the econometric model to account for past DWF exceedance and the green area represents the enhancement required to deliver the additional DWF capacity over the planning horizon.

*Figure 4: Existing and forecast dry weather flow at Sale WwTW*




*Source: UUW analysis*

#### 4.2.2.2 Existing AMP8 scheme for BOD compliance and spill reduction

Sale WwTW is subject to a programme of environmental improvement during AMP8, driven by the AMP8 requirements under WINEP as part of its interventions to improve the dissolved oxygen levels within the Manchester Ship Canal[3]. To support this objective, the AMP8 scheme will deliver a tighter biochemical oxygen demand (BOD) permit limit of 10 mg/l and improve storm storage performance to at least Water Framework Directive (WFD) standards. Figure 5 shows an aerial view of Sale WwTW.

*Figure 5: Sale WwTW – Aerial photograph of the existing site layout*


*Source: Google Maps*

[3] UUW53R - Candidate DPC Projects, page 15

We intend to deliver the growth driver alongside these drivers as part of a combined solution. We present evidence later in this section to demonstrate this is the most efficient approach across multiple AMPs.

#### 4.2.2.3 Impact of the future growth requirement

The original AMP8 scheme was developed to achieve a relatively modest tightening of the BOD permit, with no increase in DWF. The forecast growth requirement fundamentally changes both the scale and nature of the treatment solution required at Sale WwTW.

Our assessment has identified that a 19% increase in DWF, from 19,261 $m^3$/day to 22,980 $m^3$/day, is required to accommodate forecast growth to the design horizon. We reviewed opportunities to address infiltration. Previous CCTV surveys (conducted in 2024) proved unsuccessful in identifying significant infiltration sources and therefore a substantial reduction in infiltration is not considered to be a feasible solution for achieving a material reduction in DWF.

Given the combination of the increased discharge flow, the limited dilution available within the receiving watercourse (Stromford Brook), and the slow-flowing nature of the River Mersey, environmental impact modelling and pre-permit discussions with the Environment Agency indicate that significantly tighter effluent standards will be required.

Specifically, the ammonia permit limit would tighten from 10 mg/l to 2 mg/l and the suspended solids permit from 60 mg/l to 15 mg/l. In addition, the BOD permit limit would tighten further from the 10 mg/l standard achievable through the AMP8 scheme to 8 mg/l. These tightened permit requirements are shown in Table 5.

*Table 5: The impact of growth on permit values*

| Parameter | Current permit | Improvements in AMP8 | Growth related impact |
|---|---|---|---|
| DWF | 19,261 m3/d | 19,261 m3/d | 22,980 m3/d |
| BOD | 30 mg/l | 10 mg/l | 8 mg/l |
| Ammonia | 10 mg/l | 10 mg/l (no change) | 2 mg/l |
| Suspended Solids | 60 mg/l | 60 mg/l (no change) | 15 mg/l |

*Source: WINEP requirements and UUW detriment modelling*

These revised permit requirements represent a substantial enhancement to treatment performance beyond that assumed within the AMP8 design basis. Consequently, the original AMP8 solution is no longer sufficient to meet the combined WINEP and growth drivers. Additional treatment capacity and process enhancements are therefore required to accommodate future growth while meeting the revised environmental permit limits.

#### 4.2.2.4 Optioneering to address the future growth requirement

To accommodate the tighter growth-related permit requirements, we have conducted a robust analysis of available options against the new permit requirements. The outputs of the initial screening exercise are presented in Table 6.

*Table 6: Summary output of the initial feasibility assessment*

| Option | Outcome | Rational |
|---|---|---|
| Implement a side-stream Moving Bed Biofilm Reactor (MBBR) with Dissolved Air Flotation (DAF) | Discounted | Although technically feasible, there is uncertainty regarding its ability to consistently achieve the required Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) permit limits. |
| Retain the current AMP8 solution and retrofit Mobile Organic Biofilm (MOB) within the existing Activated Sludge Plant (ASP) to increase capacity | Discounted | This option relies heavily on existing assets and required wider hydraulic upgrades. It introduces delivery and process risks and may have required additional Final Settlement Tank (FST) capacity. |

| Option | Outcome | Rational |
|---|---|---|
| Maintain the existing Full Treatment Flow to Treatment (FTFT) but increase the storm storage capacity significantly above the AMP8 project's provision | Discounted | Not considered technically feasible because storm volumes could not be returned within the required timescales. The option carried a high risk of failing to achieve the required permit standards. |
| Relocate the outfall from Stromford Brook to the River Mersey | Discounted | High cost, significant environmental and permitting risks, and uncertainty regarding programme delivery. The option would still require substantial additional treatment infrastructure to achieve the required effluent quality standards. |
| Increase settlement capacity with two additional Final Settlement Tanks (FSTs) while utilising the existing Activated Sludge Plant (ASP) | Discounted | This option results in extensive interfaces with existing assets and therefore increases the complexity of construction, resulting in added cost and delivery risk. |
| Increase settlement capacity with one additional Final Settlement Tank (FST), expanded Activated Sludge Plant (ASP) capacity and new blowers | Discounted | Similar to the above option, this involves extensive modification of existing infrastructure, resulting in high complexity, and a higher capital cost and delivery risk. |
| Two options were shortlisted for further evaluation:<br>1) Retain the scope of the AMP8 scheme but provide an additional two FSTs and one additional ASP.<br>2) Retain the scope of the AMP8 scheme but provide an additional side-stream MBR | Progressed | These two options represented the strongest balance of programme, technical feasibility, constructability and process risk, and were therefore taken forward for detailed assessment. |

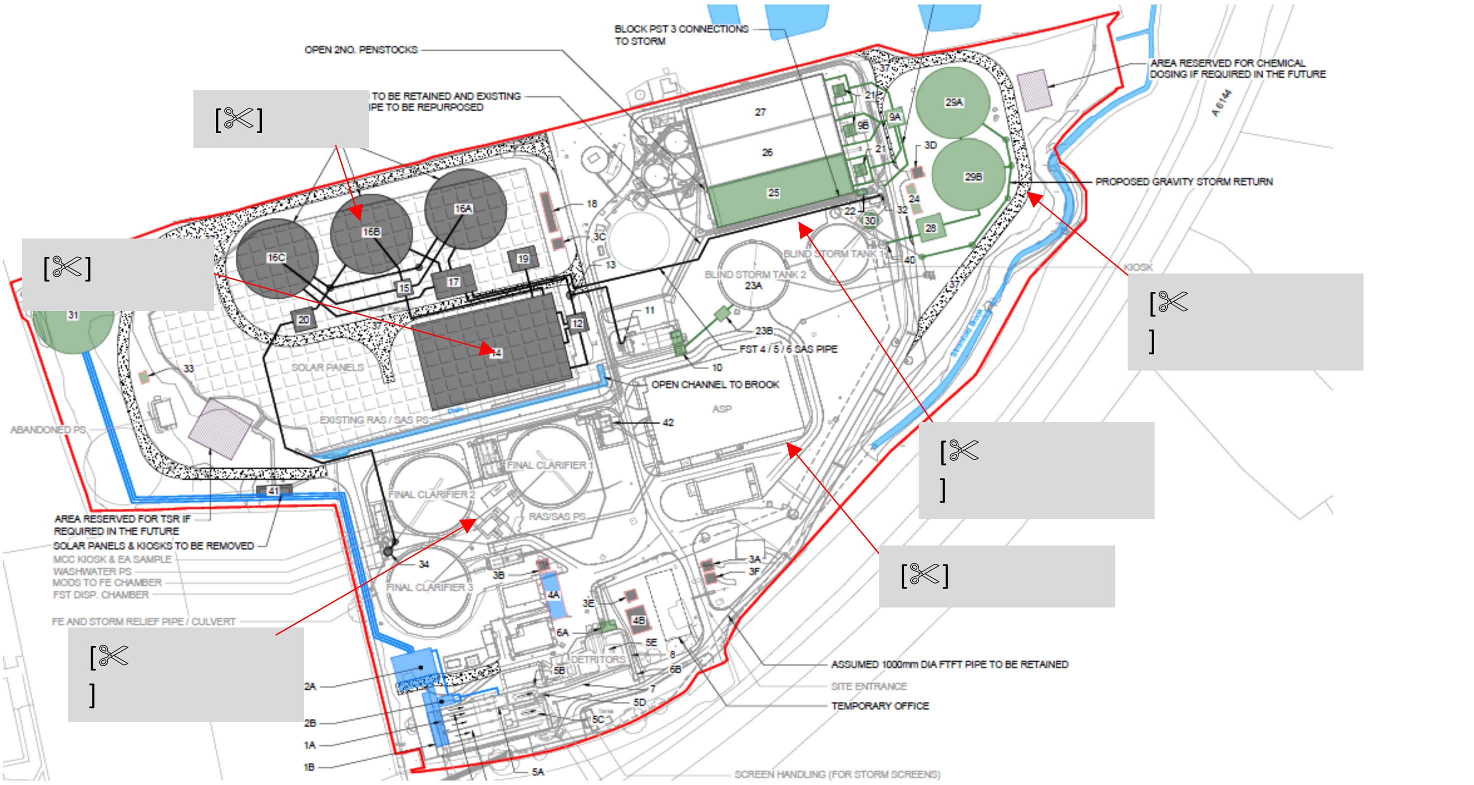
*Source: UUW analysis*

Following the review of available options, two options were carried forward to more detailed assessment:

- Option 1 comprises a conventional side-stream activated sludge process solution, including a new biological treatment stream and associated final settlement tanks operating in parallel with the existing process. The current design basis assumes an approximate 50:50 flow split between the existing and new treatment streams.
- Option 2 comprises a side-stream membrane bioreactor (MBR) solution designed to treat approximately 40% of the site flow. The MBR provides a highly intensified treatment process capable of achieving the more stringent biochemical oxygen demand (BOD), ammonia and suspended solids limits associated with the revised permit requirements. Although MBR technology has a higher unit treatment cost than a conventional activated sludge process, it removes the need for additional final settlement tanks.

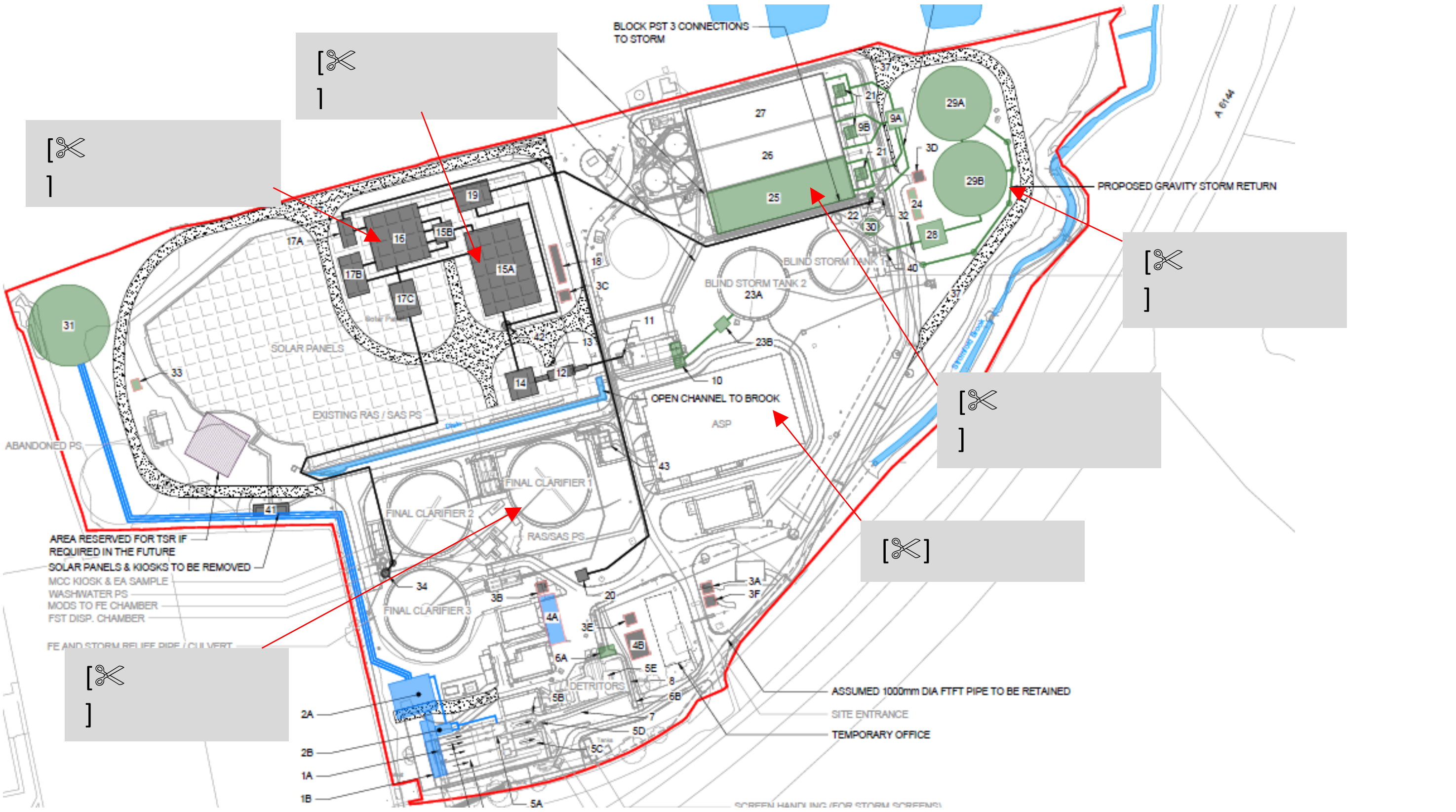
The two options demonstrated comparable performance in terms of deliverability, operational resilience and environmental outcomes. Consequently, a bottom-up cost estimate was developed for each option to support the selection of the preferred solution.

*Figure 6: Option 1 – ASP side-stream*




*Source: UUW design drawing 80066129-01-ARC-SALEZ-99-DR-C-00025, Revision P01*

*Figure 7: Option 2 - MBR side-stream*




*Source: UUW design drawing 80066129-01-ARC-SALEZ-99-DR-C-00026, Revision P01*

#### 4.2.2.5 Economic evaluation of the two options and impact of the delivery plan on cost

The economic appraisal considered not only the direct cost of each treatment solution but also the implications of delivering the growth requirements alongside the existing AMP8 environmental improvement scheme.

Option 1 could be integrated with the existing AMP8 project, as it builds upon the proposed treatment configuration through the addition of two further FSTs and an additional ASP. This creates an opportunity to realise construction and delivery efficiencies through a single programme of works.

In contrast, Option 2 would replace the existing AMP8 treatment solution. As MBR technology incorporates solids separation within the treatment process, it removes the need for a new final settlement tank. Consequently, the final settlement tank included within the AMP8 scheme would become surplus to requirements and would not need to be constructed.

To ensure a like-for-like comparison, the cost assessment considered the following delivery scenarios:

- Option 1 delivered as a standalone growth scheme in AMP9 following completion of the AMP8 project. **This is the current delivery trajectory and hence the baseline for comparison.**
- Option 1 delivered as an extension to the existing AMP8 project during AMP8. This achieves efficiencies of scope relative to delivering across two AMPs.
- Option 2 delivered in place of the existing AMP8 treatment solution.

A breakdown of the scope for each of the three delivery scenarios is shown in Table 7.

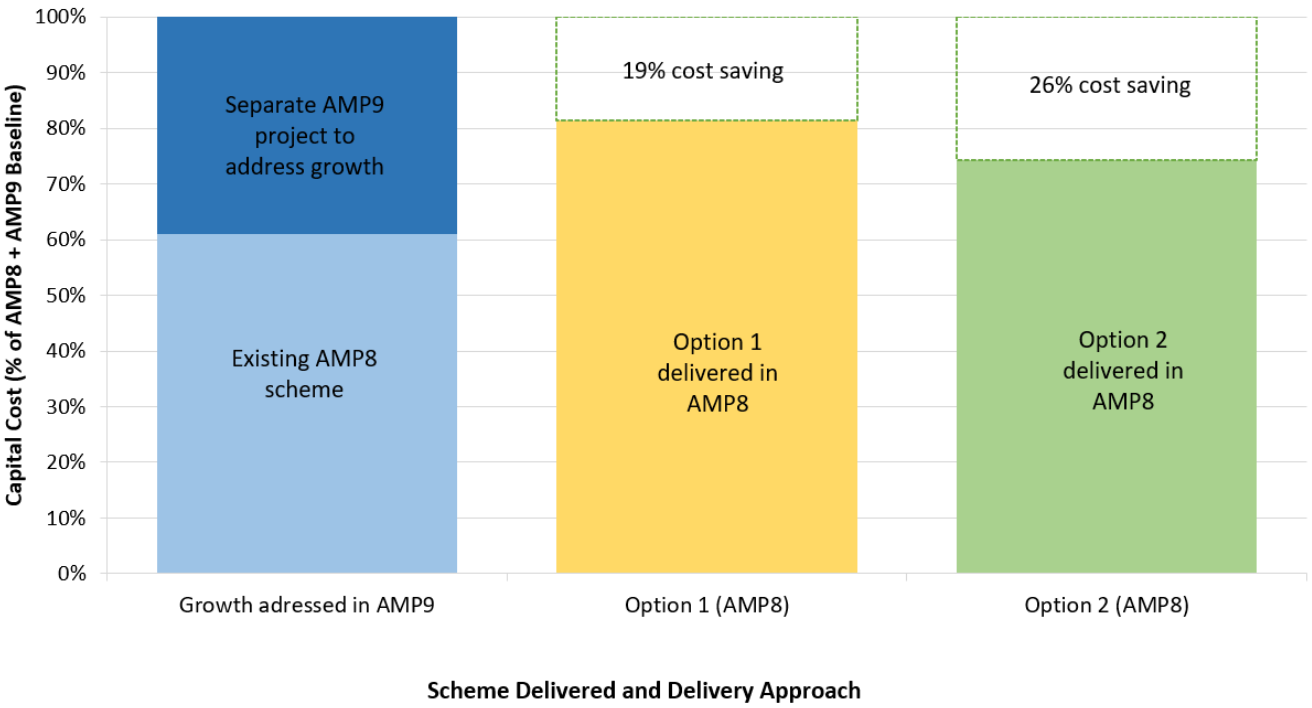
*Table 7: Summary of the three delivery scenarios to address the growth driver*

| Scenario | Scope delivered in AMP8 | Scope delivered in AMP9 |
|---|---|---|
| AMP8 solution unchanged with growth addressed in AMP9 | • Conversion of existing storm tank to a PST<br>• Provision of storm water storage<br>• Provision of one additional FST<br>• Minor modifications to existing ASP | • Provision of an additional ASP<br>• Provision of two additional FSTs and modification to existing pipework arrangement |
| Option 1 delivered in AMP8 | • Conversion of existing storm tank to a PST<br>• Provision of storm water storage<br>• Provision of three additional FSTs<br>• Provision of a side-stream ASP | No additional scope in AMP9 |
| Option 2 delivered in AMP8 | • Conversion of existing storm tank to a PST<br>• Provision of storm water storage<br>• Provision of an MBR | No additional scope in AMP9 |

*Source: UUW's analysis*

The relative cost of each delivery option (as a percentage of the cost of the existing scheme planned for AMP8 implementation) is shown in Figure 8 below. We have presented these figures in percentage format to enhance the clarity of the comparison – the scenarios reflect combined solutions that deliver three independent enhancement drivers. We present detailed estimating schedules of each solution in Appendix C. This will allow Ofwat to reconcile the movements set out in Appendix C. For clarity, we are only seeking the funding for the growth driver as part of this representation, with the funding determined by Ofwat's efficient benchmark and DWF adjustment.

*Figure 8: A comparison of the implications of delivery approach on cost*




*Source: UUW analysis*

Addressing the growth driver as part of the combined AMP8 scheme, rather than through a standalone AMP9 project, delivers an estimated cost saving of around 19%. This delivery approach (as a single integrated scheme) avoids duplicate project delivery costs and enables significant efficiencies. Although the overall asset scope remains broadly unchanged, savings are realised through reduced engineering and project management resource requirements, a single programme of surveys and investigations, lower contractor preliminaries and mobilisation costs, fewer site tie-ins and operational interventions, and the avoidance of future construction inflation. Minor efficiencies are gained through the construction of three FSTs as part of a single project (rather than two standalone projects) and modifications (improvements) to the existing ASP can also be avoided if the additional ASP is to be constructed earlier.

A further cost saving can be achieved through the adoption of Option 2 compared to Option 1: Option 2 has a 26% lower cost than the baseline. While membrane bioreactor technology has a higher unit treatment cost than a conventional activated sludge process, it provides a more efficient overall solution by addressing both the existing WINEP drivers and future growth requirements within a single treatment stream. By removing the need for additional final settlement tanks, Option 2 reduces the overall infrastructure requirement and associated construction costs.

As shown in Table 8, the cost-benefit analysis demonstrates that both options provide strong value for money; however, Option 2 achieves a higher benefit-to-cost ratio of 2.74 compared with 2.50 for Option 1.

*Table 8: Summarised whole life cost, whole life benefit and the benefit cost ratios for Sale within the growth case. (£m, 2022-23 CPIH prices)*

| Site | Whole Life Cost | Whole Life Benefit | Benefits Cost Ratio |
|---|---|---|---|
| Sale – Option 1 | 46.2 | 115.6 | 2.50 |
| Sale – Option 2 | 42.1 | 115.3 | 2.74 |

*Source: UUW analysis of whole life cost and whole life benefit of preferred options*

This assessment demonstrates that delivering the growth investment during AMP8 represents the most cost beneficial approach. Delivering the AMP8 programme in isolation and subsequently addressing the growth driver through a separate AMP9 investment would not represent an efficient use of expenditure. Furthermore, Option 2 provides the lowest-cost solution, delivers the highest benefit-to-cost ratio, and meets both the environmental and growth drivers. Option 2 is therefore identified as the preferred option. As such, we consider our proposal to present a significant opportunity to create delivery efficiencies for the long-term benefit of customers.

#### 4.2.2.6 Application of Ofwat's growth at STW methodology

Sale has been assessed using Ofwat's Growth at STW modelling approach and is therefore consistent with the wider methodology applied across the programme.

The growth requirements identified at Sale result in a modelled enhancement allowance of £28.5 million prior to the application of the DWF adjustment. Sale WwTW meets Ofwat's draft determination criteria for a DWF adjustment and, for the purposes of this submission, UUW has applied the draft determination methodology, updated to reflect inclusion of 2025 data, to derive the requested allowance. This approach has been adopted to ensure consistency with Ofwat's assessment framework pending consideration of UUW's proposed revised sequential approach to DWF adjustment. Similarly, the requested allowance reflects application of Ofwat's programme-level efficiency challenge, in line with the way this was applied in the draft determination.

We are not requesting any site-specific uplift, bespoke DWF adjustment or alternative cost assessment approach for Sale. We consider that Sale should be assessed using Ofwat's standard Growth at STW methodology and funded in accordance with the resulting modelled allowance and subsequent adjustments. This ensures that the site is assessed and funded on a basis consistent with the approach applied in Ofwat's draft determination.

We therefore request that Ofwat includes Sale within the Growth at STW programme at final determination and reflects the associated efficient allowance required to deliver the preferred integrated solution.

## 4.3 Dry Weather Flow adjustment

### 4.3.1 Background and rationale for the adjustment

In this section, we cover the following points related to the DWF adjustment methodology used by Ofwat:

- Evidence of remedial action and maintenance activity at sites receiving a DWF adjustment (Section 4.3.2);
- Issues with the DWF adjustment (Section 4.3.3); and,
- Bespoke DWF adjustments (Section 4.3.4).

At PR24, Ofwat introduced a DWF adjustment when assessing enhancement expenditure for growth at Sewage Treatment Works (STWs). This adjustment reduces enhancement allowances where sites have exceeded their DWF permit limits. This is because investment required to meet existing DWF levels should be funded through base expenditure allowances and not be recovered again through growth enhancement funding. As stated by Ofwat, "*we do not expect customers to pay for any non-compliance with existing permit conditions*"[4].

We note Ofwat has described its DWF cost adjustment as a 'DWF non-compliance adjustment'. We assume this to mean adjustment in relation to exceedances of DWF values in the permits, as permit compliance (as determined by the Environment Agency) is based on the following permit clauses:

*(a) For compliance purposes an exceedance shall be recorded for a calendar year only when the limit in effect on 31 December of that calendar year is exceeded by 90% or more of the 'good' recorded Total Daily Volumes in that calendar year.*

*(b) Up to and including 31 December 2025:*

*(i) If an exceedance of the Dry Weather Flow limit is recorded in a calendar year then the operator shall, as soon as is reasonably practicable, investigate the reasons for the exceedance.*

[4] PR24-final-determinations-Expenditure-allowances-Enhancement-cost-modelling-appendix.pdf

*(ii) The operator shall report the reasons for the exceedance to the Environment Agency and the steps that it proposes to take to restore compliance.*

*(iii) An exceedance of the Dry Weather Flow limit shall not be recorded as a failure of the Dry Weather Flow limit in that calendar year if the operator takes appropriate steps to restore compliance.*

*(c) From 1 January 2026 the limit has been complied with in an assessment calendar year unless;*

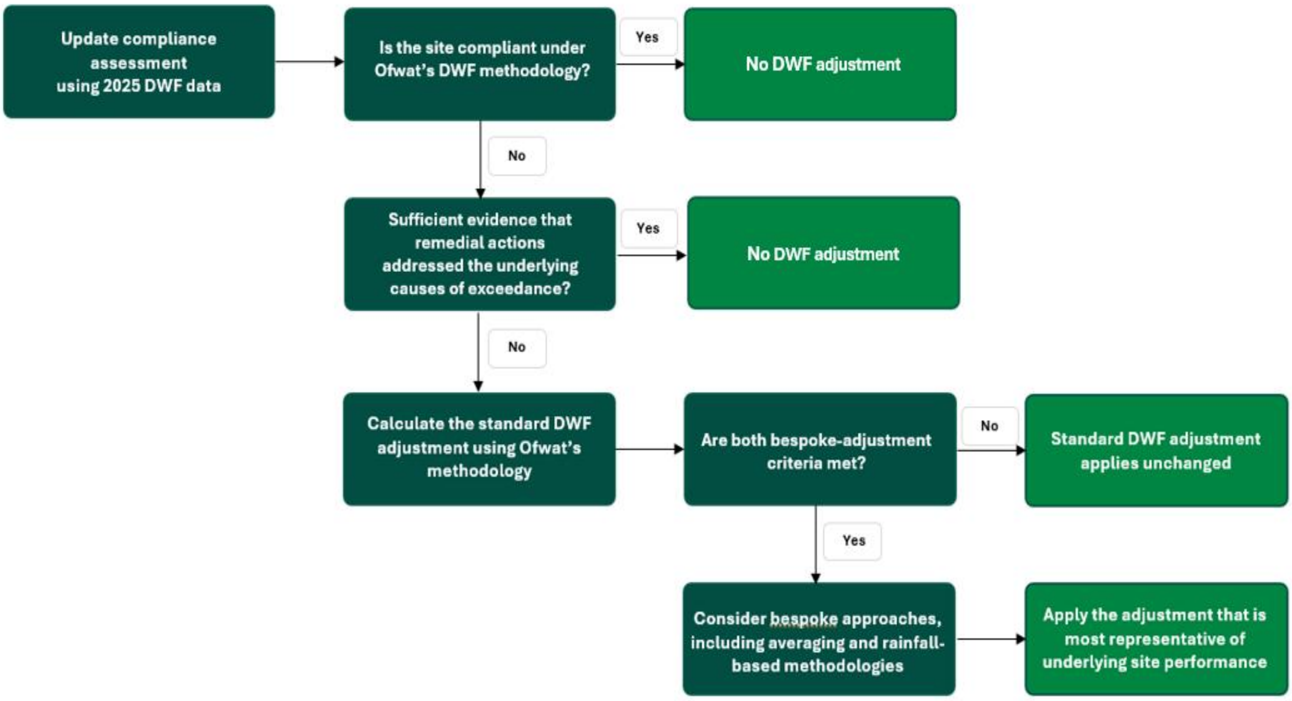
*(i) the limit was exceeded in the compliance assessment calendar year, and;*

*(ii) two or more exceedances have occurred in the preceding 4 calendar years.*

Following the draft determination, we have adopted a sequential assessment approach to determining a proportionate DWF adjustment, as presented in Figure 9 below. This approach has been used to inform our representations.

We believe this approach protects customers from funding expenditure associated with historical exceedances while ensuring that DWF adjustments remain based on the latest available evidence and the operational performance of individual sites.

***Figure 9: DWF adjustment process flow***




*Source: UUW analysis*

Applying the methodology described above results in four potential outcomes for sites assessed as requiring adjustment under Ofwat's DWF methodology. These are as follows:

- Standard DWF adjustment applies;
- No DWF adjustment applies following effective remedial action;
- No DWF adjustment applies following incorporation of 2025 data; or,
- A bespoke DWF adjustment applies where justified by site-specific evidence.

### 4.3.2 Evidence of remedial action at sites with exceedances

#### 4.2.2.1 Process summary for managing DWF

This section summarises the processes that we have in place to manage DWF exceedances including data analysis, end-to end checklists and actions plans for our WwTWs and infiltration reduction plans in the network.

DWF assessment is a statistical analysis used as a means of assessing performance against DWF permit values. This is necessary because it is not possible to measure 'true' DWF - defined as the average daily flow to the treatment works during seven consecutive days without rain (excluding a period which includes public holidays) following seven days during which the rainfall did not exceed 0.25mm on any one day.

Inherently, DWF assessment using the non-parametric methodology (unlike measurement of 'true' DWF during a dry weather period) is not independent of rainfall, catchment drain-down period, surface water inundation or groundwater influences on flows into the sewer system. As such, all of these factors will influence measured Q90 i.e. in a wet year the Q90 (the 37th lowest value in the year) is statistically higher and a DWF exceedance may occur when a site has not actually experienced a dry weather period.

The assessment of DWF uses the measured total daily flows received at a WwTW over a 12 month period (January to December). While companies cannot fully control the volume of water received on a given day, they can undertake measures to influence it and use available data to forecast future flows. Due to natural variation within flows from domestic, trade and rainfall, the benefits of an intervention are not immediately measurable, and it may take a period of time to understand and quantify the benefit of an improvement scheme undertaken to reduce DWF.

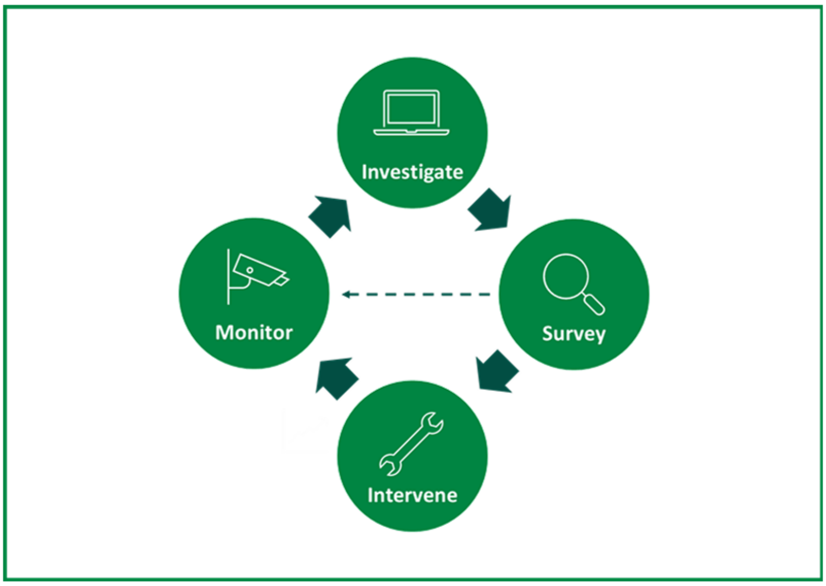
Flow compliance reports are produced monthly, using a rolling 12-month assessment of DWF performance. For sites that are at risk of exceeding their DWF permit, end-to-end checklists are used to guide dedicated 'flow and spill technical officers' to undertake a site inspection, analysis of available data with the view of establishing the root cause of any exceedance or erroneous data. This process is well established and longstanding and is used for both DWF and FTFT routinely.

Groundwater infiltration can make a substantial contribution to DWF and can be a key driver of DWF failures. Managing infiltration, however, can be both challenging and time-consuming. The Environment Agency's Infiltration Reduction Plan guidance[5] acknowledges that reducing infiltration typically involves a structured programme of investigations, repairs and monitoring, with repeated intervention cycles often required to systematically identify and eliminate sources of groundwater ingress throughout the sewer network. Our approach aligns with this recognised framework and best practice guidance.

Where infiltration is identified as the root cause of a DWF exceedance our infiltration reduction programme provides a structured and evidence-based approach to identifying, assessing and prioritising opportunities to reduce groundwater infiltration into the wastewater network. Its primary objective is to minimise unnecessary hydraulic loading on the sewerage system, pumping stations and WwTWs. As shown in Figure 10 below, our process comprises of four stages: Investigate, Survey, Intervene and Monitor.

[5] Discharges from groundwater surcharged sewers: RPS 362 - GOV.UK

***Figure 10: Iterative process to investigate, identify and address groundwater infiltration***




*Source: UUW analysis*

Potential infiltration reduction opportunities are identified through a range of established processes including:

- Infiltration Reduction Plans (IRPs);
- Dry Day Spill (DDS) investigations;
- Emergency Overflow/Storm Overflow (EO/SO) investigations;
- Operational intelligence, data analytics and AI insights; and,
- Major capital schemes.

These processes use a range of evidence, including flow and rainfall analysis, groundwater data, hydraulic modelling, operational performance records, Event Duration Monitoring (EDM) data, historical investigations and network performance trends to identify where infiltration may be contributing to elevated flows within our network and received at our WwTWs. Once identified, we prioritise opportunities using a risk-based assessment framework.

We evaluate catchments based on the following factors:

- operational performance impacts;
- environmental and compliance risks;
- sewer flooding risk;
- historical infiltration severity; and,
- deliverability of remedial action required.

Greater priority is given where infiltration concerns are identified through multiple evidence sources, providing increased confidence that infiltration is a significant contributor to observed flows. Priority catchments are then subject to targeted investigations to confirm infiltration sources and quantify potential benefits. Investigations may include flow, rainfall and groundwater assessments, CCTV surveys, manhole inspections, hydraulic modelling and advanced data analysis. Where defects are confirmed, appropriate interventions such as sewer rehabilitation, patch lining, point repairs and manhole sealing are implemented.

Post-intervention monitoring is undertaken to assess the effectiveness of completed works and, where possible, quantify the resulting flow reductions. This enables us to determine whether planned interventions have successfully addressed the identified infiltration issues and whether any remaining hydraulic constraints persist within the catchment.

Our methodology for our IRPs provides an evidence-based process which demonstrates that infiltration reduction opportunities are systematically identified before growth-driven investments are progressed. Post-intervention monitoring is undertaken to verify the effectiveness of any intervention and will identify any remaining hydraulic constraints following the completion of proportionate infiltration reduction measures.

Overall, the IRP methodology ensures a consistent, transparent and repeatable process for identifying and delivering infiltration reduction schemes. It supports efficient investment decisions and ensures that capacity enhancement projects at WwTWs are delivered in conjunction with network infiltration reduction schemes, where opportunities are identified and deliverable. This helps ensure that wastewater treatment works enhancement proposals are considered alongside catchment-wide infiltration reduction opportunities to deliver the most efficient long-term outcome for customers.

#### 4.2.2.2 Summary of actions

In the draft determination Ofwat recognises that where companies have undertaken remedial actions through base expenditure to address DWF exceedances, and can provide sufficient evidence of the activities undertaken and their effectiveness, the DWF adjustment should not apply where those interventions have resulted meeting DWF requirements in the most recent years of the assessment period.

In this section we provide evidence of site-specific improvements that have been carried out to reduce flows received at the WwTW and therefore reduce the potential for future DWF exceedances. These interventions include a variety of measures designed to address the underlying causes of DWF exceedance and improve site performance.

The evidence presented demonstrates that UUW has actively identified, investigated and responded to DWF exceedances at the sites identified in Table 9. As such, we consider that no DWF adjustment should be applied for sites where remedial actions have been carried out, and there is evidence this remedial action has addressed the underlying performance issue at the site. In some circumstances, remedial action may have improved the performance at a WwTW but may need to be combined with further intervention or permit changes at the WwTW to meet the evolving demands of the catchment. In Table 9 below, we have summarised the activities undertaken, the cost of investigations and interventions, and their status. Additional details are provided in Appendix A.

***Table 9: Summary of DWF investigation, improvements and actions***

| Site name | Type of activity | Project spend £ | Summary of activities undertaken |
|---|---|---|---|
| Armathwaite | Operational review and investigations | N/A | End-to-end checklist completed in April and November 2024 identified significant growth within the catchment. A detailed assessment of site performance, including review of operational data, instrumentation and site inspections, concluded that the available data accurately reflected site conditions and that population growth was the primary driver of the observed DWF exceedance.<br>As a result, an action plan was developed which identified the need for further network investigations and a future increase in the DWF permit. The site was subsequently included within a DWF investigation programme to assess feasible options for addressing the exceedance and accommodating future growth.<br>Following further assessment in 2025, the preferred solution was identified as an increase in the site's DWF permit to accommodate forecast population growth. The site was therefore included within the Cost Change ‘Growth at STW’ programme with an enhanced pre-permit application to accommodate future permit requirements. |

| Site name | Type of activity | Project spend £ | Summary of activities undertaken |
|---|---|---|---|
| Fazakerley | Operational review and investigations | N/A | In 2022, an end-to-end checklist identified that humus tank process returns were being double counted within total daily flow measurements. This process return can operate continuously and return around 40 l/s to the inlet of the WwTW. This return is now fitted with MCERTS flow measurement, and the volume is removed from the calculated daily flow to ensure we are now accurately assessing DWF. Using the latest data as a true indicator of DWF, our analysis identified that an increase in the DWF permit is required to meet the demand driven by future growth. |
| Grange-over-Sands | WwTW related actions and implementation of an Infiltration reduction plan | £521,899 | Following an internal review, Cartmel in Cark (a pumping station that pumps to Grange-over-Sands WwTW) was found to be a significant contributor to high flows received at the WwTW. Working with the Environment Agency, we have installed new treatment units at Cartmel in Cark Pumping Station (now permitted as Cark WwTW) adding treatment capacity within the catchment and reducing the demand at Grange-over-Sands by up to 60l/s. In addition, further work is ongoing at Cark WwTW to enhance the treatment capacity at this site. The full LBE is estimated c.£3m with spend of £0.5m to date.<br>As well as the work ongoing at Cark WwTW, we have undertaken infiltration reduction within the network. In October 2024, 580 metres of Infiltration surveys were completed and in April 2026 we have completed 86 metres of relining and additional lateral connection repairs in the network have been identified for completion. |
| Great Orton | Infiltration reduction plan | £34,528 | We have undertaken infiltration reduction within the network. In November 2024, 295 metres of infiltration surveys were completed and in January 2026 UUW completed 100 metres of re-lining and enabling works. We are now reviewing the impact of the intervention to understand if this meets the need or whether further investigation and intervention is required. |
| Ingleton | Infiltration reduction plan | £125,734 | In 2022 we identified infiltration as primary reason for DWF exceedance and a hydraulic modelling investigation into potential infiltration at a key pumping station was complete. This investigation, supported by CCTV surveys, identified two key areas of infiltration with an estimated average infiltration of approximately 3.29 l/s. Remediation was undertaken following this investigation, however groundwater infiltration continued to be a concern in this area and so further infiltration reduction investigations were undertaken within Ingleton network. In November 2024, 545 metres of infiltration surveys were completed but no active infiltration identified. A second round of infiltration surveys reviewing 8,393 metres of sewer network completed in July 2026. We are currently reviewing the CCTV footage to identify further future remedial actions. |
| Runcorn | Operational review and investigation | N/A | A DWF end-to-end checklist was completed in 2023. Visual inspection onsite did not identify any issues with the flow meter or obstructions within the flume or channel.<br>The check noted that there was housing growth within the area, but no significant developments were identified. |
| Urmston | Operational review and investigation | N/A | In May 2023 a site inspection identified a foreign object found within a channel resulting in erroneous flow data, this was removed, improving data quality and measured DWF performance. |

Appendix A sets out further detail around site-specific improvements, maintenance and monitoring activities carried out at Grange-over-Sands, Fazakerley, Great Orton and Ingleton WwTWs.

### 4.3.3 Issues with the DWF adjustment and proposed changes

This section discusses:

- How DWF performance is assessed by Ofwat (Section 4.3.3.1);
- The impact on the DWF assessment from using 2025 DWF data (Section 4.3.3.2);
- The limitations and issues associated with the current DWF adjustment calculation (Section 4.3.3); and,
- Evidence of the impact of rainfall and how it affects the DWF adjustment (Section 4.3.3.4 and in detail in Appendix B).

#### 4.3.3.1 Assessing DWF performance

In this section we discuss the DWF assessment by Ofwat and discuss its implications. We support and understand the principle that customers should not pay for companies to meet existing permit conditions through additional enhancement allowances. However, we do not consider that the current methodology used by Ofwat consistently achieves this objective and also note that Ofwat's approach is different from the Environment Agency's methodology.

In our original submission, we assessed any candidate WwTWs against the Environment Agency's established "3-in-5-year" methodology[6] to assess DWF performance. According to this methodology, from 2026 for a site to be non-compliant a site would have to:

- fail in the assessment year; and,
- fail in at least two of the preceding four years.

Applying this approach, all of the eight sites included in our original submission that received a DWF adjustment under Ofwat's methodology in the draft determination are fully compliant. This reflects the fact that all eight sites were compliant in 2025, which - under the Environment Agency's methodology - is the key assessment year and therefore a key determinant of overall exceedance status; this is because where a site is compliant in the assessment year, it cannot be classified as non-compliant. This approach applies greater weight on the current performance position of a site while still recognising the importance of historical performance. By requiring evidence of failure in the assessment year, the methodology ensures that assessments are based on current site performance and not historical exceedances that no longer reflect current operational conditions.

Under Ofwat's approach, a site is considered for the DWF adjustment where DWF permit exceedances occur in any three years within the assessment period, irrespective of whether the site has subsequently met performance requirements in the year of assessment. While we recognise Ofwat's objective of protecting customers from funding expenditure associated with historical exceedances, the effect of this approach is that sites which are currently compliant continue to attract a DWF adjustment due to historical exceedances even when there have been active steps taken to resolve issues causing exceedances. In our view, greater weight should be given to the latest available DWF performance data when determining whether a DWF adjustment is appropriate.

Section 4.3.3.3 discusses in more detail the limitations of the way in which the calculation of the adjustment is made and provides additional analysis for how the adjustment should be improved.

If Ofwat is therefore still minded to make a DWF-related adjustment at fully compliant sites, we believe that the current methodology should be complemented by appropriate adjustments to ensure the approach is proportionate, evidence-based and takes into account site-specific operational circumstances.

#### 4.3.3.2 Incorporating 2025 DWF data

We support Ofwat's stated intention[7] to update its DWF assessment with 2025 data in its final determination to ensure the most up-to-date information is used to assess any DWF-related cost adjustments. We support the principle that, as newer performance data becomes available, a robust regulatory assessment should reflect the

[6] Calculating DWF compliance 8. Forward look and future reporting - GOV.UK

[7] Cost Change Draft Determinations 2026 – Sector Overview, p. 18.

most recent operational evidence, rather than relying on a historical dataset that may no longer be representative of current operating conditions.

Using the 2025 data, all eight sites that received a DWF adjustment in the draft determination remain compliant with their DWF permits under the Environment Agency's "3-in-5-year" compliance methodology[8]. In addition, available monitoring data indicates that these sites continue to operate within permitted DWF limits during 2026.

Table 10 below summarises the impact of updating the assessment from the 2020–24 to 2021–25 DWF data, based on Ofwat's DWF performance assessment approach. The updated assessment would remove Great Orton WwTW reducing the aggregate adjustment by £5.3 million[9] relative to the adjustment in the draft determination (a reduction from £52.0 million to £46.7 million).

*Table 10: DWF adjustment comparisons*

| Site name | Ofwat DD DWF adjustment (using 2020–24 data) | Updated DWF adjustment (using 2021–25 data) | Change in DWF adjustment (£m) | Does the site exceed permit in any 3 years (2021–25) |
|---|---|---|---|---|
| Armathwaite | 4.93% | 4.05% | -0.02 | YES |
| Dovenby | 45.89% | 45.89% | - | YES |
| Fazakerley | 360.99% | 35.44% | -12.01 | YES |
| Grange-over-Sands | 49.30% | 40.48% | -0.64 | YES |
| Great Orton | 63.32% | - | -1.68 | NO |
| Ingleton | 50.62% | 62.08% | 0.48 | YES |
| Runcorn | 52.34% | 51.90% | -0.06 | YES |
| Urmston | 69.16% | 46.85% | -3.37 | YES |

*Source: UUW analysis of Ofwat's "CCPCA 2026 DD Growth at STWs model"*

We note that the adjustment for Ingleton WwTW becomes more punitive after the inclusion of additional data, despite the fact that this site exhibited improved performance, and was fully compliant with its permit in 2025. This is a counterintuitive outcome which is the direct result of the current 'averaging' of failing years only approach used to calculate DWF adjustments, as discussed in more detail in section 4.3.3.3.

#### 4.3.3.3 Issues with the current DWF calculation

**This section demonstrates that the current DWF adjustment methodology can produce counterintuitive outcomes and does not always reflect the true underlying site performance.**

The DWF adjustment is calculated through the following steps:

- Sites are identified as exceeding using the "3-in-5" rule, whereby a site is classified as eligible for a DWF adjustment if the permit value was exceeded in at least three years during the 2020 to 2024 period;
- The average Q90 value is then calculated using only the years of DWF exceedance. The existing permit value is subtracted from the average to derive an 'average overstep'; and,
- The 'average overstep' is divided by the expected change in the DWF permit to calculate the DWF adjustment factor (%).

The current methodology results in adjustments that either overstate or understate the underlying level of DWF exceedance and therefore may not reflect site performance. This is for three main reasons:

[8] Calculating DWF compliance 8. Forward look and future reporting - GOV.UK

[9] This figure excludes effects associated with Fazakerley scheme, as we propose a separate adjustment for this site – see Section 4.3.1

1. **It can under-represent more recent data** - The “3-in-5” rule takes into account any three years of exceedance, ignoring the fact that a site might have since met performance requirements based on the last available year of data.

2. **It misses out critical informative data and is influenced by exogenous factors** - The focus on exceedance years when calculating the ‘average overstep’ considers only periods of exceedance and fails to account for years in which the site operated within its permit limits. Performance in exceedance years can be influenced by exogenous factors, such as rainfall, meaning that these years may not be representative of the site's long-term underlying operational performance. This issue is discussed further below.

3. **It can lead to counterintuitive and mis-calibrated adjustments -** The sole inclusion of exceeding years can produce counterintuitive outcomes, whereby sites with poorer performance receive a less severe adjustment.

   These issues are illustrated in a practical example in Table 11 below, which presents two hypothetical sites and their Q90 DWF performance, assuming both have the same current permit level (100 $m^3$/day) and expected future permit change (50 $m^3$/day). Both sites are classified as non-compliant, as they exceed their permit levels in at least three years during the assessment period. However, Site 2 exhibits poorer performance than Site 1, with worse Q90 outcomes in 2020 and 2021. Despite this, the current methodology results in a smaller DWF adjustment for Site 2. This arises because the calculation of the average overstep is based only on the years in which the permit was exceeded. For Site 2, the larger number of exceedance years increases the averaging window and reduces the calculated average overstep reducing the adjustment.

*Table 11: Illustrative example of DWF adjustments under the Ofwat methodology*

| | Q90 performance ($m^3$/day) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2020 | 2021 | 2022 | 2023 | 2024 | Average Overstep of exceeding years | DWF permit change | DWF permit % adjustment |
| Site 1 | 80 | 80 | 140 | 140 | 140 | 40 | 50 | -80% |
| Site 2 | 110 | 110 | 140 | 140 | 140 | 28 | 50 | -56% |
| DWF Permit | 100 | 100 | 100 | 100 | 100 | | | |

*Source: UUW analysis*

This issue is confirmed at Ingleton WwTW, one of the sites included in our submission. At draft determination, the DWF adjustment was calculated using data from the 2020–2024 assessment period. As the site recorded multiple permit exceedances during this period, in the draft determination Ofwat applied a 50.62% downward adjustment, as shown in Table 12 below. However, site DWF performance has improved significantly in recent years, with annual Q90 values declining over the last three years and the 2025 Q90 falling comfortably below the permit threshold. Despite this improvement, recalculating the adjustment using the updated 2021–2025 assessment period results in a more severe adjustment of 62.08%.

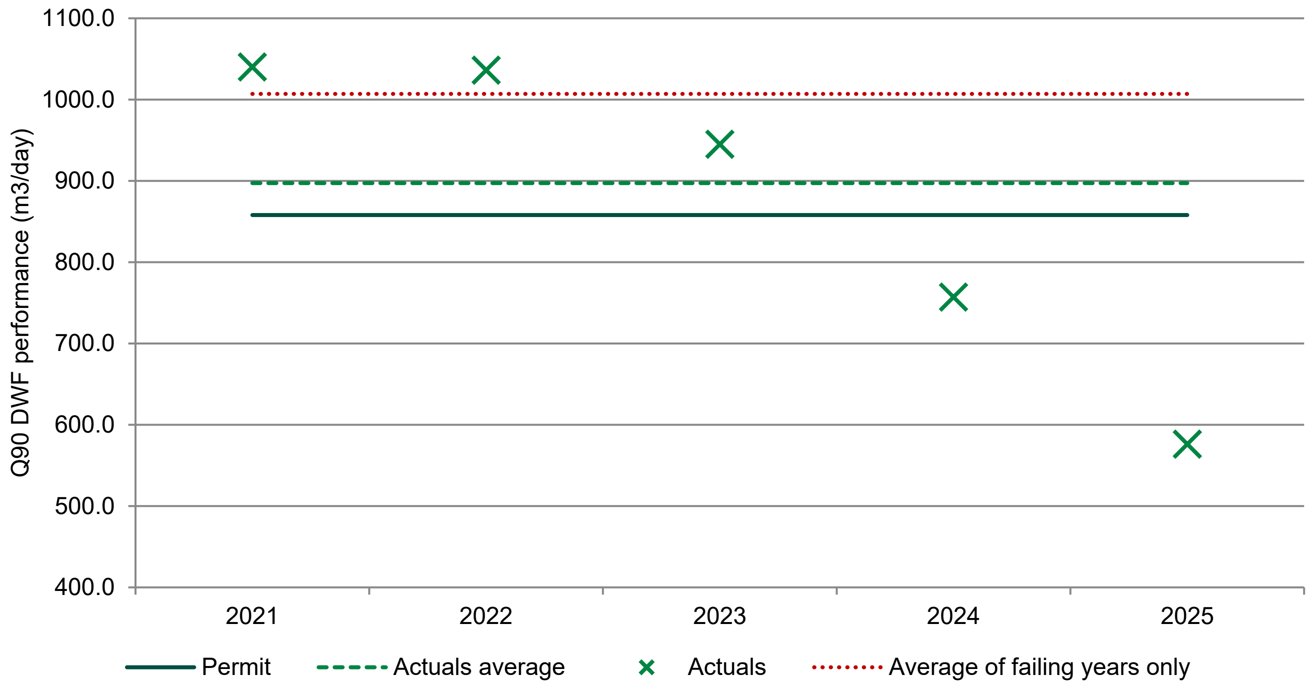
*Table 12: Ingleton STW DWF performance*

| | Q90 performance (m3/day) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average exceedance (2020–24) | Average exceedance (2021–25) | DWF permit % adjustment (2020–24) | DWF permit % adjustment (2021–25) |
| Ingleton | 897 | 1040 | 1036 | 945 | 757 | 576 | 980 | 1007 | 50.62% | 62.08% |
| DWF Permit | 858 | 858 | 858 | 858 | 858 | 858 | | | | |

*Source: UUW analysis*

Figure 11 below highlights the reason for this counterintuitive outcome. The "X" markers show the observed annual Q90 value for Ingleton WwTW, while the black line represents the permit threshold. Although the site exceeded its permit in only three of the five years between 2021 and 2025, the current methodology calculates the adjustment using only the years in which the permit was exceeded (illustrated by the red dashed line), rather than reflecting performance across the full assessment period (illustrated by the green dashed line). As a result, removing the relatively low 2020 value from the assessment window increases the average exceedance among the remaining years, leading to a larger adjustment despite overall performance improving.

*Figure 11: DWF performance data for Ingleton WwTW*




*Source: UUW analysis*

Therefore, the current DWF adjustment approach creates a number of unintended consequences.

The methodology can produce:

- outcomes that are disconnected from recent performance trends, with a site facing a more severe adjustment despite clear evidence of sustained improvement.
- counterintuitive outcomes where poorer performing sites receive a more lenient adjustment, as demonstrated in Table 11.

- perverse outcomes whereby a more favourable adjustment is achieved through DWF exceedances occurring across a greater number of years (providing some of those years have a relatively small 'overstep').

Overall, this can produce outcomes that are not consistent with the underlying objective of protecting customers from double-funding remediation of permit exceedance. It can create, for example, an unintended consequence by incentivising companies to delay growth investment until older permit exceedance years are no longer included in the five-year assessment window, rather than encouraging timely remediation of underlying performance issues and proactive investment to support growth.

We consider that a more appropriate basis for calculating the DWF adjustment would be to average performance across all years within the assessment period, rather than only those years in which the permitted DWF was exceeded. Using the example in Figure 11, the adjustment should be based on the green dashed line, rather than on the red dashed line. This approach would address the issues identified above (such as the potential for poorer-performing sites to receive a less stringent adjustment) while providing greater incentives for sustained performance improvements. In addition, this methodology would reduce the sensitivity of the adjustment to individual years. By incorporating both exceeding and non-exceeding years, the resulting adjustment would be less vulnerable to the influence of atypical conditions, such as unusually wet years, and would better reflect underlying site performance over the assessment period as a whole.

We consider that this change would be straightforward to implement and would better align with the objective of protecting customers from double-funding investment while ensuring that adjustment levels remain proportionate to actual performance. Further details of how this proposed averaging approach can be applied as part of a bespoke DWF adjustment methodology are provided in Section 4.3.4.

#### 4.3.3.4 Influence of rainfall on DWF performance

**This section summarises evidence that rainfall may have materially influenced DWF outcomes during the assessment period. Detailed rainfall analysis, statistical assessment and econometric modelling are provided in Appendix B.**

As discussed above, the current DWF adjustment methodology is sensitive to the specific data window used for assessment. In addition to the methodological limitations identified in Section 4.3.3.3, DWF performance can also be influenced by external factors outside company control, most notably rainfall.

DWF assessment is a statistical analysis used as a means of assessing performance against DWF limits. Inherently, DWF assessment uses the non-parametric methodology, unlike measurement of 'true' DWF during a dry weather period, is not independent of rainfall, catchment drain-down period, surface water inundation or groundwater influences on flows into the sewer system. As such, all of these factors will influence measured Q90 i.e. in a wet year the Q90 (the 37th lowest value in the year) is statistically higher and a DWF exceedance may occur when a site has not actually experienced a dry weather period.

Our analysis of rainfall conditions, site-level performance data and econometric modelling provides evidence that rainfall during the assessment period was materially above long-term averages and will have influenced DWF outcomes at a number of sites.

Specifically, the analysis presented in Appendix B demonstrates that:

- rainfall during the assessment period was significantly above historical norms;
- higher rainfall is associated with a greater incidence of DWF permit exceedances;
- rainfall can influence Q90 performance and therefore the outcome of DWF assessments;
- econometric analysis identifies a statistically significant relationship between rainfall and DWF performance; and,
- after controlling for rainfall effects, certain sites are not exceeding permitted DWF under typical rainfall conditions.

This evidence suggests that exceptional rainfall conditions during the assessment period has influenced DWF outcomes and led to a disproportionate and miscalibrated DWF adjustment at a small number of sites. We therefore consider it appropriate to apply a bespoke assessment in limited circumstances where there is evidence that rainfall conditions were particularly exceptional.

Such exceptional weather has manifested as DWF exceedances during these wet weather years. Importantly, these wet weather exceedances do not represent a failure to manage growth in the network. This is transparently the case since growth would not "appear" and then "disappear" in subsequent years, such as 2025 and 2026 when measured DWF has returned to within permit limits.

Further detail of analysis in this area is provided in Appendix B.

### 4.3.4 Bespoke DWF adjustment

**This section sets out the circumstances in which a bespoke DWF adjustment should be applied and presents a practical methodology for reflecting underlying site performance more accurately than the standard approach.**

#### 4.3.4.1 Criteria for sites eligible for a bespoke adjustment

The analysis above demonstrates that performance during the assessment period has been materially influenced by atypical rainfall conditions. Consequently, there is a risk that the current DWF-adjustment understates the underlying level of performance at a small number of sites, where both the magnitude of the adjustment and the severity of rainfall are particularly high.

Considering these issues, we propose a bespoke DWF adjustment when certain conditions are met. To identify sites that qualify for this bespoke DWF adjustment, we take the following four steps:

1. To identify sites where 2021–25 rainfall was exceptionally high, we compare that period's average rainfall against what a "normal" five-year stretch has looked like historically at the same site;
2. For each site, we take its annual rainfall from 1995 to 2020 and calculate the average rainfall for every possible run of five consecutive years within that record: 1995-99, 1996-2000, 1997-2001, through to 2016-2020. This produces 22 overlapping five-year averages, which together provide a normal range of rainfall outcomes a five-year period at that site has produced over the last three decades;
3. We then identify the 97th percentile of these 22 historical averages. This is the level that only the wettest 3% of five-year periods in the site's history has reached. We have used this very high percentile level to capture only the most significant outliers. This threshold sits close to two standard deviations above the long-term average, a conventionally used statistical benchmark for distinguishing a genuinely unusual outcome from ordinary year-to-year variation; and,
4. We compare the actual 2021–25 average against this threshold. If the average exceeds the threshold, the site qualifies for a bespoke adjustment.

Using the 2021–25 assessment period aligns with the data that will be available to Ofwat at final determination. Assessing conditions across the full five-year period, rather than focusing on a single year, ensures the analysis captures persistent wet weather trends consistent with the intent of the "3-in-5" assessment, rather than being influenced by one exceptional rainfall year.

The comparison threshold is based on each site's own 30-year rainfall record. Exceeding the 97th percentile threshold indicates that rainfall during 2021–25 was significantly higher than would normally be expected based on the site's long-term historical record. This threshold has been deliberately set at a stringent level to ensure that only sites experiencing truly exceptional rainfall conditions are identified. Where a site meets this criterion, it provides strong evidence that rainfall during the assessment period was materially above normal and supports the application of a bespoke DWF adjustment for that site.

Under this set of criteria, two UUW sites qualify for a target adjustment: Ingleton and Urmston. These sites experienced exceptionally wet conditions over the assessment period, especially in years 2023 and 2024.

#### 4.3.4.2 The proposed bespoke adjustment

To calculate the bespoke DWF adjustment, we triangulate across two estimation approaches:

- **'Full averaging' approach** – to calculate the DWF adjustment, we use the average Q90 value across all years in the assessment period (2021–2025), rather than averaging only those years in which the permit was exceeded. As discussed in Section 4.3.3.3, averaging performance across the full period provides a more consistent and representative measure of underlying DWF performance. To derive the revised adjustment for each site, we adapt the formula used in Ofwat's "CCPCA 2026 DD Growth at STWs" model to incorporate the full-period average Q90 value. We then calculate the resulting 'average overstep' in a manner consistent with Ofwat's existing methodology. For Ingleton this produces a DWF adjustment of 5.3%, while for Urmston the resulting adjustment is 6.9%.

- **Econometric approach** – to estimate underlying DWF performance, we use the quantile regression model (as described in Appendix B) to generate Q90 predictions under normalised rainfall conditions. Specifically, we substitute each site's long-term (1995–2025) average rainfall value into the model, rather than the rainfall observed during the assessment period. This provides an estimate of Q90 performance after removing the effects of atypical rainfall. For both Ingleton and Urmston, the resulting predicted Q90 values are below their respective DWF permit thresholds. This indicates that, once rainfall conditions are normalised, both sites meet their DWF requirements and do not exhibit an underlying DWF exceedance. On this basis, the resulting DWF adjustment is null for both sites.

While we consider that these two approaches improve the current methodology, each has limitations. The 'Full averaging' approach may still be influenced by outlier years, while the econometric model may not fully capture all the complex factors affecting DWF performance. We therefore triangulate the results from both approaches by taking the average of the resulting DWF adjustments. Overall, this results in a DWF adjustment of 2.7% for Ingleton and 3.4% for Urmston. Given the evidence that atypical rainfall has materially affected performance at both sites, we consider these bespoke adjustments provide a more appropriate reflection of underlying DWF performance than the standard methodology.

In conclusion, while we consider that Ofwat should not apply any type of DWF adjustment at sites that are fully compliant with the Environment Agency DWF definition, if Ofwat is still minded making an adjustment it should consider a bespoke approach to Ingleton and Urmston at final determination, as shown in Table 13.

***Table 13: Bespoke DWF adjustment calculation approach***

| WwTWs name | UUW request (£m) | DWF adjustment (%) | | | | Allowed costs post triangulated DWF adjustment (£m) |
|---|---|---|---|---|---|---|
| | | Ofwat DD | 'Full averaging' approach | Econometric approach | Triangulated adjustment (%) | |
| Ingleton | 4.250 | 50.6% | 5.3% | 0.0% | 2.7% | 4.076 |
| Urmston | 15.300 | 69.2% | 6.9% | 0.0% | 3.4% | 14.558 |

*Source: UUW analysis*

## 4.4 Customer protection and Price Control Deliverables

**Ofwat describes the growth at sewage treatment works PCD in section 6.1.5 of the '*Cost Change draft determinations 2026 – Price control deliverables appendix*' and quantifies the delivery incentives and parameters in PCD model '*PR24CCP14*'.**

Ofwat's draft determination PCD for growth at sewage treatment works broadly follows in form from the comparable PCD at PR24 FD with two exceptions, scheme substitutions and time incentives. Scheme substitutions are not permitted in the CCP PCD but are permitted in the FD PCD. In the CCP PCD, time incentives are underperformance only and relate only to schemes due to be delivered in AMP9. In the FD PCD, time incentives are under- and out-performance and relate to all schemes in the CCP PCD.

Overall, these exceptions reduce the flexibility of the CCP PCD and increases the financial and delivery risk compared to the PR24 FD PCD. In addition, it creates two-tier PCD methodologies – one for PR24 FD PCDs and one for CCP PCDs. This creates more complexity in an area of economic regulation which is already highly complex against a backdrop of regulatory reform which is aiming to – in part – decrease the complexity of regulation.

While we understand Ofwat's reasoning for creating discrete CCP PCDs with methodologies distinct from the PR24 FD PCDs, we propose that Ofwat considers whether the benefits of this – in terms of customer protection – outweigh the burden and complexity of the additional regulation.

Following the draft determination, we include an accompanying PCD workbook '*UUWR26-15 Cost change DD response – PCDs*'. In this we have included our response to the growth at sewage treatment works PCD, with the inclusion of two additional schemes for Fazakerley WwTW and Sale WwTW.

# 5. Approach for final determination

We propose that Ofwat provides a final determination allowance of £292.1 million for Growth at Sewage Treatment Works. This supplements the draft determination allowance of £224.8 million with four key adjustments discussed in the previous section and summarised in Table 14 below. These adjustments increase allowances by £67.3 million relative to draft determination and are explained in detail in the following sections. Full scheme breakdown of final determination request is provided in Table 14 of our '*UUWR26-11 - Cost change tables commentary*' document.

***Table 14: UUW's totex final determination request for growth at sewage treatment works split between AMP8 and AMP9 (£m, 2022-2023 CPIH)***

| | Section Ref | AMP8 | AMP9 | Total |
|---|---|---|---|---|
| Draft determination allowance per Table 2 | | **209.189** | **15.636** | **224.825** |
| *Adjustments:* | | | | |
| DWF adjustment – 4 sites* | 5.1 | 16.694 | 0.510 | 17.204 |
| Warrington North – revised estimate | 5.2.1 | 11.164 | 1.751 | 12.915 |
| Fazakerley – revised DWF assessment | 5.2.3 | 24.384 | - | 24.384 |
| Sale – additional site | 5.2.4 | 12.809 | - | 12.809 |
| Total adjustments | | **65.052** | **2.261** | **67.313** |
| **Final determination request** | | **274.241** | **17.896** | **292.137** |

*Source: UUW estimates*

** Grange over Sands, Great Orton, Ingleton and Urmston. A full reconciliation of the proposed DWF adjustment by site can be found in Table 15.*

We accept the 1.28% efficiency adjustment applied by Ofwat in its draft determination for all sites excluding those subject to a DWF adjustment, and the two 'deep dive' challenges at Warrington North and Rochdale. For the avoidance of doubt, UUW accepts the cost challenge at Rochdale in full.

Following the draft determination, we have provided evidence to support the following adjustments to the draft determination allowance:

1. **DWF adjustments** – This involves incorporating 2025 DWF performance data, accepting the evidence provided for remedial actions at specific sites and allowing for bespoke DWF adjustments where appropriate. We ask that Ofwat allows a £17.2 million increase in allowances relative to the draft determination across seven sites. This comprises four sites where we propose changes to Ofwat's DWF adjustment and three sites where we make no representation.
2. **Warrington North** – We ask that Ofwat allows £54.2 million of investment in WwTW capacity reflecting the deep dive evidence at this site and updated scheme cost estimates. This represents an increase of £12.9 million compared to our draft determination allowance.
3. **Fazakerley** – We ask that Ofwat allows £24.4 million of investment in light of the revised DWF requirements. The requested allowance reflects application of Ofwat's Draft Determination DWF adjustment methodology

to a modelled investment requirement of £38.3 million, pending Ofwat's conclusions on DWF adjustments in its final determination.

4. **Sale** – We ask that Ofwat allows £12.8 million of investment at Sale WwTW net of Ofwat's DWF adjustment methodology and Ofwat’s programme-level efficiency challenge, which we reflect in our requested allowance in full.

## 5.1 Proposed application of DWF adjustments

We have proposed a sequential approach to making DWF adjustment as set out in Section 4.2.1. In our view, this approach is consistent with protecting customers from funding expenditure associated with historical exceedances while ensuring that DWF adjustments remains based on the latest available evidence and the operational performance of an individual site.

Applying the approach described above results in an aggregate DWF adjustment of £39.3 million across UUW's sites (excluding Fazakerley and Sale), as summarised in Table 15. This represents a £17.2 million reduction relative to the draft determination DWF adjustment. The reduction is driven by:

- the incorporation of 2025 DWF performance data;
- consideration of site-specific remedial actions; and,
- application of the bespoke DWF adjustment methodology for Ingleton and Urmston.

After adopting this approach, we have presented in Table 15 a summary of the adjustments and a reconciliation between the original totex request, the draft determination allowance and our draft determination response. The table presents the full scheme costs for each site and shows the application of both cost efficiency and DWF adjustments under the draft determination and UUW's proposed final determination approach.

This shows the drivers of the change, identifying the impact of revisions on the full scheme cost, cost efficiency assumptions, DWF adjustments, and presents the resulting movement between the draft determination allowance and our draft determination response.

We note that we have used the post efficiency and DWF adjustment cost figures (in the ‘DDR Response’ column in the table below) as inputs for financial modelling – this is further explained in Section 5 of our ‘UUWR26-11 - Cost Change Draft Determination: UUW Representation’ document.

***Table 15: UUW's totex original request, draft determination allowance, draft determination response and variance for each of the sites categorised originally as requiring a DWF adjustment (£m, 2022-2023 CPIH)***

| Site Name | Ref | Original | Draft determination (DD) | | | Draft Determination Response (DDR) | | | | Variance DD v DDR | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full scheme request | Cost efficiency | DWF adjustment | DD Allowance | Full scheme request[1] | Cost efficiency | DWF adjustment | DDR Response[2] | Full scheme request | Cost efficiency | DWF adjustment | Total change |
| Armathwaite | 3 | 2.746 | -0.035 | -0.134 | 2.577 | 2.746 | -0.040 | -0.109 | 2.596 | - | -0.005 | 0.024 | 0.019 |
| Dovenby | 3 | 2.442 | -0.031 | -1.106 | 1.305 | 2.442 | -0.036 | -1.104 | 1.302 | - | -0.005 | 0.002 | -0.003 |
| Grange-over-Sands | 5 | 7.295 | -0.093 | -3.551 | 3.651 | 7.295 | -0.093 | - | 7.202 | - | - | 3.551 | 3.551 |
| Great Orton | 5 | 2.692 | -0.034 | -1.683 | 0.975 | 2.692 | -0.034 | - | 2.658 | - | - | 1.683 | 1.683 |
| Ingleton | 4 | 4.250 | -0.054 | -2.124 | 2.072 | 4.250 | -0.062 | -0.112 | 4.076 | - | -0.008 | 2.012 | 2.004 |
| Runcorn | 3 | 14.656 | -0.187 | -7.573 | 6.896 | 14.656 | -0.215 | -7.494 | 6.947 | - | -0.028 | 0.078 | 0.050 |
| Urmston | 4 | 15.300 | -0.195 | -10.446 | 4.659 | 15.300 | -0.224 | -0.517 | 14.558 | - | -0.029 | 9.928 | 9.899 |
| **Subtotal** | | **49.381** | **-0.630** | **-26.616** | **22.136** | **49.381** | **-0.705** | **-9.337** | **39.340[6]** | **-** | **-0.075** | **17.279** | **17.204[7]** |
| | | | | | | | | | | | | | |
| Fazakerley | 8 | 25.727 | -0.328 | -25.399 | - | 38.331 | -0.562 | -13.385 | 24.384 | 12.605 | 0.234 | 12.013 | 24.384 |
| Sale | 9 | - | - | - | - | 28.450 | -0.417 | -15.224 | 12.809 | 28.450 | -0.417 | -15.224 | 12.809 |

*Source: Ofwat's "CCPCA 2026 DD Growth at STWs model"; UUW estimates*

1. We have included the full scheme costs in our data tables to enables Ofwat to apply any DWF adjustments or efficiency challenges to the full scheme costs.
2. For the purposes of our draft determination response, we have included the figures set out in this column within the financial model. These values reflect UUW's view of the appropriate DWF adjustment and programme-level efficiency challenge that should be applied at final determination.
3. At these three sites, we retain the DWF adjustment applied by Ofwat in the Draft Determination with updated 2025 DWF data.
4. For these two sites we propose a bespoke DWF adjustment which we discuss in detail in section 4.3.3.3.
5. For Grange-over-Sands and Great Orton, we consider that no DWF adjustment should apply. Grange-over-Sands is now compliant following remedial action (see Section 4.3.2), while Great Orton no longer requires a DWF adjustment once 2025 data is included.
6. £39.3 million is the aggregate DWF adjustment across UUW's sites (excluding Fazakerley and Sale).
7. £17.2 million is the change from the draft determination allowance to our draft determination response for these seven sites referred to in Table 7 above.
8. Fazakerley – Refer to section 5.2.3
9. Sale – Refer to section 5.2.4

## 5.2 Proposed treatment of scheme-specific adjustments

In addition to the DWF assessment approach described above, we ask that Ofwat reflects the following scheme-specific adjustments in its final determination.

### 5.2.1 Warrington North

We ask that Ofwat accepts UUW's requested enhancement allowance of £54.2 million for Warrington North

The allowance reflects the reduction in our cost estimate of £3.3 million from our original submission. This is £12.9 million above the draft determination modelled allowance of £41.2 million reflecting the atypical characteristics of the scheme, which are not captured through existing models.

### 5.2.2 Rochdale

We accept Ofwat's draft determination position for Rochdale in full following further cost challenge, optioneering and refinement of the proposed solution.

### 5.2.3 Fazakerley

We ask that Ofwat allows for £24.4 million of investment reflecting the changes to the DWF permit requirements.

The allowance of £24.4 million reflects a revised modelled enhancement allowance of £38.3 million following reassessment of the future DWF permit requirement net of Ofwat's DWF adjustment of £13.4 million and programme-level efficiency challenge. We note that we have provided evidence of maintenance and monitoring activity. We accept Ofwat's programme-level efficiency challenge in full.

### 5.2.4 Sale

We ask that Ofwat allows £12.8 million of investment to meet growth at Sale WwTW.

The allowance of £12.8 million reflects a modelled enhancement allowance of £28.5 million net of Ofwat's DWF adjustment of £15.2 million and programme-level efficiency challenge. We accept both the DWF adjustment and programme-level efficiency challenge in full.

### 5.2.5 Grange-over-Sands

We ask that Ofwat allows £7.2 million of investment in full to meet growth at Grange-over-Sands WwTW.

We have provided evidence of monitoring and maintenance activity which has addressed the underlying DWF exceedances at the site. As a result, we consider that no DWF adjustment should be applied at final determination.

### 5.2.6 Great Orton

We ask that Ofwat allows £2.7 million of investment in full to meet growth at Great Orton WwTW.

Following incorporation of 2025 DWF data, Great Orton no longer meets Ofwat's criteria for a DWF adjustment. We have provided evidence demonstrating that monitoring and maintenance activities have addressed the underlying causes of historical DWF exceedances at the site. As a result, we consider that no DWF adjustment should be applied at final determination.

### 5.2.7 Price Control Deliverables

We ask that Ofwat uses the update PCDs for Growth at STW and associated funding allowances, where necessary, to reflect the final determination position. For completeness we have submitted an accompanying PCD workbook '*UUWR26-15 Cost change DD response – PCDs*'.

# Appendix A DWF exceedances - A summary of investigations and remedial actions

**A.1.1.1 Grange-over-Sands**

*Background*

Grange-over-Sands WwTW is a coastal wastewater treatment works, serving approximately 10,000 PE on the northern stretch of Morecambe Bay in Cumbria. The site is just a few miles south of Lake District National Park border and is surrounded by coastal and upland area. The mixture of woodland, farmland, hills, urban areas and the estuary creates a unique catchment landscape.

Grange-over-Sands WwTW is a compliant works, assessed under the Environment Agency's "3-in-5-year" methodology. However, it is subject to an adjustment under Ofwat's assessment of DWF methodology. The evidence below provides details of activities undertaken to reduce groundwater infiltration within the Grange-Over-Sands catchment area. Significant reductions in flows to the WwTWs following improvement activities reflects a step change in performance which should be taken into consideration within Ofwat's assessment of performance.

*Activities undertaken to address DWF exceedance*

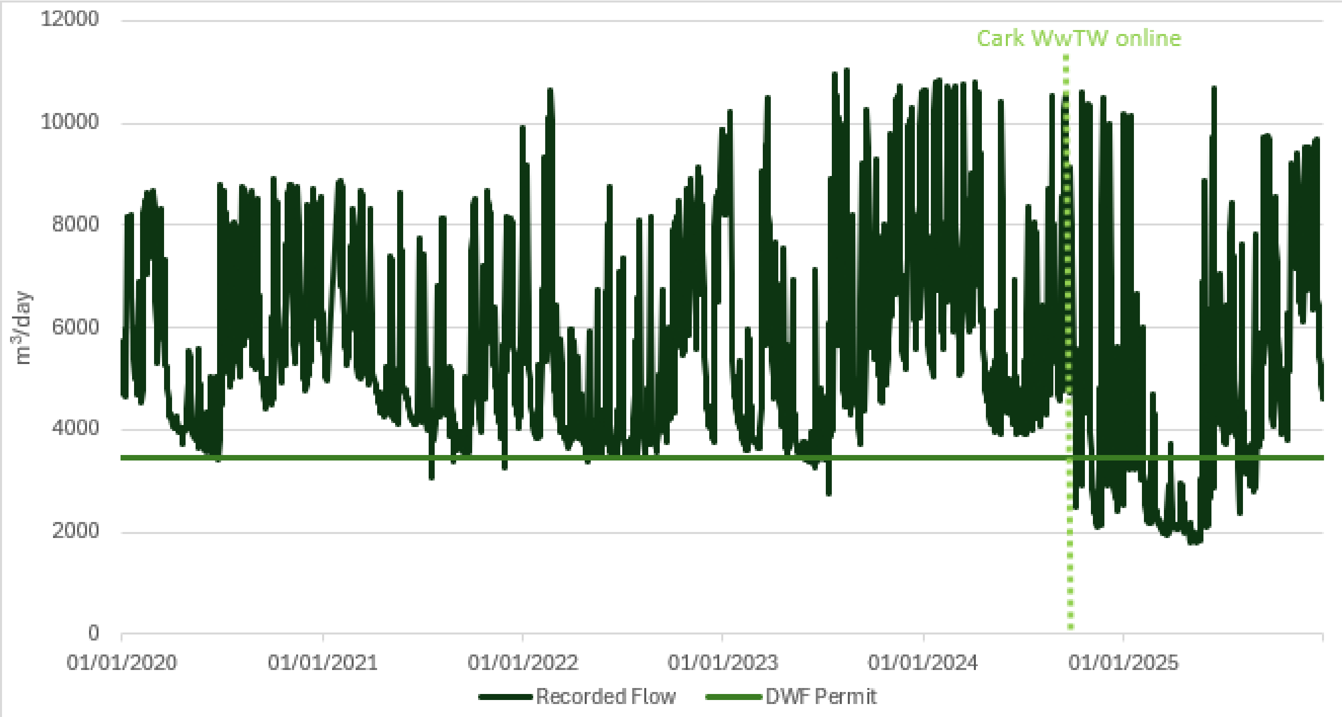
Following an end-to-end checklist assessment of the catchment and treatment system, we identified infiltration and inundation as the primary drivers of Grange-over-Sands WwTW exceeding its current DWF permit. Investigations identified that significant volumes were being passed forward from Cartmel in Cark Pumping Station (PS), the terminal pumping station immediately upstream of the treatment works.

We have worked closely with the Environment Agency to identify appropriate mitigation measures and have developed a solution to install additional treatment processes at Cartmel in Cark PS (now permitted as Cark WwTW). This enabled a proportion of flows to be treated upstream, reducing the volume of flow transferred to Grange-over-Sands WwTW.

The new treatment facilities became operational in October 2024 and delivered an additional treatment capacity of up to 60l/s at Cark WwTW therefore reducing the hydraulic load arriving at Grange-over-Sands WwTW. This improvement is identified as a milestone in the graphs below, showing measured total daily volumes at Grange-over-Sands between 2020 and 2025.

Figure 12 below highlights the point at which the additional capacity was commissioned and provides evidence supporting a clear reduction in dry weather flows at Grange-over-Sands compared with previous periods when the additional treatment capacity was not available.

*Figure 12: Total daily flows recorded at Grange-over-Sands in 2020 to 2025*




*Source: UUW plot of TDV data recorded from MCERTS flow meter including permitted DWF limit*

Since this remedial action was undertaken, Grange-over-Sands measured DWF has been within permit limits, and evidence from 2026 year-to-date shows that this treatment works has been within permit limits again in 2026. The reduction in flows following completion of the scheme provides confidence that the identified root cause has been effectively addressed and that the site is no longer experiencing the same level of infiltration observed historically. The increase observed in the second half of 2025 is within the range of short-term variation in the dataset and seasonal rainfall. This does not alter the overall reduction in flows following completion of the scheme.

*Network Infiltration Reduction Programme*

In parallel with the upstream treatment solution, we have undertaken a targeted IRP across the Grange-over-Sands catchment to further reduce DWF within the network.

The assessment concluded that significant groundwater infiltration was unlikely in the catchment. Some evidence of base infiltration in the system was identified including rainfall-driven runoff and areas of the Grange catchment where watercourses ran next to sewers and highways where public sewers are located. It is possible for flow to enter the system through highway gullies; therefore we have undertaken further investigations and conducted CCTV surveys to see if there was infiltration into the sewer and identify if there was land drainage connected into the sewer, which would be assessed for removal.

In late 2024, 580 m of CCTV surveys were completed. The CCTV surveys were assessed using Artificial Intelligence techniques to rapidly identify and locate points of infiltration. The surveys were then reviewed by an engineer to assess for any required remedial works and multiple points of infiltration were identified. This confirmed the need for interventions to seal the network. Checks were also carried out on all lateral connections; none are suspected of receiving flows not bound to receive. Relevant intervention and remedial works were all completed in Spring 2026. This involved multiple lateral connection repairs and 79m of sewer lining to prevent infiltration.

Grange-over-Sands is currently in the monitoring stage of identifying and addressing infiltration. The site will then follow the iterative process to monitor the efficacy of these remedial works and identify new points of infiltration, should they arise.

*Figure 13: Before and after images within Grange-over-Sands network demonstrating presence of groundwater infiltration (left) and remediation though a lateral connection repair known as a 'top hat' (right).*


*Source: UUW Images from CCTV surveys of Grange-over-Sands network.*

**4.2.2.4 Fazakerley**

Fazakerley is a large WwTW situated to the North of Liverpool serving over 170,000 PE from two discrete catchments. As such, influent enter the WwTW by a high-level inlet and a low-level inlet. The total daily flow is measured by summing the high-level and low-level flows. In 2022, an end-to-end check identified that humus tank process returns were being double counted within the total daily flow measurements. This process return can operate continuously and return around 40 l/s to the inlet of the WwTW. Flows from the humus tank are measured and the volume is removed from the calculated total daily flow (TDV) using the following formula:

TDV = FFT Low level + FFT High level - Humus Return.

In addition, a significant flow project has been undertaken to improve flow performance installing new pumps which were able to balance flows received from the two catchments between the high and low level inlet channels to ensure that the minimum pass forward flow can be met at all times (even when only one catchment is in storm conditions). The project also installed a new flume and made changes to the channels to improve flow measurement. This involved investing over £10.8 million to increase flows passed forward to treatment by ensuring that both high and low-level inlets are maximised before discharge to the storm tanks is required.

*Figure 14: New transfer pumping station and manhole connection to transfer flows from the high-level inlet to low-level inlet*


*Source: UUW photographs during construction of flow project at Fazakerley WwTW*

#### 4.2.2.5 Great Orton

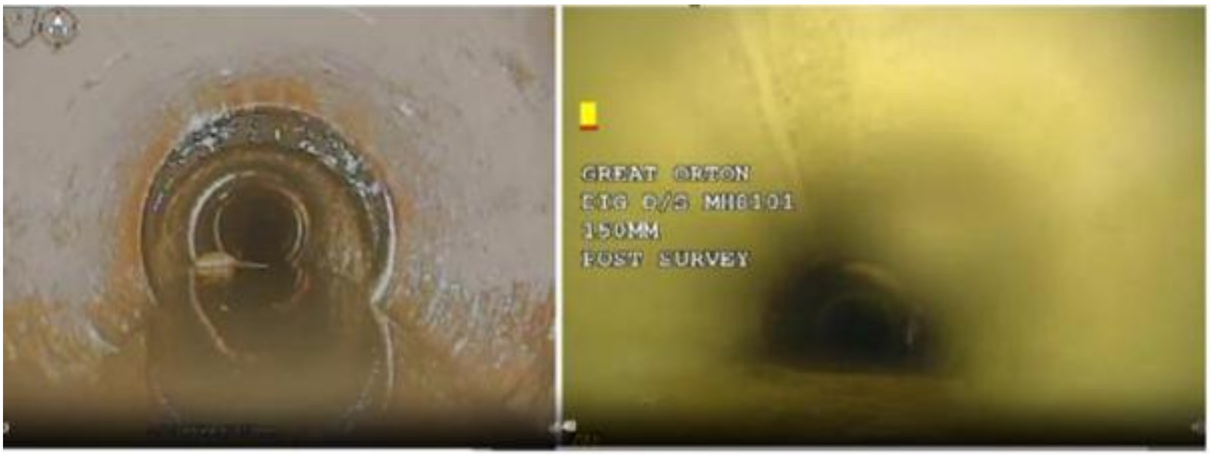
*Background*

Great Orton is a small village in Cumbria, in the North of our region serving a PE of 212. It is surrounded by rural land and discharges to Roughton Beck. Great Orton is a compliant works, assessed under the Environment Agency's "3-in-5-year" methodology.

In 2022, infiltration was identified as a potential root cause of the storm overflow discharging. The purpose of this plan is to capture the process to investigate, identify and address significant groundwater infiltration. An internal analysis concluded that there was some evidence of seasonal infiltration due to groundwater ingress and, based on an analysis of the baseflow, reducing infiltration in this area could potentially reduce flow to Great Orton WwTW. Further observations identified rural streams and ditches running adjacent to public sewers where infiltration of the sewer system could happen via highway drainage systems or defects in the pipe fabric. There was also the possibility of slow rural runoff contributing to spills. From these findings, it was recommended that CCTV surveys be completed to identify if there was infiltration from the watercourse or any land drain connections.

We completed infiltration surveys of 295 m of sewer in November 2024. Infiltration was identified through the surveys and remedial activities identified. In January 2026, 100 m of sewers were re-lined to seal the network from groundwater infiltration. We are now reviewing the impact of remedial activities on the infiltration within this area. This adaptive approach ensures that we are managing infiltration efficiently and delivering the best value for customers by targeting specific areas for investigation and improvements where required.

***Figure 15: Great Orton network before (left) and after remediation through a relining (right).***




*Source: UUW Images from CCTV surveys of Great Orton network*

#### 4.2.2.6 Ingleton

In 2022, following an end-to-end assessment of the catchment and treatment system, we identified infiltration and inundation as the primary drivers of Ingleton WwTW exceeding its current DWF permit. A detailed infiltration study was undertaken to identify whether groundwater infiltration was a cause of unusual pumping operation at a key pumping station within the catchment.

Following a desktop review of available data, a site investigation was subsequently carried out and identified the presence of groundwater infiltration into the sewer network. CCTV surveys later identified two significant infiltration sources around Manhole 1401, including groundwater entering beneath a connection and infiltration within the downstream sewer. The investigation estimated average infiltration entering the system at approximately 3.29 l/s, with individual assessments ranging between 2.74 l/s and 4.39 l/s.

The study concluded that groundwater infiltration upstream of the pumping station is a significant contributor to elevated flows, DWF performance and storm overflow performance. CCTV investigations confirmed specific infiltration defects within the sewer network, and modelling demonstrated that remediation could deliver substantial operational and environmental benefits, including improved DWF improvement and spill reductions of up to approximately 30%. Remedial action was undertaken in the network to remove infiltration identified from this study. Remedial action was taken to remove groundwater infiltration identified through this investigation.

***Figure 16: 2022 CCTV surveys identified evidence of groundwater infiltration within Ingleton catchment***


*Source: UUW Images from CCTV surveys of Ingleton network*

The assessment concluded that significant groundwater infiltration was likely. However, there was also indication of a very slow response runoff. Monitoring at the storm tank indicated ingress from high groundwater levels in the catchment; a level of base infiltration in the system that remains high in the winter could be due to rural runoff or groundwater infiltration due to soil saturation.

The assessment highlighted areas in the catchment where sewers crossed the river or ran close to bodies of water. It can be that flow from these watercourses can enter the sewer system through structural defects. The assessment also found that there were fields that fell towards the catchment, notably towards the combined sewer due by potential rural runoff from these fields into the combined sewer.

We have undertaken CCTV surveys, completed a further 545 m of infiltration surveys in November 2024 and completed further review of CCTV footage which found evidence of historical infiltration but no presence of active infiltration. Checks were carried out on all lateral connections; none were suspected of receiving flows not bound to receive. Therefore, no further interventions were recommended to prevent infiltration in the network.

In July 2026, 8,393 m of infiltration surveys were further completed and we now plan to assess the footage to identify areas of infiltration into the network and arrange appropriate remediation. Given the ongoing interventions, we recognise that the evidence currently available may not be sufficient to support the complete removal of the DWF adjustment at Ingleton WwTW.

However, the site has experienced unusually high rainfall over the assessment period, which we believe provides evidence for applying a bespoke DWF adjustment of 2.7%, as we explain in Section 4.3.4. In our view, this approach better reflects the site's underlying performance by accounting for the influence of atypical rainfall conditions.

# Appendix B Influence of rainfall on DWF performance

## B.1 Evidence of the impact of exogenous factors on DWF performance

**This section demonstrates that rainfall during the assessment period was materially above long-term averages and is likely to have influenced DWF outcomes across submitted sites.**

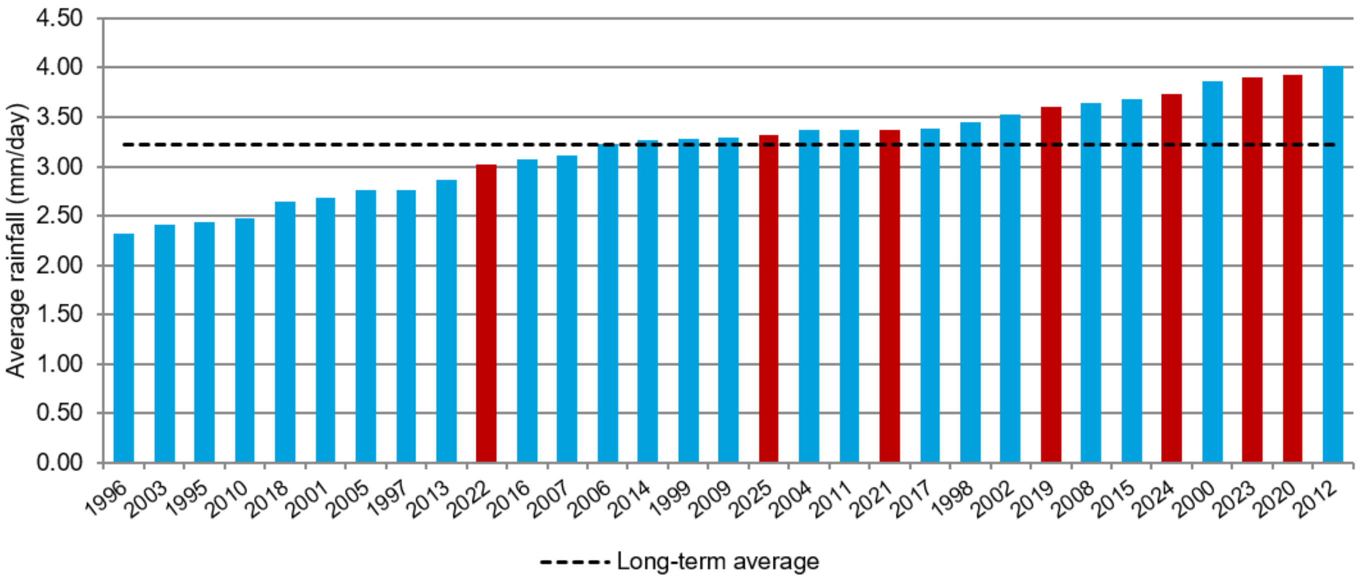
DWF reflects the volume of wastewater arriving at the treatment works under dry weather conditions and is influenced by a range of external factors. One of the most significant variables outside management control is rainfall. DWF is intended to represent flow under dry-weather conditions, and performance is assessed statistically using ranked daily measured flows. In wetter periods, rainfall-derived inflow, elevated groundwater infiltration and the time taken for the sewer catchment to drain down can increase flows during and after rainfall. Where there are insufficient dry, fully drained-down periods, these effects can raise the lower end of the annual flow distribution and therefore the assessed Q80/Q90.

Some exceedance may consequently reflect the rainfall conditions and data window assessed, rather than reflect a sustained increase in underlying dry weather flow or growth-related demand. As stated by Ofwat, there is significant "*sensitivity of the '3-in-5 year' methodology to the data window used, particularly where individual years are unusually dry or wet*."[10]

To assess the potential impact of rainfall on treatment works performance, we compiled long-term rainfall data covering the period 1995 to 2025. All 34 WwTWs sites that form part of the original submission were matched to corresponding rain gauges by proximity using longitude and latitude geospatial data. Based on this, daily rainfall totals were extracted from the Environment Agency rainfall API.[11]

Figure 17 below shows average annual rainfall (mm/day) over the last 30 years, ranked from the driest to the wettest year, based on observations from the rain gauges in close proximity to the 34 UUW WwTWs.

***Figure 17: Average rainfall per year (ranked in ascending order) across the 34 WwTWs***




*Source: UUW analysis of EA's rainfall data*

Notably, 2020, 2023 and 2024 rank among the five wettest years in the sample period. More broadly, all years between 2019 and 2025 (with the exception of 2022) recorded rainfall above the long-term average, reflected by the dashed line.

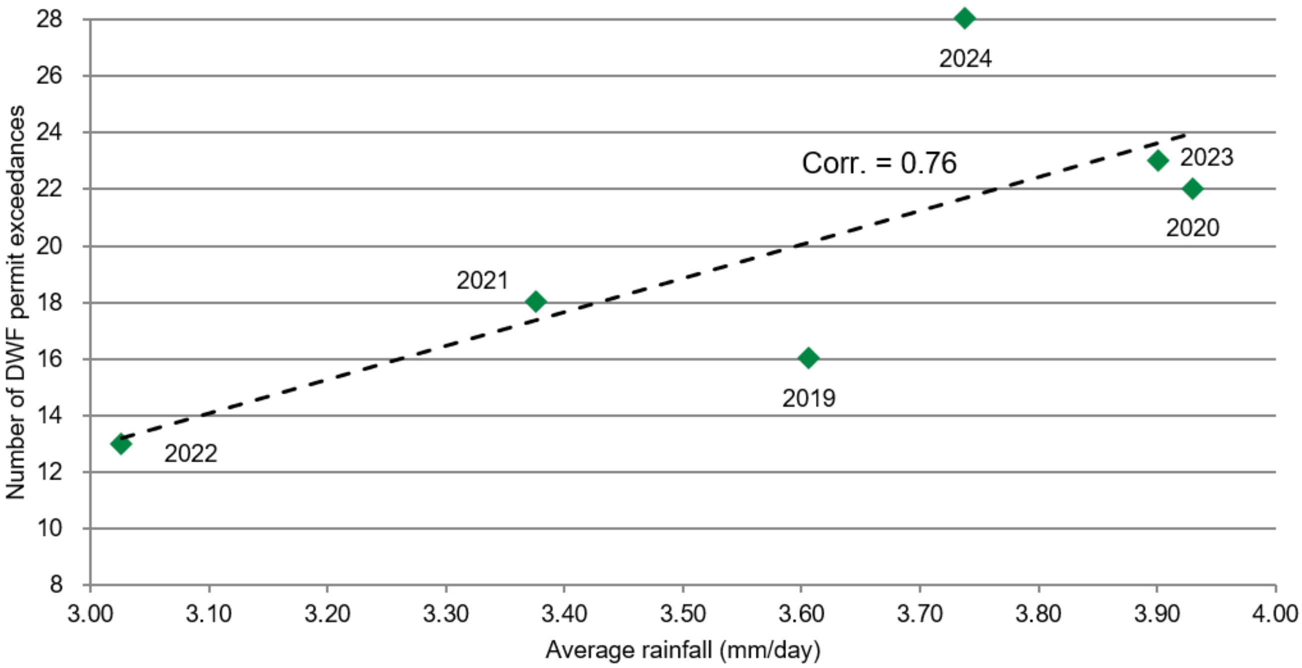
[10] Cost Change Draft Determinations 2026 – Sector Overview, p. 18.

[11] Defra Hydrology Data Explorer

Under Ofwat's current assessment methodology, an adjustment is triggered where permit limits are exceeded in any three years within the assessment period. This creates a risk that sites may fail the "3-in-5 year" test due to permit exceedances occurring during unusually wet years. As mentioned, the assessment period used in the draft determinations (2020–2024) includes three of the five wettest years in the 1995–2025 period. We have investigated whether the DWF performance may therefore have been materially affected by exceptional rainfall conditions rather than underlying operational performance, increasing the likelihood of a DWF adjustment.

Based on the available outputs from Ofwat's CCP "Growth at STWs" model[12], we find that over 70% of all exceedances across submitted sites from all companies occurred during the years 2020, 2023 and 2024. Figure 18 below shows a scatterplot of the number of DWF permit exceedances against average rainfall for years 2019-2024. It exhibits a positive relationship between the two variables – high rainfall years are associated with a higher number of DWF permit exceedances (correlation 0.76).

***Figure 18: Relationship between rainfall and DWF permit exceedances***

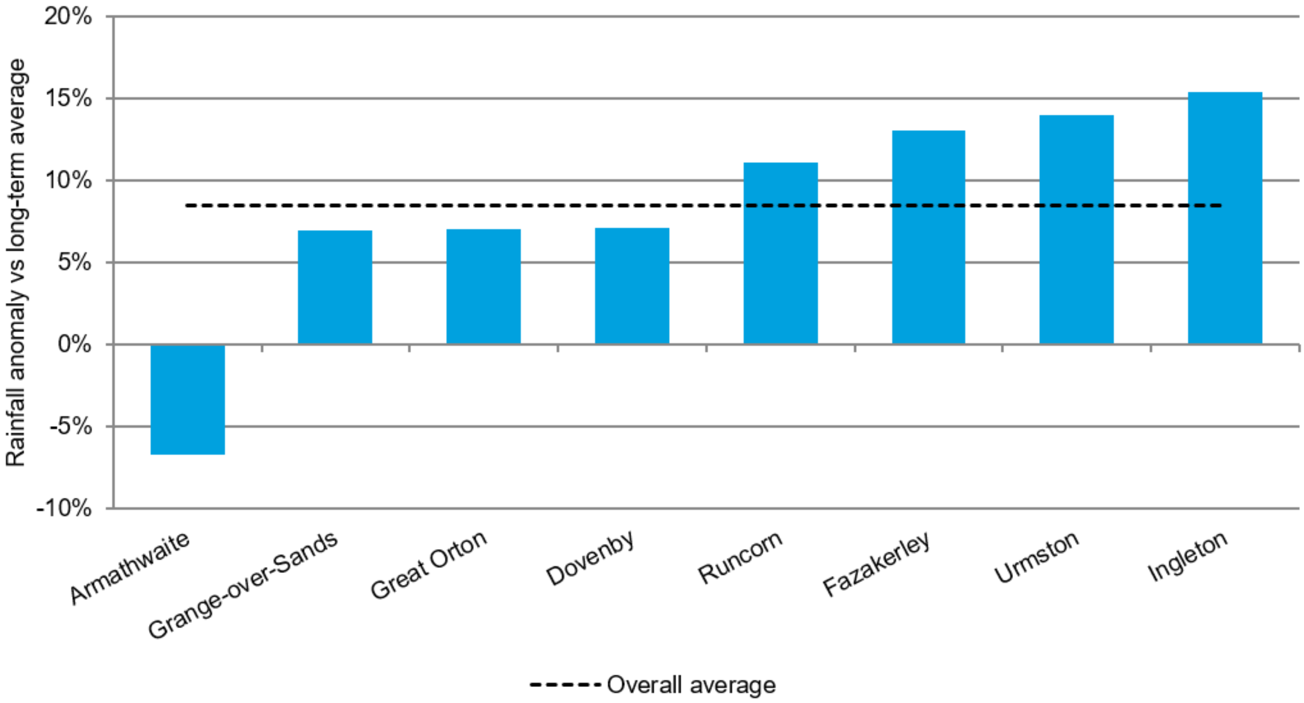



*Source: UUW analysis of EA's rainfall data and Ofwat's "CCPCA 2026 DD Growth at STWs model"*

A similar pattern is observed at site level. Figure 19 below compares average rainfall during 2021–25 against each site's own long-term rainfall average. With the exception of one site, all submitted WwTWs that had a DWF adjustment applied experienced rainfall levels above their historical average during these years. Overall, across the set of submitted sites, average rainfall in 2021–25 was approximately 8% higher than the long-term average, as indicated by the dashed line. This provides further indicative evidence that apparent DWF exceedances might be driven by abnormal weather impacts.

[12] The detailed model can be found on Ofwat websites at the following hyperlink: [Final determinations models - Ofwat]

*Figure 19: Site-level rainfall anomaly: how far 2021–2025 sat above each site's own long-term average*




*Source: UUW analysis of EA's rainfall data*

## B.2 Impact of rainfall on the DWF calculation

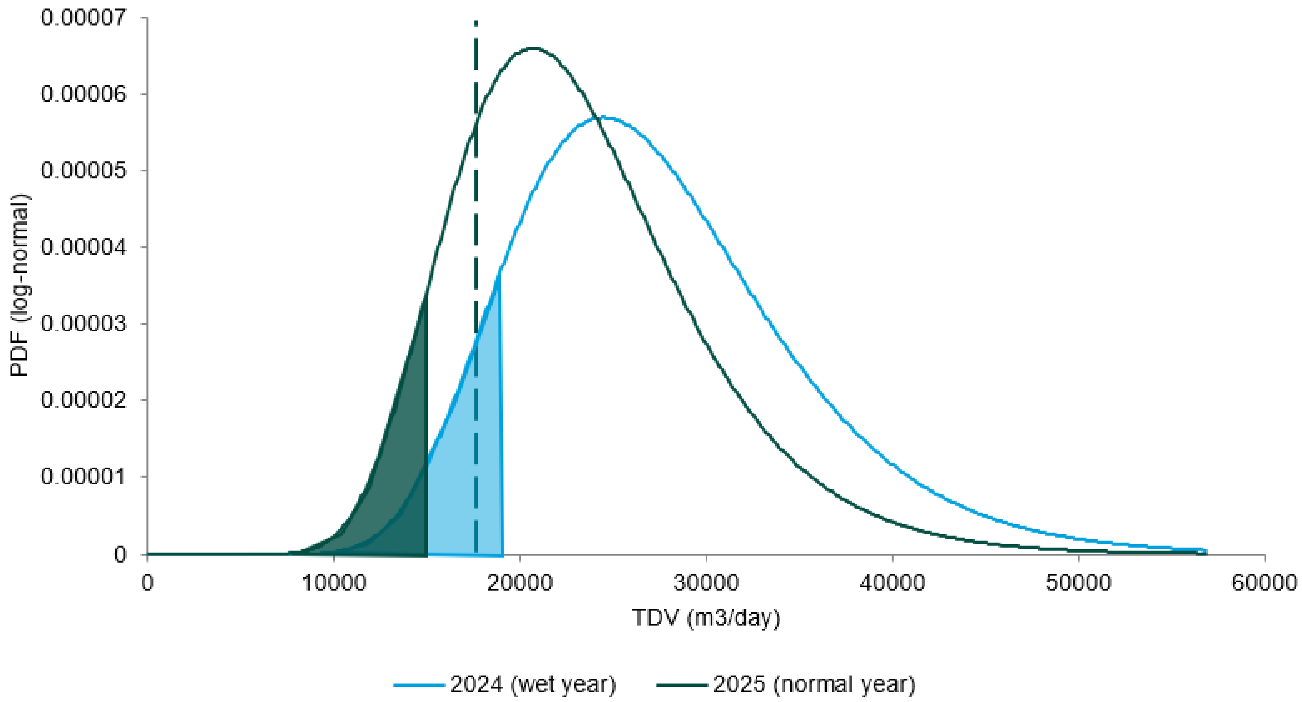
**This section demonstrates that elevated rainfall can affect the full distribution of treatment works flows, meaning that Q90-based DWF assessments remain sensitive to atypically wet weather conditions.**

Under the Q90 approach, the 10th percentile (37th lowest value) of Total Daily Volume (TDV) observations is calculated for each site and compared against the site's DWF permit. The rationale is that the lower tail of the TDV distribution should be representative of performance during relatively "dry" conditions. In effect, the assessment focuses on the smallest 10% of observed TDV values rather than the full distribution.

Therefore, it could be claimed that rainfall predominantly affects the upper tail of the TDV distribution, increasing only the highest flow observations associated with wet weather events, while leaving the lower tail largely unchanged. If this were true, the Q90 methodology would effectively filter out the influence of extreme rainfall and provide a robust measure of dry weather performance.

However, examination of site-level data suggests that rainfall can influence the entire distribution of TDV values rather than only its upper tail. Figure 20 below illustrates this effect using Runcorn WwTWs as an example. The figure plots the probability density functions (PDFs) of TDV for two years, based on log-normal distributions fitted to the observed data: 2025, a relatively typical year in which rainfall was approximately 5% above the long-term average, and 2024, a notably wet year in which rainfall was approximately 36% above the long-term average.

*Figure 20: Distribution of TDV in 'wet' and 'normal' years for Runcorn STW*




*Source: UUW analysis*

The figure shows a clear rightward shift in the entire TDV distribution during the wetter year (shown in blue). The dashed vertical line represents the DWF permit threshold for Runcorn WwTWs, while the shaded areas represent the lowest 10% of observations used to calculate the Q90 metric. In 2025, the Q90 threshold (green shaded area) lies to the left of the permit limit, indicating performance within the DWF permit limit. By contrast, in 2024 the Q90 threshold (blue shaded area) shifts to the right of the permit limit, resulting in an exceedance.

This example demonstrates that elevated rainfall can affect not only extreme flow observations in the upper tail of the distribution but can shift the distribution as a whole. This is important because the Q90 metric is intended to approximate site performance under dry weather conditions by focusing on the lowest 10% of TDV observations. However, when rainfall remains persistently high throughout the year, even these lower-percentile observations may be influenced by wet weather. As a result, the 10th percentile may no longer represent a genuinely dry-weather period, and Q90 can remain sensitive to unusually wet conditions.

## B.3 Econometric estimation of rainfall effects

**This section demonstrates that rainfall has a statistically significant influence on Q90 performance and shows how underlying site performance can be assessed by controlling for atypical weather conditions.**

The above findings highlighting the potential for atypical rainfall conditions to materially affect DWF performance outcomes. To investigate whether this relationship holds at a more granular level, we combined daily rainfall data with measures of TDV (m³/day). This provides a disaggregated view of DWF performance and rainfall impacts on a daily basis across the 34 UUW WwTWs, resulting in a dataset comprising more than 59,000 observations.

To test the robustness of the relationship between rainfall and TDV, we developed an econometric model using data from 2021 to 2025, aligning with the assessment period expected to be available for CCP final determinations. DWF performance is assessed using the Q90 metric, which represents the 10th percentile of TDV observations at each site. Accordingly, we employ a "quantile regression" model, which estimates the conditional quantile of the dependent variable. This approach is more appropriate than a conventional ordinary least squares (OLS) regression, as the latter models the conditional mean. Quantile regression is also less sensitive to non-normal error distributions and outliers than OLS, making it particularly well suited to modelling lower-tail performance measures such as Q90.

*Table 16: Regression outputs*

| *Dependent variable:* **TDV ($m^3$/day)** | **Coefficient** | **t-value (std. err.)** |
|---|---|---|
| *Explanatory variables:* | | |
| Recorded rainfall (mm/day) | **2.51** | **1.76*** **(1.43)** |
| Site-specific dummies | | *Omitted for brevity* |
| Constant | 3205 | 53.4*** (60.02) |
| *Number of observations:* **59,313** | | |
| *Pseudo $R^2$:* **0.5764** | | |
| *Correl. between observed and fitted values:* **0.8576** | | |

*Source: UUW analysis*

The quantile regression uses TDV ($m^3$/day) as the dependent variable and recorded rainfall (mm/day) as the primary explanatory variable. Site-specific dummy variables are included to control for fixed WwTWs characteristics, such as the population served. The outputs from this regression are presented in Table 16. Although parsimonious, this model appears to perform well overall:

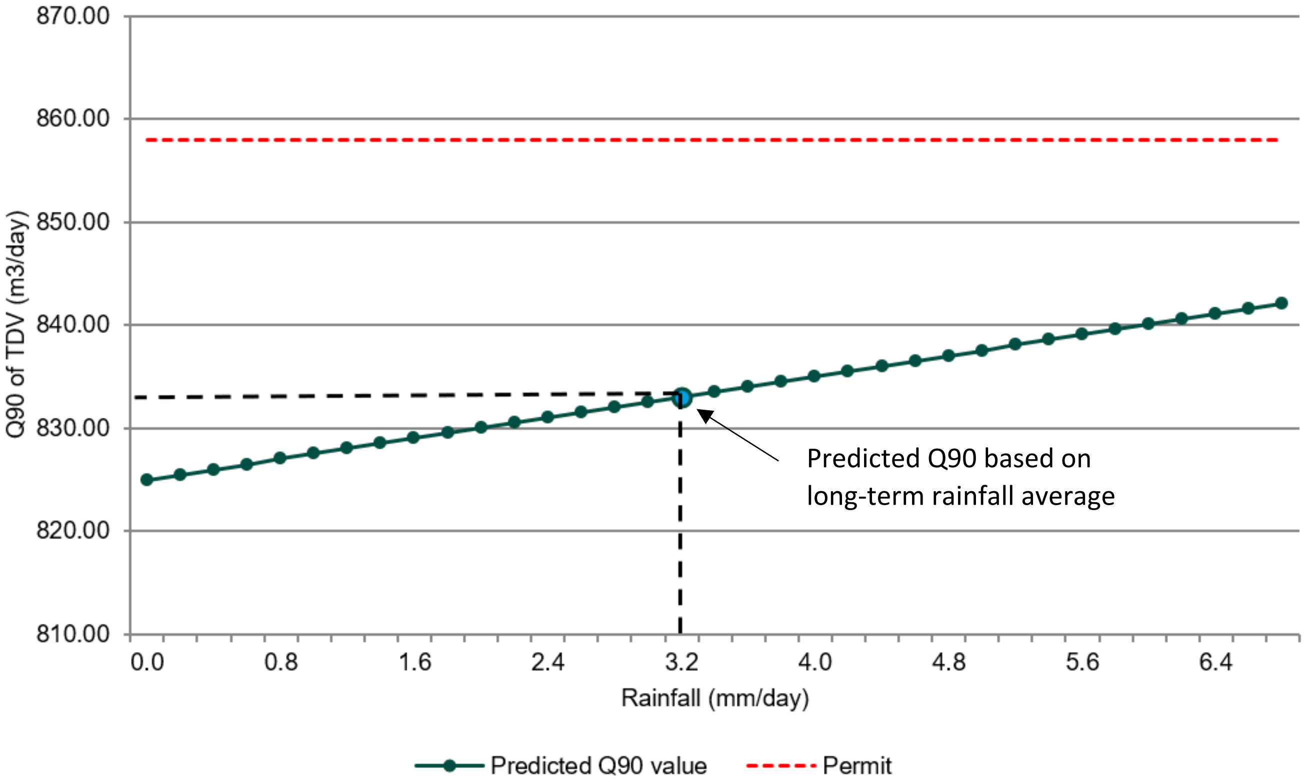
- As expected, rainfall is found to have a positive and statistically significant effect on Q90 performance at the 10% significance level;
- Nearly every site dummy is statistically significant (coefficients and t-values are omitted for brevity);
- The model produces a squared correlation between observed and predicted values of 0.86 (this statistic is the analogue of conventional OLS $R^2$), indicating high explanatory power; and,
- Robustness checks, such as changing the functional form, generally produce similar results (further details provided in Appendix B.4).

These modelling results provide evidence of a statistically significant relationship between Q90 performance and rainfall, even after controlling for site-specific characteristics. In particular, they suggest that rainfall can affect TDV values at the 10th percentile, despite this metric being designed to represent site performance under dry weather conditions. This reinforces the findings in the previous section, indicating that Q90 may remain sensitive to prolonged periods of above-average rainfall.

Importantly, the econometric model can be used to estimate DWF performance under normalised rainfall conditions, allowing the influence of atypical weather to be isolated from underlying site performance. Specifically, the model can be used to predict $10^{th}$ percentile TDV values by applying each site's long-term average rainfall (1995–2025) rather than the rainfall observed during the assessment period. The resulting predicted Q90 value can then be compared against the site's permit level to assess whether it would be compliant under typical rainfall conditions.

Intuitively, where a site has experienced above-average rainfall, substituting long-term average rainfall into the model removes the impact of unusually wet conditions and provides an estimate of underlying DWF performance. This adjustment is symmetrical: where a site has experienced an unusually dry period, the rainfall-normalised estimate may be higher than the observed value.

*Figure 21: Predicted DWF performance for Ingleton WwTWs*




*Source: UUW analysis*

The figure above illustrates the approach using Ingleton WwTW. The green line shows the modelled relationship between rainfall and predicted Q90 performance, while the red dashed line represents the site's permit level. Ingleton's long-term average rainfall is approximately 3.2 mm/day. When this value is applied to the model, the predicted Q90 is 833 $m^3$/day, below the permit threshold of 858 $m^3$/day.

This result indicates that, after controlling for the effects of atypical rainfall, Ingleton's underlying DWF performance is consistent with permit limits. In other words, the observed exceedances during the assessment period appear to be driven by unusually wet conditions rather than a persistent underlying increase in DWF.

The same rainfall-normalisation exercise can be applied across other sites. In some cases, the predicted Q90 may remain above the permit threshold even under average rainfall conditions, indicating a genuine and persistent growth in DWF. This approach therefore provides a more targeted means of identifying sites where intervention is required, while reducing the risk that adjustment decisions are driven by short-term rainfall conditions. Further details of how this can be applied as part of a bespoke DWF adjustment methodology are discussed in section 4.3.4.2.

## B.4 Econometric results – sensitivity checks

**This section provides further technical detail on sensitivity tests applied to our econometric model to check robustness of regression results**

We carried out a range of robustness and sensitivity checks to assess whether the results are sensitive to alternative specifications. We note that several diagnostic tests commonly applied by Ofwat to OLS models (e.g., RESET test) are not directly applicable in their usual form to quantile regression models. Nevertheless, we undertook a number of alternative checks, including:

- Estimating a log-log specification;
- Testing coefficient stability across alternative quantiles (0.10, 0.25, 0.50, 0.75 and 0.90);
- Including lagged rainfall variables to capture potential delayed effects of rainfall on TDV;

- Testing a specification including a squared rainfall term to assess potential non-linearities;
- Removing influential observations identified using Cook's Distance, consistent with Ofwat's PR24 methodology; and
- Excluding the largest site in the sample by TDV (Fazakerley) to test whether results were driven by a single large observation.

The results were broadly consistent across these alternative specifications. In particular, the rainfall coefficient remained positive and of a similar magnitude. The squared rainfall term was not statistically significant, suggesting that a linear functional form provides an appropriate representation of the relationship between rainfall and TDV. Similarly, excluding Cook’s Distance outliers or removing the largest site from the sample did not materially affect the results. A summary of these robustness checks is provided in Table 18.

We acknowledge that the model is intentionally parsimonious and may not capture all of the complex interactions between rainfall and DWF performance. However, the model is transparent, consistent with the underlying relationship, and performs well across a range of diagnostic specifications. It therefore provides a credible basis for generating rainfall-adjusted DWF performance estimates. Specifically, the estimated coefficients can be combined with long-term (1995–2025) rainfall data to derive underlying Q90 performance under “normal” rainfall conditions. We therefore consider this approach appropriate for inclusion within our bespoke DWF adjustment methodology.

***Table 17: Quantile regression outputs from Stata***

| Statistic | Value |
|---|---|
| Raw sum of deviations: | 7.82e+07 (about 63) |
| Min sum of deviations: | 3.31e+07 |
| Number of obs: | 59,313 |
| Pseudo $R^2$: | 0.5764 |
| Correl. between observed and fitted values: | 0.8576 |

| Variable | Coef. | Std. Err. | t-value | P>\|t\| | 95% Conf. Interval | |
|---|---|---|---|---|---|---|
| recorded_rainfall_mm | 2.51316 | 1.426232 | 1.76 | 0.078 | -0.2822599 | 5.30858 |
| ARMATHWAITE | -3173 | 84.76401 | -37.43 | 0.000 | -3339.138 | -3006.862 |
| BROUGH | -2987.355 | 84.9184 | -35.18 | 0.000 | -3153.796 | -2820.915 |
| BURSCOUGH | 3848.392 | 84.71989 | 45.42 | 0.000 | 3682.341 | 4014.443 |
| CALDBECK (FRIARS ROW) | -3118 | 84.86325 | -36.74 | 0.000 | -3284.332 | -2951.668 |
| CARNFORTH | 1570.874 | 84.74815 | 18.54 | 0.000 | 1404.767 | 1736.98 |
| CASTLE CARROCK (GREEN WELL) | -3129 | 85.10819 | -36.76 | 0.000 | -3295.812 | -2962.188 |
| DOVENBY | -3131.518 | 85.23098 | -36.74 | 0.000 | -3298.571 | -2964.465 |
| DUNHAM MASSEY | -124.7791 | 84.88115 | -1.47 | 0.142 | -291.1465 | 41.58832 |
| FAZAKERLEY | 37170 | 84.7193 | 438.74 | 0.000 | 37003.95 | 37336.05 |
| FLETCHERTOWN | -3131 | 84.77354 | -36.93 | 0.000 | -3297.156 | -2964.844 |
| GARSTANG | 182 | 84.77425 | 2.15 | 0.032 | 15.84213 | 348.1579 |
| GLENRIDDING WWTW | -3165 | 85.0981 | -37.19 | 0.000 | -3331.793 | -2998.207 |
| GRANGE IN BORROWDALE | -3157.782 | 85.74427 | -36.83 | 0.000 | -3325.841 | -2989.723 |

| Statistic | Value | | | | | |
|---|---|---|---|---|---|---|
| GRANGE-OVER-SANDS | 142.9842 | 84.96519 | 1.68 | 0.092 | -23.54791 | 309.5163 |
| GREAT ORTON | -3156.503 | 84.71669 | -37.26 | 0.000 | -3322.548 | -2990.458 |
| INGLETON | -2380 | 86.4377 | -27.53 | 0.000 | -2549.418 | -2210.582 |
| LITTLE BUDWORTH SOUTH | -3175.452 | 95.32122 | -33.31 | 0.000 | -3362.282 | -2988.622 |
| LITTLE CLIFTON | -3069 | 84.72361 | -36.22 | 0.000 | -3235.059 | -2902.941 |
| MOSSLEY (MANCHESTER ROAD) | 435.9947 | 84.75742 | 5.14 | 0.000 | 269.8698 | 602.1196 |
| MOTHERBY | -3133 | 84.73492 | -36.97 | 0.000 | -3299.081 | -2966.919 |
| NEWBIGGIN (COAST ROAD) | -2570.231 | 84.72665 | -30.34 | 0.000 | -2736.296 | -2404.167 |
| OLDHAM | 51341.99 | 84.72099 | 606.01 | 0.000 | 51175.94 | 51508.05 |
| RAVENGLASS | -3040 | 86.25907 | -35.24 | 0.000 | -3209.068 | -2870.932 |
| ROCHDALE | 55005 | 85.41747 | 643.95 | 0.000 | 54837.58 | 55172.42 |
| ROCKCLIFFE | -3168 | 92.5014 | -34.25 | 0.000 | -3349.303 | -2986.697 |
| RUNCORN (WARRINGTON ROAD) | 14830 | 84.7228 | 175.04 | 0.000 | 14663.94 | 14996.06 |
| SILECROFT (WHICHAM) | -3207.261 | 86.3815 | -37.13 | 0.000 | -3376.569 | -3037.953 |
| SOCKBRIDGE | -3154 | 85.32632 | -36.96 | 0.000 | -3321.24 | -2986.76 |
| STRINES | -3067.301 | 85.67542 | -35.80 | 0.000 | -3235.225 | -2899.376 |
| URMSTON | 4529 | 84.7993 | 53.41 | 0.000 | 4362.793 | 4695.207 |
| WADDINGTON (TWITTER LANE) | -3022 | 84.74729 | -35.66 | 0.000 | -3188.105 | -2855.895 |
| WARRINGTON NORTH | 56600.49 | 84.7228 | 668.07 | 0.000 | 56434.43 | 56766.54 |
| WRAY (KILN LANE) | -3161.213 | 101.7615 | -31.06 | 0.000 | -3360.666 | -2961.761 |
| _cons | 3205 | 60.0157 | 53.40 | 0.000 | 3087.369 | 3322.631 |

*Source: UUW analysis*

***Table 18: Sensitivity analysis summary***

| Scenario | Is the primary rainfall variable coefficient positive? | Is the primary rainfall variable statistically significant (at 10%) | p-value of primary rainfall variable |
|---|---|---|---|
| Original specification (10th percentile, level-level) | Yes | Yes | 0.08 |
| Log-log specification | Yes | Yes | 0.00 |
| 25th quantile (level-level) | Yes | Yes | 0.00 |
| 50th quantile (level-level) | Yes | Yes | 0.00 |
| 75th quantile (level-level) | Yes | Yes | 0.00 |
| 90th quantile (level-level) | Yes | Yes | 0.00 |

| Scenario | Is the primary rainfall variable coefficient positive? | Is the primary rainfall variable statistically significant (at 10%) | p-value of primary rainfall variable |
|---|---|---|---|
| 25th quantile (log-log) | Yes | Yes | 0.00 |
| 50th quantile (log-log) | Yes | Yes | 0.00 |
| 75th quantile (log-log) | Yes | Yes | 0.00 |
| 90th quantile (log-log) | Yes | Yes | 0.00 |
| Rainfall lag included | Yes | Only lagged variable significant | 0.19 (non-lagged) |
| Squared rainfall included | Yes | Squared term not significant | 0.05 (non-squared) |
| Cook's distance outliers removed | Yes | Yes | 0.00 |
| Largest site removed | Yes | Yes | 0.06 |

*Source: UUW analysis*

# Appendix C Scope of solutions at Sale WwTW

As set out in section 4.2.2, we are proposing to add Sale into our submission. This will enable us to achieve efficiencies in delivery, by combining the delivery of existing AMP8 WINEP drivers with the growth driver, which would otherwise be delivered separately in AMP9. We presented Figure 8 in section 4.2.2, which demonstrated our proposed solution is cost efficient relative to separate delivery across AMPs. This appendix presents the numbers that underpinned the graph.

Note that the cost estimates presented below reflect the total cost of delivering the Sale scheme, including combined delivery of the sanitary parameters, storm overflow and growth drivers. We have already received funding for the sanitary parameters and storm overflow drivers at PR24. For clarity, we are in no way seeking anything beyond our PR24 Final Determination for these drivers. This submission only reflects the growth driver. We accept Ofwat's modelled allowance and wider cost assessment approach including any DWF adjustments.

We present the total cost of the scheme because this demonstrates the overall efficiencies we expect from combined delivery. Ofwat will not be able to reconcile the cost estimates set out below with information it has previously seen (e.g. at PR24) because they reflect the new proposed delivery approach at Sale i.e. the combined delivery of three separate drivers.

Ofwat will note that there is a gap between these estimates and the aggregated allowances for sanitary parameters, storm overflow (as in our PR24 FD) and growth drivers (as per its cost change methodology). We acknowledge there is an ongoing efficiency challenge at Sale. However, we intend to address this during delivery of the scheme. We are not seeking an allowance above that reflected by Ofwat's cost assessment approach. Our proposal is intended to maximise long-term delivery efficiencies at Sale, while aligning with Ofwat's modelled benchmarks to ensure customers are fully protected.

## C.1 Total costs of unadjusted delivery trajectory

Should Ofwat reject our proposal to add Sale to the cost change process, we would deliver the sanitary and storm overflow schemes in AMP8 and return to the site in AMP9 to deliver the growth driver. This section sets out the costs of doing this.

***Table 19: Cost breakdown of the existing scheme to be delivered during AMP8***

| Scope item | Total cost (£) |
|---|---|
| Conversion of a storm tank to a PST | [✂] |
| Provision of storm water storage | [✂] |
| Provision of one additional FST | [✂] |
| Minor modifications to the existing ASP | [✂] |
| Other/enabling scope | [✂] |
| **TOTAL** | **67,094,769** |

*Source: UUW estimates*

***Table 20: Cost breakdown of the 'growth' element of the scheme to be delivered during AMP9***

| Scope item | Total cost (£) |
|---|---|
| Provision of an additional ASP | [✂] |
| Provision of two additional FSTs and modification to existing pipework arrangement | [✂] |
| Other/enabling scope | [✂] |
| **TOTAL** | **42,915,074** |

*Source: UUW estimates*

The combined cost of the solution if the existing AMP8 scheme (Table 19) and 'growth' scheme (Table 20) are delivered as standalone projects is £110,009,843.

## C.2 Option 1 costs

*Table 21: Cost breakdown of the Option 1 scheme to be delivered during AMP8*

| Scope item | Total cost (£) |
|---|---|
| Conversion of a storm tank to a PST | [✂ ] |
| Provision of storm water storage | [✂ ] |
| Provision of three additional FSTs | [✂ ] |
| Provision of a side-stream ASP | [✂ ] |
| Other/enabling scope | [✂ ] |
| **TOTAL** | **89,579,162** |

*Source: UUW estimates*

## C.3 Option 2 costs

*Table 22: Cost breakdown of the Option 2 scheme to be delivered during AMP8*

| Scope item | Total cost (£) |
|---|---|
| Conversion of a storm tank to a PST | [✂ ] |
| Provision of storm water storage | [✂ ] |
| Provision of an MBR | [✂ ] |
| Other/enabling scope | [✂ ] |
| **TOTAL** | **81,713,815** |

*Source: UUW estimates*

**United Utilities Water Limited**
Haweswater House
Lingley Mere Business Park
Lingley Green Avenue
Great Sankey
Warrington
WA5 3LP

unitedutilities.com

Water for the North West