SRN-DDR-044: WINEP – Storm Overflows

Enhancement Cost Evidence Case

28th August 2024

Version 1.0

from Southern Water

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1. Executive Summary

This document sets out our response to Ofwat's Draft Determination on Storm Overflows. The investment in storm overflows is a considerable element of our Business Plan for AMP8.

Our October 2023 business plan submission was affordable and deliverable but did not fully reflect EA WINEP requirements due to our proposed extended timetable for delivery of greener sustainable options. Discussions with Defra, Ofwat and the EA concluded in February 2024 and resulted in us having a substantially different storm overflow programme for AMP8.

Our new programme includes 297 overflows – 118 more than in October 2023 – with 4 to be completed by March 2027, 50 by June 2027, 129 by March 2030 and 114 that need to start in 2028 to meet the Defra targets by March 2035.

We submitted a revised set of data tables in February 2024 to reflect the conversations held with Defra, Ofwat and the EA on the scope of the storm overflow programme for AMP8. The revised data tables were necessary to ensure we have a compliant storm overflows programme (for both the WINEP and Defra's Storm Overflow Discharge Reduction Plan (SODRP).

Ofwat's Draft Determination of our February plan reduced our submitted costs by 6%, with this delta being driven largely by the allowance set by the current modelled approach. Within this report we respond to:

(a) Ofwat's proposed method of modelling an allowance,
(b) the factors we have concluded are driving the reduction applied to our programme, and
(c) our view of the extent this is being influenced by the modelling of grey storage with 'effective' storage provided by green solutions such as SuDS and Source Surface Water Separation in aggregation.

We propose Ofwat replicates the approach it has taken when deep-diving outliers, and models the storage provided via these solution types in isolation to allow fair assessment of efficiency.

Since our draft unassured submission in February 2024, we have continued to develop our knowledge and understanding of the effectiveness of solutions to reduce spills from storm overflows, how to deliver them efficiently and their cost. The main changes since February 2024 are:

(a) Further information from our Pathfinder projects to support the scale of effective storage to achieve the reductions in discharges from storm overflows to meet the Defra SODRP targets.
(b) Additional cost modelling for our programme based on the necessary changes in scope of work to deliver effective cost-efficient solutions.
(c) Completion of an initial draft Shellfish Water investigation for Portsmouth Harbour.
(d) Early contractor engagement on large capital solutions to deliver the programme of work on bathing waters and shellfish waters to achieve the 2027 regulatory dates and the need for upsizing solutions to hit the 2027 date first time and on time.

Our changes since February 2024 and our resulting storm overflows programme signifies a considerable investment into storm overflows. It will meet all the Defra SODRP targets and aligns with the version of the WINEP provided by the EA on 5 July 2024. Our programme now also meets the timetable set by the EA for the Water Framework Directive regulations requirements. But it remains a challenging programme in terms of affordability and deliverability.

This report sets out our new plan, with the new scope of works and new costs. It is compliant with the WINEP issued by the EA on 5 July 2024. We have challenged the efficiency of delivery of this plan and reduced our costs accordingly. We have stated, and continue to state, the significant challenges for the affordability and delivery of this plan. We have identified overflows for our core plan and those in an extended plan, and how the delivery mechanisms can be applied for storm overflows. The revised costs of our new storm overflow plan are discussed in this document and are summarised in Table 1.

Table 1: Summary of Costs for our Storm Overflow Action Plan for PR24

Component	Unit measure	October 2023 Plan			February 24 Plan				Revised Plan for Draft Determination Response			
		No. of o'flows	AMP8 Totex (£m)	Market Base Delivery (£m)	Unit	No. of o'flows	AMP8 Totex (£m)	Market Base Delivery (£m)	Unit	No. of o'flows	AMP8 Totex (£m)	Market Base Delivery (£m)
Increase flow to full treatment	£ / annual m^3 additional treatment	138	27.2			172	21.6		-	-	-	-
Grey Storage (Non-Infra)	m3	47	111.0		53,900m^3	64	131.5		67,209m^3	65	259.5	-
Grey Storage (Infra)	£ / m^3 storage	99	110.3		76,025m^3	142	179.9		79,959 m^3	141	272.7	-
Lining / Sealing	km	33	51.8			021	35.2	-	227km	37	78.1	-
New / Upgraded Screens	£/screen	127	8.0		-		15.9	-	-	216	17.6	-
Sustainable drainage / attenuation in the network	m^3 (Equivalent)	126	33.6	124.4	54,778m^3	156	24.3	122.0	79,023 m^3	156	71.5	152.0
Surface Water Separation	m^3 (Equivalent)	126	22.4	82.9	36,519m^3	156	16.2	81.3	52,682 m^3	156	47.5	101.4
Discharge relocation at Budds Farm	No.	1	5.7		-	1	6.6		-	1	12.0	-
Wetlands	£ /m2	32		80.0	352,529 m^2	36		45.7	378,870m^2	36	120.3	-
TOTAL			370.1	287.3			£431.2	£249.0			£879.1	£253.4

2. Background

We submitted our Storm Overflow Action Plan (SOAP) for AMP8 on 2nd October 2023 as part of the PR24 Business Plan submission. Our plan for storm overflows was compliant with Defra's Storm Overflow Discharge Reduction Plan (SODRP) targets and it was deliverable and affordable. Our proposals for storm overflows to meet Government and customer expectations are set out in our Enhancement Business Case on storm overflows SRN40 WINEP Storm Overflows.

Our October plan phased actions over 7 years, not 5, to enable us to promote and deliver green solutions and follow up with grey options if required to meet the Defra spill targets before the required target dates. The phasing of work over a longer period enables us to commence green solutions (such as sustainable drainage schemes - SuDS) early, whilst completing the investigations by 2027 to determine the spill targets, and still have time to implement any additional green options to get down to the spill target. This approach enabled us to deliver a more efficient programme and bring forward an early start in year 4 of AMP8 for high-spilling storm overflows and coastal sites (which need to be delivered by 2035 as a key target in the SODRP). This means we can get our highest spilling overflows into AMP8 to meet Ofwat's expectations to maximise the reduction of spills in AMP8, and also because our customer expressed the need to focus on reducing spills into the sea.

Our proposals for phasing delivery of storm overflows over AMP8 and into AMP9 were not compliant with the EA requirements set out in the WINEP guidance on storm overflows and shellfish waters, so our phased plan was rejected. Our revised plan has been developed through extensive engagement with Defra, Ofwat and the EA between October 2023 and February 2024. We now have a storm overflow programme that is fully compliant with the EA WINEP issued on 5 July 2024. The significant risks on the affordability and deliverability of the plan remain.

Defra published a revised SODRP on 25 September 2023 just prior to submission of our October 2023 business plan. We have updated our SOAP to align with the revised SODRP requirements. We have also continued discussions with Defra, Ofwat and the EA on the specific requirements for storm overflows under the Water Framework Directive regulations, especially to clarify requirements for shellfish waters, Urban Wastewater Treatment Regulations and investigations.

The number of overflows in our PR24 Business Plan for AMP8 has increased from 179 to 297.
There are an additional 118 overflows in our revised storm overflow programme for AMP8. Of the 297, 182 are to meet requirements under the Water Framework Directive regulations to prevent deterioration of shellfish and bathing waters by 2027, and to contribute towards achieving good ecological status by 2030.

A major requirement from the EA, and change to our submitted plan, was the need to bring forward 24 overflows discharging to Portsmouth and Langstone Harbour shellfish waters from AMP9 into AMP8. The EA requires all 39 overflows in Portsmouth Harbour to have a completion date of June 2027, and the 8 overflows in Langstone Harbour to be completed by March 2030. The 24 overflows already meet the SODRP targets so were not originally considered a requirement for AMP8 as the need for action on these overflows is unknown – hence the solutions and costs could not be substantiated in our business plan. However, they need to be considered with other overflows as an aggregation across each harbour to determine how to meet the shellfish requirements set by the EA and Food Standards Agency for the human consumption of shellfish. An investigation is required for the shellfish waters in both Harbours to assess the spills as an agglomeration to determine the spill target for each overflow. We had proposed to undertake these investigations in AMP8 by 2027, then plan for and complete any additional spill reduction work in AMP9 once the targets are known. Ofwat asked us in January 2024 to accelerate the Shellfish Investigation for Portsmouth Harbour to inform our Draft Determination response. We completed this early accelerated investigation in June 2024 and have used it to inform our current storm overflow programme. The findings are presented in this document. The resulting investment needed to address spills in Portsmouth Harbour is at least £185m which needs to be delivered by 30 June 2027.

Another change resulted from the Environment Agency September 2023 update of the river basin management planning data. This increased the number of overflows the EA considers as ‘probable’ or ‘confirmed’ to be causing harm, and which needed to be included in PR24 WINEP, from 52 to 85.

The full list of changes to the scope of our programme are:

a) Revisions in line with the amended definition of high priority sites in the revised SODRP.
b) Inclusion of improvements for storm overflows discharging to priority shellfish waters to meet the shellfish water requirements relating to the aggregation of significant spills by 2027.
c) Phasing of improvements for non-priority shellfish waters (in line with revised guidance from the EA).
d) Inclusion of overflows which are considered by the EA to be a reason for not achieving Good Ecological Status (confirmed or probable).
e) Consideration of the UWWTR and Storm Overflow Assessment Framework (SOAF).
f) Changes to the requirements for investigations for discharges to shellfish waters
g) Regulatory risks associated with network wetlands.
h) Lessons learned from the Pathfinder projects delivered by the Clean Rivers and Seas team.
i) Outcomes from our initial Shellfish Investigation for Portsmouth Harbour.

Our resulting storm overflow programme will reduce spills to meet:

(i) the Defra targets in the SODRP for 2035,
(ii) the EA targets for Water Framework Regulations, including Shellfish Waters,
(iii) Ofwat’s requirement to make a rapid reduction in spills
(iv) Our customers’ (and our) priority to reduce high-spilling overflows and spills into bathing waters.

3. Introduction

The purpose of this document is to respond to Ofwat's Draft Determination on storm overflows and set out our position on scope, timing and costs for our storm overflows programme for AMP8 for Ofwat's consideration in its Final Determination.

Our proposals for storm overflows have continued to evolve since we submitted our business plan to Ofwat in October 2023. Our October 2023 business plan was an affordable and deliverable plan that delivered improvements to storm overflows to meet Defra's Storm Overflow Discharge Reduction Plan (SODRP) targets. In our Enhancement Business Case on storm overflows (SRN40 WINEP Storm Overflows) we proposed delivery over a 7-year period, not 5, to promote and deliver lasting green and sustainable solutions. The extended timeline was not acceptable from a regulatory perspective due to the timetable set by the EA in the WINEP guidance and the dates in the WINEP issued on 3 July 2023.

We provided a separate set of draft data tables to Ofwat in February 2024 showing our understanding of the full Defra, Ofwat and EA requirements for storm overflows in the PR24 WINEP. The final version of the WINEP was issued by the EA to us on 5 July 2024. We have now updated our programme and costs and our response to the Draft Determination now reflects this version of the WINEP.

Since our February 2024 submission, we have continued to actively explore, test and trial innovative solutions to tackle storm overflows, to build upon our work over the last two years. In 2022, we applied to Ofwat for Accelerated Funding for our Pathfinder programme being delivered by our Clean Rivers and Seas task force. The Pathfinder projects have provided valuable information on the optimum approach (including what works and what doesn't work) and costs for achieving the Defra targets for storm overflows, especially over the last 10 months as more work on the ground has been completed. These Pathfinder projects were funded by the Accelerated Funding approved by Ofwat for AMP8 investment to be brought forward into AMP7. A condition from Ofwat was to ensure the lessons from the Pathfinder programme were captured, shared and built into the Price Review process. The findings from the Pathfinder projects are explained in this report and how we have built them into our revised storm overflow plan and costs for AMP8. These Pathfinder projects have provided an understanding of solution effectiveness and associated costs to validate cost estimation techniques used in developing our Business Plan. The two key findings are that:

I. increasing grey storage at Wastewater Treatment Works (WwTW) in many cases is only effective up to a point. Beyond this point increasing storage is not an effective solution. This is because the capacity of the works means the storage cannot be emptied in time before the next storm arrives. So, increasing capacity beyond a defined point means the capacity of the treatment works would also need to be increased or the storm tank would hold untreated wastewater all winter. We have therefore changed our approach to increasing flows to full treatment based on this evidence.

II. The storage volumes calculated in our Storm Overflow Action Plan (SOAP) needed to be increased from our top-down modelling to provide certainty we can achieve the Defra target of 10 spills or less. We have found the effective storage needs to be the equivalent of 16mm of rainfall, and not 12mm as used in our original plan. This is evidenced through the Pathfinder project case studies provided in this document.

The above findings from our Pathfinder programme mean we have increased the quantity of green effective storage in our revised plan for the overflows to be delivered by 2030 and 2035, with more of the storage requirements being delivered through sustainable drainage systems (SuDS).

Our experience, learning and evidence from the Accelerated Funding work on storm overflows in AMP7 has enabled us to develop a more robust business case for storm overflows in AMP8 and into AMP9. We have engaged closely with Defra, Ofwat and the EA to find a deliverable and affordable programme, and we have fast-tracked a key investigation into Portsmouth Harbour. This preliminary investigation has informed our revised storm overflows plan for Portsmouth Harbour, including the optimum solutions for delivering over 95,000m3 of effective storage (equivalent to 38 Olympic sized swimming pools) by June 2027. We have shared this report with the EA and are currently working on further analysis as requested by them.

Our storm overflows plan for PR24 remains a challenging programme in terms of affordability and deliverability. The specific challenge is where no deterioration requirements are driving the need for work to be completed by 31 March 2027 for bathing waters and by 30 June 2027 for shellfish waters. Four storm overflows discharging to bathing waters will need improvement by 31 March 2027 and 50 for shellfish waters by 30 June 2027. The total cost of the works to improve the 54 overflows (including Portsmouth Harbour) will be in the order of £500m. The work requires the construction of a large storage and conveyance tunnel (super sewer) in Portsmouth Harbour, new rising mains, wetlands and storage. The issues for our delivery programme for 2027 are discussed in section 4.6.

The tight timelines for these schemes means an increased business risk of non-delivery. We are unable to adopt our preferred managed adaptive approach to implement green solutions, test the effectiveness, deliver more green, test further to ensure spill targets are met, and if not, complete through grey storage solutions. For these overflows we will need to implement both grey storage and SuDS simultaneously to manage the delivery risks. The solutions will need to be scaled up to ensure they deliver the required spill targets from day one in 2027. It will mean a change in the balance between our preferred green options approach, and the need for greater grey solutions. This accelerated construction approach increases our costs, as explained in section 4.6. Delivering over a typical planning, design and construction programme period would be more efficient and cost effective – but it will not deliver the required outputs by June 2027. The case for this fast-tracked delivery approach is set out in this response.

The main Defra SODRP target dates for storm overflows are in 2035 which applies to 100% of bathing waters and 75% of the discharges to high priority sites. The EA requirements in WINEP drive action on overflows that currently meet the Defra targets – there are 72 of these in our AMP8 programme – so we need to include additional overflows to meet the Government's and our customers' broader requirements to reduce spills. We have therefore included an additional 18 coastal overflows and 9 high-spilling overflows in our plan to start in 2028 towards the end of AMP8. These overflows require complex and expensive solutions and can be delivered more efficiently for lower cost over a 7-year period using green solutions. They are not required to meet EA WINEP requirements in AMP8 but must be started in AMP8 to meet the Defra target of March 2035. Another reason for the early start on these is our customers' priorities. They identified reducing high-spilling overflows and those discharging into the sea as a priority during our engagement with them as part of the business planning process. We make the case in this document to add these overflows starting in 2028 to the Delivery Mechanism so we can work with Ofwat to assess the capacity of our supply chain, review costs and approve funding within the AMP. We have included these within this submission and will work with Ofwat to apply the Delivery Mechanism to these overflows. We propose to present a case to Ofwat in 2027 to demonstrate our capacity to deliver this additional work in AMP8.

4. Issues

4.1 Ofwat's Draft Determination - Summary

In Ofwat's Draft Determination, the wastewater enhancement expenditure allowances for storm overflows (2022-23 prices) were given as £705m, a £30m reduction from our submitted allowances of £735m.

Ofwat challenged our proposed storm overflow costs through benchmarking and then applied an efficiency challenge, so customers only pay for the efficient costs and do not overpay. Ofwat's cost benchmarking was not feasible where the range of proposals from companies was too great and there was limited historic information on the cost of delivery (for example green solutions). In these cases, Ofwat applied a deep dive and shallow dive approach.

Ofwat compared the modelled allowances against industry wide benchmarks as well as historical costs incurred by companies in delivering similar storage solutions. Based on data provided by the companies on their historical costs over the past 10 years, for grey network storage the average unit cost per m3 was £2,621 per m3 storage. The average unit cost request for the schemes included in the grey/hybrid network storage model, excluding outliers, was £3,133 per m3 storage. The average unit cost request for the schemes in the grey STW storage model, excluding outliers, was £1,953 per m3.

Where Ofwat completed deep dives into our storm overflow programme, it was satisfied the investment is efficient as "the company provides compelling evidence that an allowance above the benchmark is justified". Ofwat found we "provided additional information highlighting the large amount of efficient separation/green which is not accounted for in the grey/hybrid model. When the scheme is broken into grey and green storage separately and compared to the separate green unit costs and grey storage calculated allowances respectively, it indicates the scheme is costed efficiently".

Ofwat expects all companies to reduce their use of storm overflows and, where appropriate, reduce spills below an annual average of 20 spills per overflow per year from 2025 onwards, without additional expenditure allowances. It will provide extra funding to reduce harm from storm overflows where government targets demonstrably go beyond current permit requirements. This protects customers from paying twice for companies to comply with their existing permit obligations. The funding allowed in AMP8 by Ofwat is to further reduce the use of storm overflows by 35% by 2029-30, compared to 2021-22.

Further details on Ofwat's findings and allowance are discussed in the sections below.

4.2 A Compliant WINEP for Storm Overflows

We submitted our Storm Overflow Action Plan (SOAP) for AMP8 as part of the draft PR24 Business Plan on 2 October 2023. This met the Defra SODRP targets, but not specifically the dates set by the EA to meet its obligations under the Water Framework Directive regulations, notably to address no deterioration requirements for bathing waters and shellfish waters for which the EA set a 30 June 2027 deadline for completion.

Since October we have worked with the EA, Defra and Ofwat to ensure our SOAP for PR24 is fully compliant. The discussions with the EA and changes in EA guidance has meant our final storm overflows programme has evolved to adopt further changes. The changes are set out in this section. Overall, there are now an additional 118 overflows in our programme for AMP8, with:

a) 4 of these overflows to be improved before 31 March 2027
b) 50 by 30 June 2027
c) 129 by 31 March 2030 and
d) 114 by 31 March 2035.

There are also 210 investigations for storm overflows which need to be completed by 31 March 2027.

The revised Defra SODRP published on 25 September 2023 changed the prioritisation of overflows, mainly to include coastal sites such as marine conservation zones and shellfish waters. This increased the number of overflows discharging into high priority sites in our SOAP from 495 to 644 (an increase of 30%).

Defra's SODRP targets required 75% of high priority sites to be improved by 2035 and all overflows discharging to bathing waters. The September 2023 increase in the number of sites designated as high priority meant additional overflows needed to be included in AMP8 to meet Defra's targets.

We have 84 storm overflows that discharge into or within 1 km of shellfish waters. The EA WINEP driver guidance requires these to have an investigation by 2027 and be improved either by 2027 (to prevent deterioration) or by 2030 (to improve ecological status). Discussions with the EA concluded that an EnvAct_INV4 action is not now required for any shellfish water overflows, and that the improvements to overflows discharging to <u>non-priority</u> shellfish waters can be phased to AMP9 (i.e. completion date of 2035 instead of 2030). There are 53 overflows discharging into or within 1 kilometre of non-priority shellfish waters so we have phased these into AMP9 with a late AMP8 start so we can deliver more efficiently over 7 years.

The Portsmouth Harbour Shellfish Water requirement is for all discharges to be improved to meet the shellfish standards set by the EA and the Food Standards Agency for the human consumption of shellfish. This means that any overflows discharging into or within 1 kilometre of the shellfish water are to be improved.

The EA updated the River Basin Management Plan (RBMP) data on Waterbody Classifications and the "reasons for not achieving good (RNAG)" ecological status in September 2023 to incorporate cycle 3 data. This changed the number of overflows flagged as a confirmed or probable RNAGs for intermittent discharge from 52 to 112. This also increased the number of storm overflows in our SOAP.

The EA also provided further clarification on the WINEP in relation to meeting the screening requirements in the Defra SODRP. Screening improvements are only required to achieve the Defra target dates where the overflow is being improved to reduce spills. It has been clarified that overflows where only screening improvements are required are deemed to currently meet the Defra targets and therefore count towards the 2030 and 2035 target dates. We planned overflows with only 'new screen required' as overflows for AMP11 or AMP12 in our programme unless the overflow is on the same site as an overflow to be improved – in which case it was brought forward in the programme to align with the other overflow.

We submitted a response to Ofwat query OFW-OBQ-SRN-205 in February 2024 which included the required changes to our storm overflows programme for AMP8 that were known at the time. The changes are listed above in section 2 as well as any changes resulting from the meetings with Defra, Ofwat and the EA in December 2023 and January 2024. The accompanying data tables were unassured due to the tight timetable for responses, the draft nature of the submission and the ongoing discussions with the EA on the WFD and Shellfish requirements. The numbers and costs for storm overflows have subsequently been updated to incorporate the findings from the Pathfinder projects, further regulatory requirements and the publication of the latest WINEP on 5 July 2024. Our storm overflow plan is in accordance with the agreed actions on the WINEP issued by the EA on 5 July 2024.

The EA (with support from Ofwat and Defra) wrote to water companies on 29 February 2024 to set out the requirement to bring the highest spilling overflows into compliance with the Urban Wastewater Treatment Regulations (UWWTR) as a priority and outline what this now means for the PR24 WINEP. In the same letter, new WINEP driver guidance was issued for any improvements to reduce storm overflow spill frequency to a demonstrated cost beneficial level to meet UWWTR, with a required completion date of 31 March 2028. All overflows previously identified under the EA's Storm Overflow Assessment Framework (SOAF) are already within our SOAP with completion dates agreed with the EA of 2030 (to reduce harm) or 2035 (to reduce number of spills). Of these, none of the overflows have a solution to reduce spills that is cost beneficial under the Best Technical Knowledge Not Entailing Excessive Cost (BTKNEEC) methodology. We provided the EA with our data and analysis of BTKNEEC on 27 June 2024 and provided a further update on 9 August 2024.

Our final SOAP now has 297 overflows in the programme to commence in AMP8. These are grouped by WINEP driver / category in Table 2.

Our storm overflows programme for AMP8 is therefore a fundamentally different programme than our proposed programme in October 2023 and that assessed in the Draft Determination.

Table 2: Overflows by Category in our AMP8 WINEP with Regulatory Date for Completion

Category	No. of Overflows	Regulatory Date
Bathing Water ND	4	30/03/2027
Shellfish Water ND	11	30/06/2027
Portsmouth Harbour Shellfish	39	30/06/2027
Langstone Harbour Shellfish	6	31/03/2030
Shellfish on Priority List - IMP	3	31/03/2030
Urban Pollution Management (UPM)	17	31/03/2030
SOAF Reduce Harm	17	31/03/2030
RNAG confirmed	29	31/03/2030
RNAG probable	56	31/03/2030
Shellfish Waters Not on Priority list	53	31/03/2035
SOAF Reduce Spills	19	31/03/2035
SOAF INV ongoing	7	31/03/2035
High Spillers	9	31/03/2035
Coastal	18	31/03/2035
Brought Forward - Works on same site	1 8	31/03/2030 31/03/2035
TOTAL	**297**	

4.3 Developing the Right Solution Types

Our revised SOAP for AMP8 has a greater focus on green and nature-based solutions. This follows government requirements set out within Defra's revised SODRP published on 25 September 2023. The SODRP specifies the targets which must be met, but also the government's expectations on how water companies respond. Some of the key principles are summarised in Table 3. We have adopted these principles in our revised SOAP.

The focus on green is supported by our customers and enables us to contribute more towards improving the environment, specifically to meet the challenges of Biodiversity Net gain and Ofwat's Biodiversity performance commitment for PR24.

We know that SuDS need to be part of the solution and that they work. We have monitored the performance of our investment in SuDS and asset capital maintenance for our wastewater system in Portsmouth for eight years. We invested in our wastewater system in Portsmouth to increase the resilience of the surface water and combined systems following severe surface water flooding. This investment focused on Eastney Pumping Station and a surface water separation scheme to remove rainwater from the combined system. The scheme became operational in 2015 and removed rainwater inputs to our wastewater systems from around 40 ha of impermeable area in the city. The long-term average spill frequency from the storm overflow at Fort Cumberland has dropped from 32 spills per annum in 2010 to an average of 6.25 spills per annum over the last eight years, see
Figure 1. This is an 80% reduction in spills. The total investment was around £25m-30m and around 40 ha of removal was achieved (around 5% of the total connected area).

Table 3: Defra's revised SODRP, 25 September 2023. Extract from the Key Principles:

- Water companies must remove rainwater from the combined sewer system as part of effectually draining their areas. This should include limiting any new connections of surface water to the combined sewer network, and any new connections should be offset by disconnecting a greater volume of surface water elsewhere within the network.
- We expect water companies to prioritise a natural capital approach, considering carbon reduction and biodiversity net gain, as well as catchment-level and nature-based solutions in their planning.
- Green infrastructure and other nature-based solutions are an effective option to reduce the harm caused by storm overflows and can provide multiple co-benefits for the environment and society.
- We expect companies to operate in partnerships across catchments maximising co-funding and green finance opportunities.
- We are aware that green infrastructure enhancements often have longer delivery timelines than traditional concrete solutions and may therefore be seen as riskier investments by water companies. For that reason, the Environment Agency and Ofwat will work to ensure assessment processes promote and incentivise the use of nature-based solution in favour of more carbon intensive alternatives.
- To promote sustainable solutions, green infrastructure projects started before 2027 and delivered as quickly as possible will count towards completion of the targets, subject to review[1] .
- We expect water companies to consider treatment of sewage discharges as an alternative solution where appropriate.
- We will expect water companies to value rainwater as a resource which benefits people and the environment, and to protect the natural water cycles that maintain biodiversity and full flowing rivers. Rainwater should be managed following these two principles:
    - Rainwater should be treated as a resource to be valued for the benefit of people and the environment, not mixed with sewage or other contaminants.
    - Rainwater should be discharged back to the environment as close as possible to where it lands or channelled to a close watercourse without first mixing it with sewage.
- Water companies should prevent additional rainwater from entering the combined sewer network and remove existing rainwater connections where it is the best value solution.

[1] This statement from DEFRA is not enough to assure Southern Water that simply delivering the green at Portsmouth is sufficient to meet the government's targets as the EA has **not** (despite this policy statement from DEFRA) relaxed its requirement to deliver a WFD ND solution by 2027.

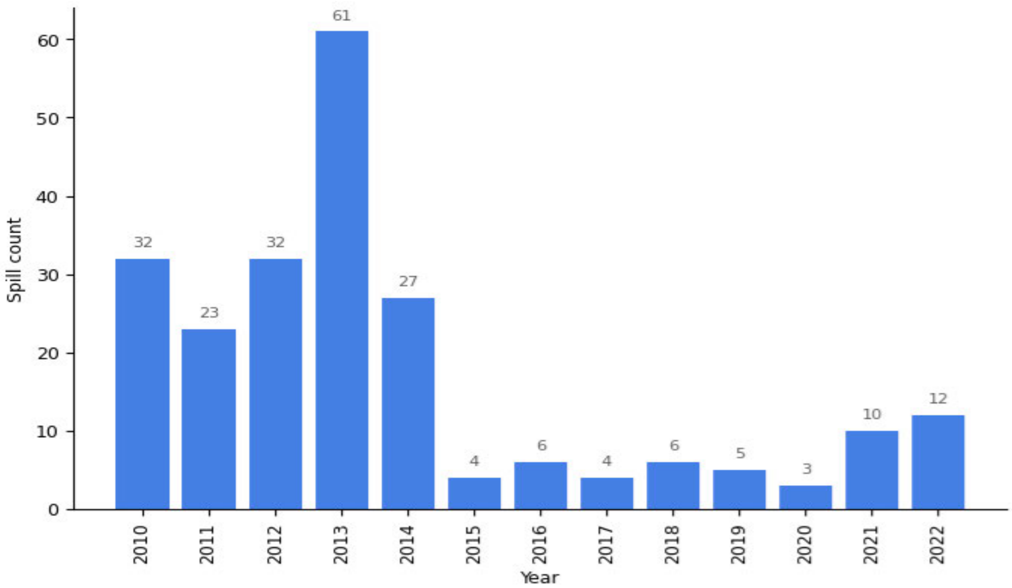


Figure 1: Fort Cumberland Spill Count (2010 – 2022)

4.4 Grey Storage, SuDS and Separation

4.4.1 Responding to the Draft Determination

Ofwat has set an allowance on storage schemes in the network and at wastewater treatment works primarily via an econometric log linear triangulated model, with an upper-quartile efficiency challenge. This effectively set an allowance for our programme which included traditional grey storage paired with effective storage provided from SuDS and separation. £476.7m of our requested programme was assessed via this method, with the model setting an allowance of £437.8m, 92% of our requested funding for the corresponding schemes.

Ofwat identified outliers through Cooks distance analysis and removed these schemes from its model and assessed them via deep dive. This accounted for a further £78.5m of the requested funding for our Storm Overflows programme (when FFT requirements were removed, as these were assessed separately). The Southern Water schemes selected for deep dive were all granted their full allowance, with the justification summarised in

Table 4.

Table 4: Summary of Ofwat's Deep Dive on Storm Overflows

Site Name	AMP8 Totex Requested (minus FFT)	Deep-dive assessment	Justifying Commentary
APPLEY PARK RYDE TRANSFER CEO	3.6	Pass: Ofwat was satisfied that **the investment is efficient.** We provided compelling evidence that an allowance above the benchmark is justified.	The company provided additional information highlighting the large amount of efficient separation/green **which is not accounted for in the grey/hybrid model.** When the scheme is broken into grey and green storage separately and compared to the separate green unit costs and grey storage calculated allowances respectively, it indicates that the scheme is costed efficiently.
BROADSTAIRS CEO	5.9		
FAIRLEE CSO	4.0		
MARINE DRIVE BRIGHTON NO.2 CEO	25.3		
PARK ROAD SOUTHAMPTON CSO	0.8		
QUEENBOROUGH SSO	30.7		
BEXHILL & HASTINGS CSO	6.5		
SANDOWN NEW NO.1 SSO	1.7		

Ofwat has indicated, via its deep dives, that it recognises it is not appropriate to compare against a cost curve projecting efficient costs primarily for grey storage when an individual scheme uses a higher proportion of effective storage provided by green solutions. We recognise and accept this is an appropriate manual intervention from Ofwat, however, we note that for our schemes which have had allowances set via the modelled allowance, in many instances these also rely on effective storage provided by SuDS/separation and have potentially not benefitted from the comparison Ofwat has applied.

All effective storage provided by SuDS/separation is completed in the network, even if it's associated with schemes providing grey storage at a wastewater treatment works. In effect, Ofwat's model is calculating an allowance for these schemes that blends interventions between the network and the STW and projects an appropriate allowance based on costs informed more significantly by industry costs for grey storage at a STW only.

Table 5 shows the individual schemes where the allowances have been set by the model, and the split of grey/green storage compared to our company average. This sample is the 10 sites with the largest delta between our requested costs and their respective modelled allowances. This provides to us an indicative sample of schemes to further assess to understand what could be driving this cost challenge. Some of these sites are Combined Emergency Overflows (CEOs).

Table 5: Ofwat's modelled costs and allowances for storm overflows

Site Name	Modelled Cost	Modelled Allowance	Delta (Allowance – Cost)	% of storage provided from grey solutions	% of effective Storage provided by SuDS / Separation
SWALECLIFFE CSO	16.2	3.1	-13.2	100%	0%
BUDDS FARM HAVANT SE7 CEO	23.3	11.2	-12.2	46%	54%
THORNHAM SSO	14.4	3.7	-10.7	39%	61%
KINGS HALL HERNE BAY CEO	17.5	9.3	-8.2	59%	41%
FAIRPLACE HILL BURGESS HILL CEO	13.7	7.8	-5.8	25%	75%
FAREHAM ROAD GOSPORT OUTSIDE 359 CSO	11.1	6.5	-4.7	56%	54%
PIER ROAD SOUTHSEA CSO	11.5	6.8	-4.6	56%	54%
RATTLE ROAD WESTHAM CEO	8.9	5.1	-3.7	7%	93%
COURT LANE COSHAM SSO	10.1	6.3	-3.7	56%	54%
GROVE ROAD GOSPORT CEO	8.6	5.5	-3.1	56%	54%
Southern Water Sample Site Average				**50%**	**50%**
Southern Water Full Programme Average				**56%**	**44%**
Rest of Industry Average (where Hybrid between Grey / green / other)				**72%**	**28%**

Table 5 demonstrates that these sites (except for Swalecliffe CSO) feature a high proportion of effective storage being provided by SuDS/separation, higher than our full programme averages, and significantly higher than the rest of the industry.

As demonstrated by Ofwat's judgement of outlier schemes, when the explanatory reason for this has been due to the profile of solution costs being weighted towards SuDS/Separation (green storage), deep dives have consistently granted the full allowance. The weighting to green storage applies across our programme. The costs of our grey storage/effective green storage should therefore be compared similarly to ensure a like-for-like consistency and a truer representation of cost efficiency across our programme.

In summary, we consider the rationale which drove acceptance of our costings in the schemes which were subject to deep dives should be adopted across our proposed programme because the whole programme is weighted to green storage.

4.4.2 How we have improved our understanding through delivery

SuDS and Separation

Since our submission, we have trialled SuDS/Separation activity in several catchments with hugely encouraging results. We are projected to reach or exceed our spill targets in all catchments. We forecast we will have delivered £5.53m of activity to reduce spills, by slowing the flow of water into the network and separating it entirely.

Rainwater runoff from the public highway accounts for around 40% of flow in combined sewage systems. Retrofitting SuDS is an effective and sustainable way to disconnect or attenuate large impermeable areas such as highways, driveways and car parks. These solutions need to be carefully targeted to be effective and have considerable community support. There are many examples of how local councils have proactively followed a “grey-to-green” approach for managing rainwater in city centres, such as the example below in Sheffield.

Photo 1: Example of Highways SuDS in Sheffield ©Susdrain.org.uk

However, there are significant barriers to the delivery of SuDS, including resource constraints and due process within local councils. Executive level support and regular board meetings are essential to support progression. Issues such as liability, ownership and maintenance need to be resolved at an early stage.

We have been exploring delivery of highway and roadside SuDS with the highway authorities across our region as an alternative delivery mechanism. The conversations with these authorities to date have been very positive, based on a model where they fund the works from capital reserves and then secure a regular annual income from our customer bills. This approach is not supported by Ofwat for the standard DPC route. We are proposing to use an alternative market mechanism for these schemes which would require Ofwat support for the longer term payments. For the purposes of costing this plan, these costs have been included within the core plan for enhancement.

Opportunistic collaboration and partnership needs to be utilised to combine works, synchronise capital programmes and use every improvement scheme as an opportunity to install SuDS and better manage stormwater.

When designing SuDS to reduce storm overflows, savings can be made by reducing the capacity of the SuDS to cope with smaller rainfall events rather than flooding and by using repeatable designs to suit a range of urban settings. Consideration should always be given to any green area which could be utilised for attenuation.

These on-site trials have a forecast out-turn cost of £5.53m for 9.5 hectares of impermeable area (equating to £58.2 per m^2), providing us with an actual delivery rate which we have incorporated as a component in our build-up of costs when estimating the cost of the AMP8 programme of work.

In our October 2023 submission, we used a unit rate of £46.1 per m^2 of impermeable area when averaged out across our SuDS and Separation programme. Since then, we have completed trials across a selection of our wastewater systems, of varying types and complexity. These catchments delivered portions of SuDS activity at a rate of £56.9 per m^2.

The costs for disconnection of domestic and non-domestic downpipes were found to be higher than estimated, driven primarily by indirect costs such as enabling and the community engagement we required for delivery. This evidence has enabled us to re-evaluate our cost assumptions for this activity, although we have revised the figure down to £53.3 per m^2 by setting additional efficiency targets. We have used this new efficient unit rate for our cost estimates, with higher confidence in their robustness and accuracy.

These trials, alongside improved understanding of the catchments, also triggered a need to revise our assumption of 12mm SuDS sizing within our business planning. This is due to the spatial variability of rainfall within our region, which has been stark. Figure 2 below shows the spatial variation in average annual rainfall across the region and the representative stations used to understand the likely sizing of SuDS required in each area.

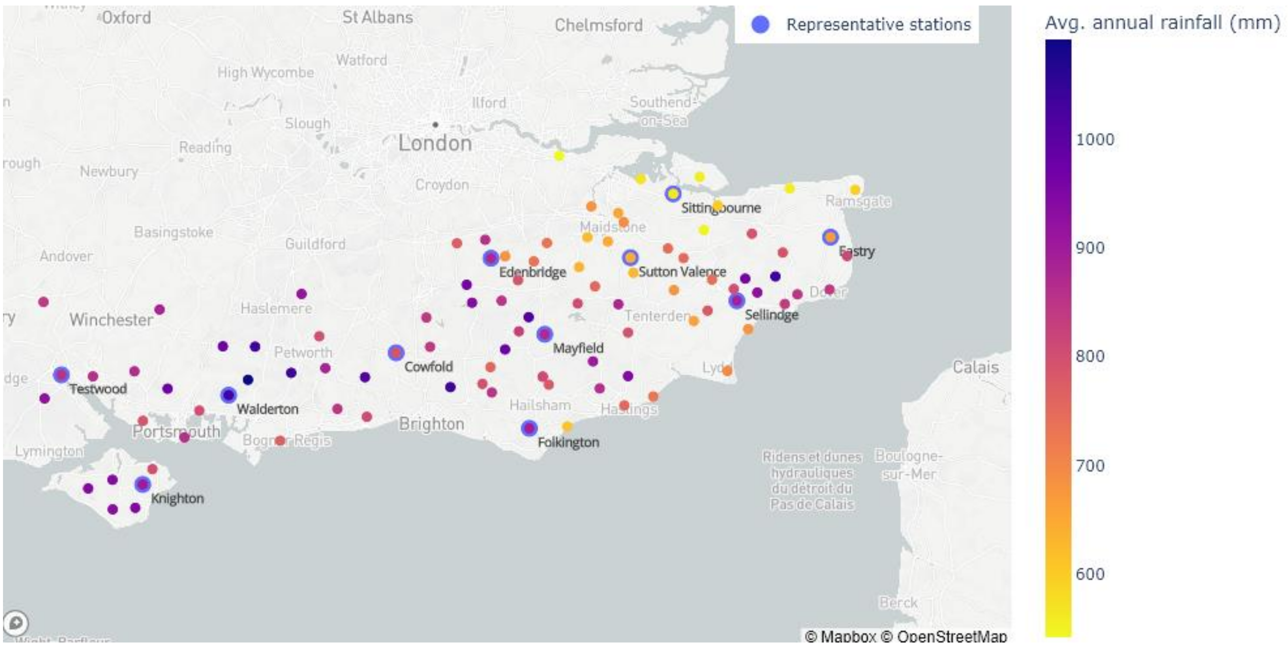


Figure 2: Spatial variability of rainfall within Southern Water region

Further analysis of the 11 datasets in the below graphics shows managing the first 12mm of rainfall would leave spills above 10 in more than 70% of our region. Therefore, the base assumption needs to increase to a level that would bring spill counts down to the target with higher confidence.

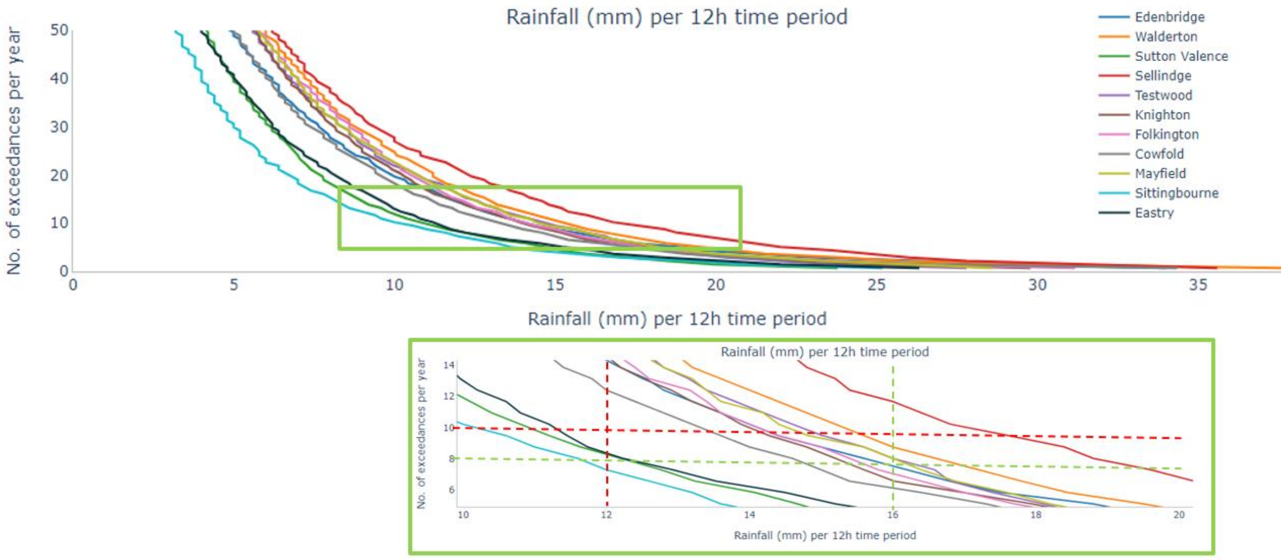


Figure 3: Projected rainfall (mm) per 12h time-period across 11 catchments

These figures demonstrates that, while considering spatial variability, only managing the first 12mm of rainfall will not guarantee achieving a target of 10 spills or less per year. Therefore, SuDS will be sized appropriately for a given catchment to ensure they deliver best value for our customers. The evidence collected to date from our Pathfinder programme clearly shows our solutions need to be designed with 'equivalent storage' to manage the first 16mm of rainfall, not 12mm as previously proposed by the Storm Overflows Evidence Project (SOEP).

Grey storage

Defra's Storm Overflows Evidence project (SOEP) informed the development of the spills policy in the SODRP. The evidence informed the calculation of the volume of water which needs to be captured to ensure the 11th biggest storm per year does not spill, therefore delivering storage to a 10-spill-per-year solution. This calculation also informed the EA's decision to select 10 spills per year as a standard target for spill reduction across the WINEP.

The method presumes the volume of additional storage is fully available at the time of each storm to ensure there is no more than 10 spills per overflow. This means the storage needs to be emptied before the next storm arrives. The weather patterns in the UK mean storm tanks would need to be pumped out very quickly, or the storage volume would need to be increased. The limiting factor is the capacity of the treatment works to process the water in the storm tanks quickly and ensure sequential storm events do not overload the capacity of the storm tanks and lead to spills.

Our Clean Rivers and Seas team has been proactive in AMP7 to best utilise the acceleration funding granted by Ofwat to commence work to reduce discharges from storm overflows and bring down the number of spills as soon as possible. The purpose of this early work in AMP7 was to reduce spills and help optimise solutions to achieve the Defra targets in AMP8 i.e. find out what works, what doesn't and the costs involved.

As part of this project, we provided additional storage at selected wastewater treatment works (WwTW) and monitored the effectiveness of the solutions. The findings from these schemes, which have been completed during the last few months, are presented in case studies in Appendix A. A case study on the practical application of SuDS is also provided in Appendix C.

We completed top-down modelling of the storage requirements, consistent with the SOEP, to make sure the 11th largest storm per year does not spill. However, our experience in practice demonstrates this approach is ineffectual at reducing spills outside infrequent scenarios and therefore the 10 spills per annum target is likely to be exceeded in our area if we plan to only use the top-down model based on only managing the first 12mm of rainfall.

Our findings show that additional storm storage in most municipal wastewater settings will not significantly reduce storm overflows. Only isolated moderate storms will be captured. In most representative catchments, the additional flow is too high, the storm duration is too long, and the storage will not be able to return quickly enough, especially if there is rainfall subsequent to the initial event. Rainfall in the UK often occurs on consecutive days which will quickly exhaust storage.

In addition, for overflows where there is significant prolonged infiltration through groundwater ingress or rainfall induced infiltration, then additional storm storage is ineffective. The evidence suggests that in small ‘flashy’ catchments where incoming flow returns to dry weather conditions quickly, additional storm storage can be effective, but such instances are rare. We have identified the predominant root cause for each of our overflows, but further assessment will be required for each overflow before confirming the optimum solution and effectiveness of storage.

There are also disadvantages to providing additional storage. Where sites have excessive stormwater retention times due to the above factors, stored stormwater can become septic and harm downstream treatment. Storm storage must also be pumped and treated which incurs additional operational expenditure, and the more dilute the wastewater the less effective the biological processes used in treatment.

The capital construction costs associated with building additional grey storm storage are significant, as discussed in section 4.4.3 below, and the sustainability of this option is poor due to expected population growth and climate change. Our Drainage and Wastewater Management Plan (DWMP) sets out our strategy to target long-term sustainable options to tackle the problem of rainwater in sewers at source and keep rainwater out of sewers, to allow more wastewater to stay in.

Our experience from our Pathfinder programme is clear that storage alone will solve only a small percentage of storm overflows. Reducing discharges to 10 or less per annum on average will need more than storage. Storage will need to be combined with other strategies, such as increases in treatment capacity and rainwater separation and attenuation.

The evidence presented from these case studies shows we need to change our design parameters for costing spill reduction for overflows where the root cause is ‘storm;’ i.e. rainwater. Many of these overflows have a preferred option of SuDS and storage. The new revised design parameters are:

(a) The maximum storage volume possible at any site is 0.5 multiplied by the pass forward flow for 12 hours minus the existing onsite storage volume.
(b) The rest of the volume required to achieve the Defra targets needs to be made up by the appropriate amount of impermeable area management through separation using sustainable drainage systems (SuDS).

(c) Sewer sealing works will be required for systems with material infiltration flows and the extent of SuDS adjusted accordingly. The severity of infiltration is assessed and the length of sewer sealing and SuDS adjusted accordingly as follows:

- Severity 1: 10% pipe length sealed, 100% SuDS work required
- Severity 2: 20% pipe length sealed, 90% SuDS work required
- Severity 3: 30% pipe length sealed, 80% SuDS work required
- Severity 4: 40% pipe length sealed, 70% SuDS work required
- Severity 5: 50% pipe length sealed, 60% SuDS work required

For 'storage only' overflows, the costs need to be based on separation, given they are generally the difficult areas with all the sources of water. Our unit cost per hectare separated is applied based on the rainfall amount and hence volume of runoff generated per square metre.

The case studies and resulting changes in our planning assumptions for storm overflow solutions and costings, means the grey component of storage costs for the 297 overflows being improved in AMP8 changes from £311.5m to £293.8m (excluding the large grey schemes or the additional 'SuDS + Storage' to meet the 2027 requirements).

4.4.3 Our latest position on costs and how this compares with the industry.

As highlighted, we have used the results from our onsite trials to revise our cost estimates across the plan to provide a more granular and accurate estimate of funding requirements. This has increased in absolute terms the size of our programme, in particular for storage provided through SuDS and Separation, however our estimated storage provided through these solutions has also increased. It also affects the proportion of effective storage we will need to provide.

To assist Ofwat's assessment of our new costs, we have sought to understand how these changes will impact the modelled allowance and potential outlier schemes subject to deep dive to provide further evidence to support the efficiency of costs in these scenarios. We are unable to predict how other water companies may revise their own costs at Draft Determination, but we are able to input our new costs into the model's Ofwat have used to set the allowances thus far.

We anticipate if Ofwat utilises its Draft Determination models for storage at the Network and the STW at Final Determination, then £894m of our programme will be subject to having an allowance set in this method, however 31 projects with a value £279m had no allowance set due to outlier status.

The most material projects with outlier status are listed below, with explanatory reasons listed for why their costs appear disproportionate to assist with deep dive assessment.

Table 7: Most material outlier projects when assessed against Ofwat models

Site Name	Network / STW	Requested Cost (AMP8 only)	Likely cause of outlier status
KINGS HALL HERNE BAY CEO	Network	84.3	Major site upgrade to install new rising main and major treatment work upgrades May Street WwTW. See section 4.6.2 for further detail of 2027 programme
MARINE DRIVE BRIGHTON NO.2 CEO	Network	41.6	High proportion of effective storage provided via green solutions
DIAMOND ROAD WHITSTABLE CEO	Network	17.1	High proportion of effective storage provided via green solutions
QUEENBOROUGH SSO	STW	35.5	High proportion of effective storage provided via green solutions
SWALECLIFFE CSO	STW	84.3	A new treatment process that will increase the treatment capacity from 205l/s to c 550l/s, a major and complex upgrade to the site's infrastructure. See section 4.6.2 for further detail of 2027 programme
Total		262.8	

Our remaining, non-outlier, modelled programme compares well with Ofwat's cost models, evidence that even with the considerable additional scoping under-taken to ensure our programme is deliverable, it still will deliver efficiently for the customer. The outliers are a material and critical component of our programme however, and we will assist Ofwat deep dives to ensure they are adequately funded through AMP8.

4.5 Wetlands for treating spills from storm overflows

4.5.1 Responding to Draft Determination

Ofwat assessed the costs for wetland schemes using the number of schemes, total wetland equivalent storage and total wetland area (ha). The initial assessment of our plan, £76.4m for 36 schemes, found our costs to be efficient. We had the second most efficient cost per hectare at £2.68m, equivalent to £268 per m^2, (post efficiency challenge) within the industry. These cost estimates were inclusive of the infiltration/sewer sealing cost estimates required to deliver the wetland solutions effectively.

4.5.2 How we have improved our understanding through delivery

Wetlands

We explored wetlands as a solution in line with Defra's expectation that "water companies to consider treatment of sewage discharges as an alternative solution where appropriate". Our position is in line with that of the water industry, which believes that Nature-Based Solutions (NBS) such as wetlands can play a pivotal role in eliminating harm from storm overflows. We identified wetlands as the preferred option for 32 storm overflows in our PR24 draft business plan submitted in October 2023. Of these, 6 of the wetlands were for overflows on the sewerage network and 26 at the wastewater treatment works.

Discussions with the Environment Agency about our proposal for construction of wetlands to treat storm overflow discharges are continuing. Wetland approaches form an important part of our proposals to reducing storm overflows in AMP 8 and beyond. We understand there is to be a joint EA, Defra and Ofwat working group looking at the implications and regulatory issues around the use of wetlands. The EA has concerns over the level of ambition and number of sites being proposed for wetland storm treatment by water companies in PR24 and has indicated there may be opportunity for some trials at limited sites in AMP8 as an alternative approach.

The current uncertainty on the use of wetland solutions presents a risk to water company investment plans and their ability to meet SODRP targets. Based on feedback from Wessex Water and the regulatory network, there would seem to be an emerging hierarchy in terms of the likelihood of gaining a discharge permit depending on asset and discharge type i.e. hardest for a network discharge, easier for a WwTW discharge.

The statutory and non-statutory status of the UWWTR and Environment Act (and the associated SODRP) presents a regulatory challenge for regulators and the industry. While the SODRP encourages nature-based solutions to reduce harm and specifically mentions groundwater infiltration, the UWWTR focuses on prevention of leaks and BTKNEEC which could be seen as contradictory to SODRP requirements. The London Thames Tideway and Whitburn infraction proceedings in relation to the UWWTR concluded that environmental impact was not considered a driver for investment to improve spills and the outcome was to reduce spill frequency regardless of environmental impact.

We have altered the blend of options within our Storm Overflows plan based on the Pathfinder project lessons learned, while ensuring compliance with Defra and EA requirements, and to maximise greener options. Our revised SOAP has increased the number of wetlands solutions proposed for AMP8 to 36.

We have used the time since our submission to challenge the evidence emerging from wetland projects which we are either delivering or are in a more advanced stage of design and costing, to assess the impact to this Price Review.

We have challenged our understanding of the costs to deliver wetlands by conducting additional exercises since the submission. These include:

(a) A review of our Staplefield WwTW and Lavant WwTW wetland projects to understand where our assumptions have been tested to ensure our cost estimates are based on the latest understanding of delivery requirements; and

(b) A bottom-up review of the remaining wetland projects planned for AMP8 to improve the definition of scope and accuracy of cost estimates.

The Lavant wetland is already in place and operational. We have set up a monitoring programme for both conventional and wetland process streams for parameters which are required by the permit and some others as well. Both show good compliance with the required standards and performance for both streams being similar, and in some cases better, for the wetland process. For example, Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Total Nitrogen and Total Phosphorus are all often better from the wetland than from the conventional process. A case study for the Lavant WwTW wetland project is provided in Appendix B.

We have considered the potential to deliver wetland solutions through the Direct Procurement for Customers (DPC) 'lite' route. Our discussions with various external organisations, such as rivers trusts, landowners, and developers, have resulted in them expressing an interest in working with us on this initiative. Some want to construct wetlands on our behalf to generate an annual income or biodiversity credits. We are also discussing the use of wetlands to treat discharges for storm overflows, especially where the root cause is groundwater infiltration. The Draft Determination did not support the use of the DPC as an alternative delivery mechanism for provision of wetlands. We are keen to find a way forward for wetlands to improve water quality before it is released back into the environment, so we will move these into our core plan and continue discussions with the various river trusts and landowners.

Our learning on the costs to deploy wetland projects has triggered an opportunity to revisit our method for estimating cost. Our original cost estimates utilised a unit cost taken from our DWMP and WINEP cost tool. The cost was given as a cost per m2 of wetland of £168.2 per m2. Our learnings from Lavant and Staplefield, as explained above, have tested the assumptions within estimates from this tool. To demonstrate this gap, Staplefield is forecast to deliver at £458.4 per m2.

In collaboration with the delivery team for Staplefield, we have now completed a bottom-up review of all 36 wetland sites, validating our assumptions of wetland sizing (and subsequent land purchase needs), likely enabling/design costs, indirect costs and construction costs (£/ha), informed by the contractor costs incurred through Staplefield and Lavant. This review ensures our final AMP8 estimates maximised our improved understanding of the sites in question as well as the latest delivery experience at Staplefield. The outcome of this exercise is a revised unit rate (used for costs in our latest submission) of £280.2 per m^2 to address the following:

- Original estimates had insufficiently accounted for land purchase needs. Each site has had its likely sizing and purchase needs calculated on a case-by-case basis.
- Construction costs (£/ha) assumptions were tested against Staplefield contractor quotes.
- Assessment of indirect cost uplift initially used in planning against a bottom-up calculation for the 36 sites.

The cost estimate for the 36 wetlands has increased from £72.7m to £198.2m, inclusive of the infiltration costs associated with delivering those schemes. The cost increase for the Wetland component alone is £72.7m to £181.2m. We recognise this is a large increase from our original estimates, however, top-down benchmarking summarised in section 4.5.3 has indicated our costs are in line with industry estimates and are informed by new information arising from recent delivery experience.

Sewer sealing / infiltration

The Environment Agency has stated it expects water companies to demonstrate they have taken measures to reduce infiltration before proposing treatment of groundwater-fed discharges through wetlands.

Our Enhancement Business Case on Resilience – Infiltration (SRN50) includes a case study on our industry level trial for Andover Pan Parishes to tackle the issue of groundwater infiltration (see Appendix 6 of SRN50). This work on the pan-parishes in Andover was one of our Pathfinder projects. This trial project in north Hampshire spanned several parishes to significantly reduce groundwater infiltration. This demonstrated the extent of infiltration that occurs into even good condition sewers and from private laterals on the network. This trial provided an opportunity to evaluate the benefits of this activity and to revisit our cost estimates for improved accuracy.

We demonstrated in the Pan Parishes project that sewer sealing using techniques such as [redacted] flood grouting system is the most sustainable, environmentally friendly and customer beneficial solution to significantly reduce groundwater infiltration. It does require widespread sewer sealing on both the public and private networks.

The Chairman of Ofwat visited East Dean near Chichester on 31 July 2024 to see sewer sealing works in progress on site. He saw first-hand how we are sealing the public and customer sewers in East Dean, recognising the benefits of this work and the need for this to be treated as enhancement investment.

Our work in the Pan Parishes evidenced how we need to revise the impermeable area to be managed from 30% to 80%, and therefore adjust the costs for storm overflows where groundwater infiltration is the root cause of the problem.

Our findings from the Pan Parishes project in Hampshire suggest 100% water tightness is uncertain and difficult to achieve. Hence, we will also need to utilise nature-based solutions in the form of wetlands at wastewater treatment works to protect customers and the environment and meet the regulatory requirement of 10 spills or less per annum for storm overflows. This dual approach will ultimately provide a layered approach to resilience of our wastewater systems whilst meeting the Defra storm overflow targets in both the short and longer term.

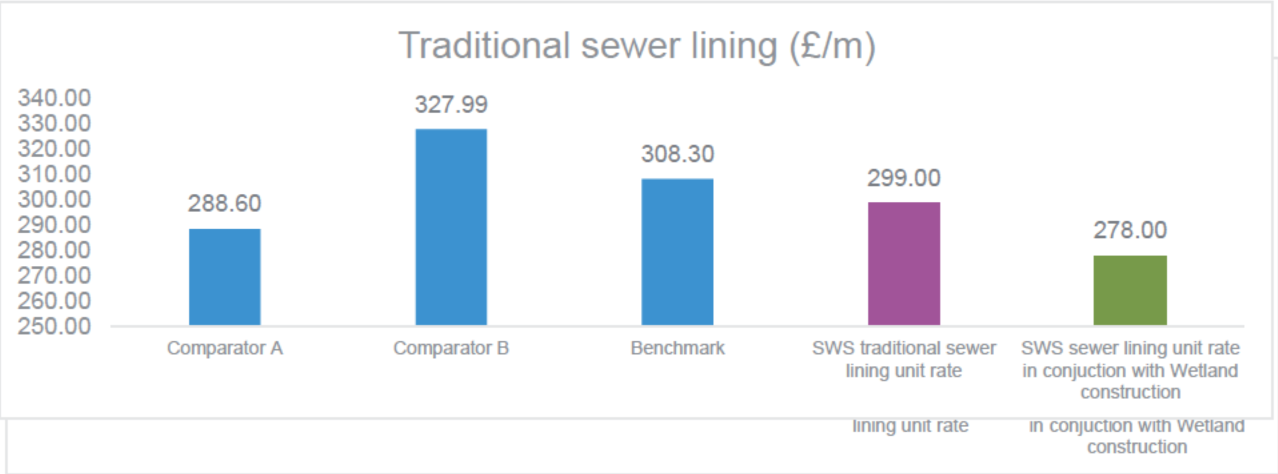
Our experience in the Pan Parishes has provided several key learnings on how to deploy sewer lining activity successfully to reduce spills.

- Our pan parish projects indicated the extent to which water infiltrates the sewer system through joints which are not designed to be watertight. Therefore, an assessment based on the condition of the sewer is insufficient to identify where lining would most optimally reduce future spills. Instead, a thorough investigation of the sewer and how it truly performs in wet conditions, enables targeted sealing activity. The benefit of this is more efficient deployment, with reduced lining applied to portions of the pipe which are not a source of infiltration.
- Sealing the private network was a critical component to the success of pan parish work and all work on private properties involves communication with landowners to gain access as we have no rights to work on private sewers. In practice this means community engagement and participation will be essential to deliver our AMP 8 programme, which challenges our assumed indirect costs for this type of work.

We have taken steps to incorporate these learnings into our method for estimating costs. The pan parish project provided a key data point to consider when we revisited our cost estimates; the out-turn cost versus the length of pipeline sealed in practice. Our costs were higher than first anticipated driven by the extent of enabling work to complete and our forecasted length of sewer to be sealed, reduced due to a more thorough understanding of where sealing would reduce future spills.

Pan parish delivered at a unit-rate of £450/m of sewer sealed. Following a review of Pan Parish, we have uplifted the original unit rate used in the October plan of £200/m per metre to £278/m to reflect the additional enabling costs encountered in delivery. To reflect the efficiencies we aim to realise when deploying sewer sealing in conjunction with Wetland construction, our new unit rate for this activity is 7% below the unit rate used for traditional sewer sealing which uses a unit rate of £299/m in line with our standard framework rate.

Our Cost Intelligence Team undertook a benchmarking exercise to compare our unit rate to provide further confidence in the efficiency of our traditional sewer programme and sewer sealing to reduce spills programme, shown below:



lining unit rate
in conjuction with Wetland construction

Figure 4: Draft Determination – Benchmark comparison of SWS sewer lining unit rates

This benchmark exercise compared our business plan rates with 2 other companies and found our rate compares favourably with the benchmark of £308.30 / m for sewers less than 275mm diameter, with our standard framework rate of £299/m being 3% below the benchmark. Since we have challenged the unit rate used for sewer sealing work used to reduce spills a further 7% lower to £278/m, we are confident these represent efficient costs. Comparator unit rates have been normalised with respect to inflation (to 22/23 pricing) and for our location in South East England, to ensure comparison is fair.

4.5.3 Top-down assessment of our costs

Our work on the Pathfinder programme has highlighted the need to revise both the cost estimates for delivering wetland schemes in AMP8 and associated infiltration costs. Our previous estimates, assessed for efficiency for Ofwat at Draft Determination had a proposed cost per hectare of £2.68m. We have revised this in our latest plan and our cost per hectare now averages out at £4.79m, driven by an increased estimate of land purchase requirements for Wetlands and an effective uplift to indirect costs to reflect more labour-intensive investigations and enabling activities. Shown below is a comparison of our previous and new unit rate with the allowances set by Ofwat at Draft Determination.

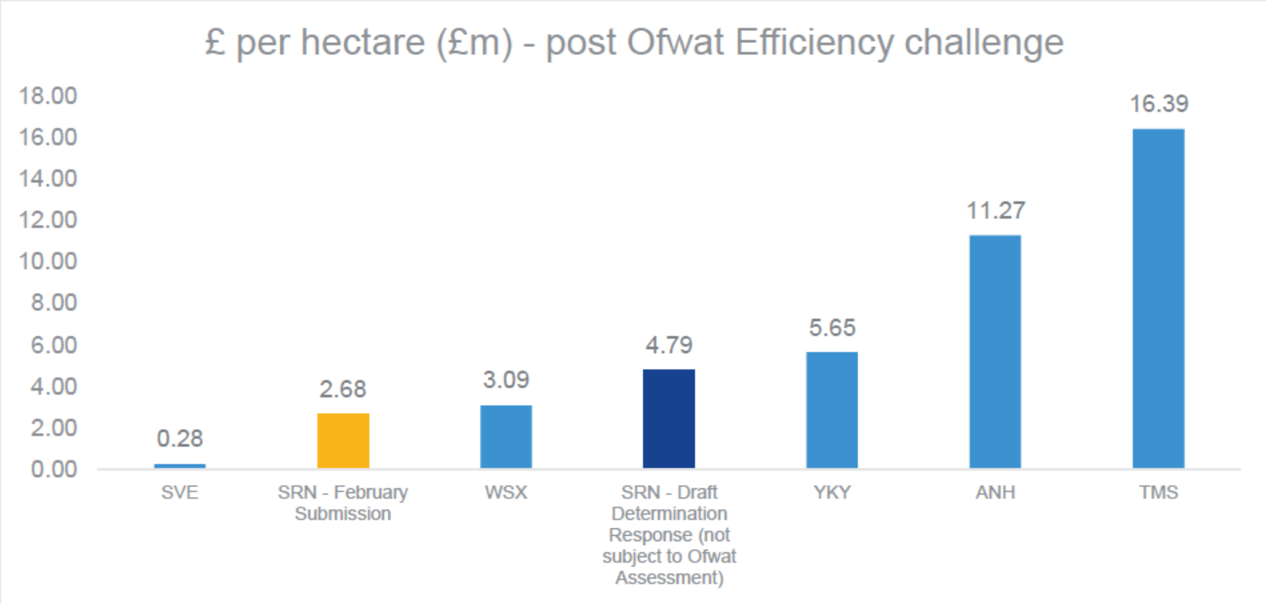


Figure 4: Draft Determination – Ofwat allowances on Wetland projects (£ per hectare)

As demonstrated above, our costed solutions and the further work we have completed show our solution costing was the second cheapest within the sector. With our latest estimate of costs, driven by real delivery experience in Pan Parish and at Staplefield, the £ per hectare has increased materially, but still would compare favourably among industry peers post Ofwat's assessment.

4.6 Delivery by 2027 for WFD No Deterioration

4.6.1 Confirming 2027 spill targets and appropriate storage requirements.

A deep dive session was held with Defra, Ofwat and the EA on 9 January 2024 to discuss the size of the storm overflow programme for AMP8 and our concerns about the affordability and deliverability of the programme. We highlighted the risks and uncertainties associated with the EA's application of the Water Framework Directive Regulations requirements and setting of deadlines in 2027.

The specific challenge is where no deterioration requirements are driving the need for work to be completed by 31 March 2027 for bathing waters and by 30 June 2027 for shellfish waters. Four storm overflows discharging to bathing waters will need improvement by 31 March 2027 and 50 for shellfish waters by 30 June 2027. Following our accelerated investigation we now understand the extent of work required and costs to deliver. The total cost of the works to improve these 54 overflows is circa £500m and includes the construction of a large storage and conveyance tunnel (super sewer) in Portsmouth Harbour, new rising mains, wetlands and storage.

A limited investigation for Portsmouth Harbour was completed in AMP6 to understand the suitability of the hydraulic models available for the wastewater systems discharging into the harbour. Improvements have previously been made to some of the wastewater systems connected to the harbour to improve water quality, but the EA advised us in July 2023 that shellfish improvements were previously subject to a cost benefit assessment at a local scale.

For cycle 2 of the RBMP, the EA completed a cost benefit assessment for WFD actions at sector level to justify the costs and benefits of the Programme of Measures set out for 2021 to 2027. This meant local action is needed irrespective of the costs and benefits as the investment has been justified at the sector level. However, the water company sector investment was based on an estimated cost for the water industry as a whole in the WINEP of £4.6bn nationally (covering AMP7 and the first 2 years of AMP8). The size of the WINEP for AMP8, and in particular the costs to prevent deterioration in Portsmouth Harbour, identifies the national cost benefit analysis has significantly under-estimated the costs to the water industry and the impact on customer bills.

The investment needs for the 36 overflows into the harbour were not fully understood at the time of preparing our Business Plan for AMP8, for the reasons explained above. We were asked by Ofwat, Defra and the Environment Agency to: "*outline the extent to which transitional funding could be used to deliver an early investigation into the low spillers discharging to Portsmouth and Langstone Harbour, and viability of delivering this and associated improvements by 2027 or whether they believe there are grounds for seeking an uncertainty mechanism*[2]*".*

We secured transitional funding for some time-critical investigations for AMP8 and we have fast tracked the Shellfish Water investigation for Portsmouth Harbour to:

(a) Understand the nature and scale of works required to meet the 2027 date for shellfish requirements (including the determination of the number of overflows which will need improvement);
(b) Increase the chance of delivering improvement works by the June 2027 deadline, and
(c) Explore how an uncertainty mechanism could be applied for Portsmouth Harbour.

We have completed an initial phase of the Shellfish Water Investigation for Portsmouth Harbour. The draft (unassured) investigation report was shared with the EA on 24 June 2024 and was discussed in a meeting with the EA on 2 July 2024. We are updating the report to address comments from the EA and commissioning external assurance of the report.

The purpose of the investigation is to reduce the uncertainties surrounding the scale of works required to meet both the Shellfish Water WFD requirements and the Defra requirements for the storm overflows which could have an impact on the quality of the Shellfish Water.

The investigation has enabled us to identify the equivalent storage volume required to reduce intermittent discharges at each storm overflow to meet (a) the Environment Agency's spill frequency emission standards for Shellfish Waters and (b) Defra's storm overflow targets. The shellfish requirements require no more than 10 significant spills per annum as an aggregation (agglomeration). The investigation identified 7 different agglomerations for the harbour and calculated the storage volumes for overflows in each agglomeration to meet the spill requirements. This investigation also identified that the continuous discharge at Southwick WwTW requires improvement to comply with the Shellfish Water requirements from the EA. The EA has added this site to the WINEP with a June 2027 completion date.

The EA prioritisation method for storm overflows identified 20 overflows as shellfish water overflows requiring improvement to reduce spills, and Defra's SODRP method of prioritisation identified 36 overflows. We assessed 53 overflows in our shellfish water investigation to determine the potential impact on Portsmouth

[2] Action recorded in minutes of Southern WINEP CSO Programme deep dive 9 Jan 2024 held with Defra, Ofwat and EA.

Harbour Shellfish Water. Of these 53, 17 were identified as no impact, leaving a list of 36 overflows, plus 2 additional overflows – a total of 38. Our revised storm overflow programme will complete improvement works for all the overflows impacting on the shellfish water by June 2027. The investigation also identified that improvements are required to the continuous discharges at one wastewater treatment works at Southwick WwTW. We have added these improvements into our WINEP programme.

We are now clearer on what is needed to meet the regulatory requirements for Portsmouth Harbour shellfish water, although we are still in discussion with the EA to sign the report off. The investigation concluded that, across the 38 storm overflows discharging to the Portsmouth Harbour Shellfish Water, a storage equivalent of 95,500m3 will be required to meet both Defra's SODRP and the EA's Shellfish Water requirements. This volume is equivalent to 38 Olympic-sized swimming pools. However, if alternative modelling criteria is used in relation to the agglomeration requirements (which suggests that agglomeration 2 and 3 may need to be combined – see table 6) then the required effective storage would increase to 170,000m3 (equivalent to 68 Olympic-sized swimming pools). The cost uncertainty is significant, and hence we are recommending that all projects with a 2027 delivery deadline are core funded but go through as a programme to the Enhanced Engagement and Cost Sharing mechanism to give our regulators greater insight into the costs and delivery.

The best long-term, sustainable and best value solution to manage this volume of rainwater is to remove it from the sewers at source through separation of the rainwater and return it to the environment as close to where it falls as possible. We had set out our approach to deliver separation and attenuation through SuDS in a phased delivery programme before delivering grey storage options to make the final step to meeting Defra targets. However, the 2027 regulatory date requires an alternative approach to provide the certainty of delivery.

Our plan for tackling Portsmouth Harbour Shellfish Water requirements and completing the improvements by 2027 is:

(a) Commence work in AMP7 with Acceleration Funding
(b) Early completion of the Shellfish Investigation Report
(c) Construction of a large tunnel from Fareham to Peel Common – this new 8km long 'super sewer' will provide up to 52,000m3 of storage for rainwater-diluted sewage before it is recycled at Peel Common. This is to reduce the spills from 14 overflows in agglomeration 4 (see

(d) Table 6).
(e) Progression of both SuDS and storage in parallel for the other overflows across the harbour with an extended scope to ensure capacity is available to meet the spill targets.

The spill targets for the overflows in the harbour and the volume of rainwater to be removed from the wastewater system for each overflow to meet the target are shown in

Table 6.

Table 6: Estimated Equivalent Storage requirements for overflows with potential to impact Portsmouth Harbour Shellfish Water

Agglom-eration	Overflows	No. overflows to address	Shellfish investigation		EnvAct		Spill count (/year)
			Aggolm 2&3 separate	Aggolm 2&3 single entity	Aggolm 2&3 separate	Aggolm 2&3 single entity	
			Volume to remove (m^3)	Volume to remove (m^3)	Volume to remove (m^3)	Volume to remove (m^3)	
1	Gladys Av	5	8725	8725	8725	8725	1.0
	Widley Rd		868	868	868	868	2.0
	North End Av		5956	5956	5956	5956	1.0
	Mile End Rd No 1		325	325	500	500	5.0
	Mile End Rd No 2		6115	6115	6290	6290	1.5
2	Court Ln	1	4000	40,000	4000	40,000	10.0/0.0
3	Mainland Drayton	2	15,000	20,000	15,000	20,000	6.0
	Kirtley Cl		1,500	2,000	1,500	2,000	6.5
4	The Gillies	14	2658	2658	2658	2658	3.5
	Cams Hill		1493	1493	1493	1493	0.0
	Arundel Dr		826	826	826	826	1.0
	Bridgefoot		770	770	770	770	0.5
	Cotswold Wk		167	167	167	167	0.0
	Elmhurst Rd		4451	4451	4451	4451	5.0
	High St		19231	19231	19956	19956	0.5
	Hoeford		620	620	620	620	0.5
	Quay St		3723	3723	3723	3723	5.0
	Wicor Mill Ln		13450	13450	13450	13450	0.0
	Fareham Rd o/s 359		2170	2170	2170	2170	0.0
	Fareham Rd o/s 68		46	46	46	46	0.5
	Redlands Ln		1027	1027	1027	1027	1.5
	Brewers Ln		265	265	265	265	0.5
5		0	0	0	0	0	N/A
6		0	0	0	0	0	N/A
7	Grove Rd	1	1040	1040	1040	1040	5.0
Total		**23**	**94,426**	**169,526**	**95,501**	**170,601**	

Table 6 shows that 20 of the overflows will need to reduce to less than 5 spills per annum on average to meet the EA's shellfish requirements.

4.6.2 Summary of scope and work in progress to meet 2027 deadlines.

Since submitting our Business Plan in October 2023, our Clean Rivers and Seas team has continued progressing actions for overflows with a 2027 regulatory completion date, including those in Portsmouth Harbour. The mid-AMP8 delivery deadline reduces our list of potential options as we do not have the timeframe to incrementally deploy solutions and test the results.

Instead, we are progressing a combination of major capital grey solutions and green solutions with increased storage targets to ensure our solutions are ultimately effective and delivered within the target timeframes. This is driving the need for several major capital schemes, the most complex project being scoped to tackle Agglomeration 4, which includes 14 overflows around Fareham as part of our Portsmouth Harbour solutions. Table 7 provides a summary of our new plan to meet our 2027 obligations and the impact on the estimates of storage requirements and the costs of 2027 delivery and agglomerated spill targets.

We recognise these costs are significantly increased from our February 2024 submission. This change is being driven by a material change of scope of work needed to deliver the required ‘equivalent storage’ and achieve the spill targets. We are proposing greater use of both grey and green solutions for these overflows to provide the confidence of achieving the spill targets by 2027. This increase in scope is driven primarily by the significant scale of interventions required to achieve the 10 spills per annum or less target, especially where the targets are below 10 spills per annum to meet the agglomeration targets. These targets result in major capital ‘grey’ projects and widespread application of SuDS across the local communities.

Table 8 provides further detail of the major capital projects the materiality of these schemes within the context of the programme.

Table 7: Summary of our latest view of the 2027 programme of work

Overflow Category	Number of overflows	Feb' 2024 Cost Estimate (£m)	July' 2024 Cost Estimate (£m)
Bathing Water	4	33.2	120.6
Portsmouth Harbour Shellfish	39	132.5	185.1
Shellfish Water ND	11	79.2	193.3
Total	54	244.9	499.0

Table 8: Summary of the scope requirements for our 2027 programme

Overflow Category	July' 2024 Cost Estimate (£m)	Estimate for Major Grey Schemes (£m)	Major capital Grey components included within scope
Bathing Water	120.6	62.3	Kings Hall Herne Bay – new rising main and major treatment works upgrades at May Street WwTW
Portsmouth Harbour Shellfish	185.1	61.7	Fareham and Gosport Tunnel – This will take the flows from the catchment to Peel Common WwTW. Estimated at 5-8km in length. This will act as a super sewer to capture and store rainwater and sewage before processing at the treatment works, supported by localised SuDS. The tunnel needs to provide over 50,000m3 of storage (equivalent to 20 Olympic sized swimming pools)- potentially increasing to 170,000m3 depending upon the agglomeration requirements.
Shellfish Water "No Deterioration"	193.3	80.7	Swalecliffe WwTW – A new treatment process that will increase the treatment capacity from 205l/s to c 550l/s, a major and complex upgrade to the site's infrastructure
Total	499.0	204.7	

Our Portsmouth Harbour programme will be straightforward for Ofwat to assess for cost efficiency due to the significant volume of storage the project would deliver. However, our proposed investment at May Street WwTW and Swalecliffe WwTW will require individual assessment through deep dive since this work will not add significant additional storage and therefore, we do not have an appropriate cost driver to capture the benefit these schemes will deliver.

Kings Hall, Herne Bay

This site suffers from spills on multi-peak events as it is not capable of draining the existing ~6,000m^3 online storage tank, despite this tank being sufficient at capturing the rainfall from the initial event. To reach a 10-spill target, we must double the PFF at Kings Hall. This is only feasible with an increased capacity from the rising main, which will allow us to drain storage within 8 hours of an event, as opposed to the existing 14 hours, allowing us to capture second peaks without detrimentally impacting May Street. Merely increasing storage capacity without also increasing the PFF will continue to result in spills from multi-peak storms as the tank will not discharge quickly enough.

As we are required to have met this target by 2027, we have no choice but to proceed with this complex grey solution. Whilst there could have been potential to have delivered much of the spill benefit at Kings Hall via separation of surface water connections (which would have been our preferred approach, time-permitting) we do not have high enough confidence that these connections will be sufficient, nor enough time to investigate to build the necessary confidence to prioritise over the solution described above.

Swalecliffe WwTW

The estimated additional storage volume required for a 10 spill solution at Swalecliffe was 16,000m^3. To drain this within an effective timeframe to ensure sufficient storage is available for the next event, it would need to be returned at approximately 370l/s, which is close to double the FFT existing on site. Therefore, even if this storage were to be constructed, the works would require a complete rebuild as there is not the existing space on site to increase the capacity of the existing ASP.

Our solution instead will be deployed within the existing space on site and deploy a new treatment process, increasing site capacity from 205l/s to 550l/s and enable us to make use of existing assets that will be decommissioned for added storage, leaving only manageable amount of surface water removal to meet the 10-spill target.

Our preparation to our 2027 programme is already underway. We have commenced the optioneering of locations, outline designs and concept stage by considering the foundations of feasibility including:

- **Enabling and environmental constraints** – further, detailed assessment of the catchment area in context of our grey proposals to understand environmental and enabling policies we will need to follow to have our solutions permitted.
- **Engineering** – our internal technical experts have started the design feasibility of the schemes. To re-enforce this, we have begun early engagement with our strategic supply chain partners and subject matter experts to outline and review the constructability of the solutions.

We are confident on the scope of works required; however, material uncertainty remains over the costs, so we recommend the work for our 2027 programme be managed via the Enhanced Engagement and Cost Sharing delivery mechanism.

4.7 Pass forward flow/flow to full treatment

Ofwat has assessed pass forward flows / flow to full treatment separately in the Draft Determination – see box 1 below.

Box 1: Ofwat's analysis and comment

Analysis Commentary
The expenditure for pass forward flow/flow to full treatment increases related to storm overflow spill reduction were separated from the scheme level data to be assessed separately to the grey and grey/hybrid storage models to ensure that schemes were assessed on a like for like basis.

Cost drivers were requested for the schemes, which include number of schemes and l/s flow to full treatment increase provided. Both of these cost drivers were assessed, however neither were able to give a robust model. Data points were missing from Southern Water and Thames Water (l/s increase). This data has been requested again as part of a data submission prior to Final Determinations.

Due to the low confidence in modelling the flow to full treatment schemes, an efficiency challenge was given based on the company level efficiency challenge provided by the grey and grey/hybrid network and STW econometric models. This approach was taken as it was considered that the level of efficiency companies showed in the delivery of grey civil works for the network and STW schemes would indicate the likely efficiency in delivery of pass forward flow/flow to full treatment schemes.

We will re-assess the modelling potential as part of the Final Determination when updated datasets are provided.

We developed our business plan on the basis any spills avoided through attenuation would mean the water not escaping from our network or prematurely at the treatment works would need to be treated. There are operational costs associated with this additional volume of water as it is passed forward from a pumping station or returned to treatment from a storm tank. In some cases, the pass forward flow rate would need to be increased to empty an enlarged storm tank before the next storm.

Our Pathfinder team explored the benefits and costs of increasing storage capacity at pumping stations and treatment works through actual work on site (see case studies in Appendix A) and through hydraulic modelling. A key finding from this is that there is a finite volume of additional storage which is economical to provide to reduce spills from storm overflows. The issue is that a very large storm tank can mean the return flow to full treatment is insufficient to empty the storm tank before the next storm – which would be a breach of permit. To resolve this, the capacity of the treatment works would need to be increased to treat a higher flow due to rainwater. This makes the cost effectiveness of provision of grey storage disproportionately costly and not the best value option. In these cases, removing rainwater at source becomes the preferred, most sustainable and best value option.

We have now increased the green "at source" solutions in our plan for storm overflows and removed the costs for increasing flow to full treatment in our plan.

5. Managing Risks with Delivery Mechanisms

The discussions and meetings during December 2023 and into the start of 2024 with Defra, Ofwat and the EA were focused on exploring and resolving the issues of the deliverability and affordability of our WINEP programme for AMP8. We now have a compliant WINEP but the issues of affordability and deliverability remain a significant concern. Ofwat have therefore proposed a series of delivery mechanisms to support delivery during AMP8. These delivery mechanisms include:

(a) Large scheme gated process
(b) Large scheme Enhanced Engagement and Cost Sharing (EE&CS)
(c) Delivery Mechanism
(d) Storm Overflows Uncertainty Mechanism.

The application of these delivery mechanisms will ensure that customer bills are set for the scale of work that can be delivered in AMP8, that critical delivery deadlines and regulatory dates are achieved, and there is further regulatory consideration before commencing our additional phased programme in 2028.

The 2027 delivery deadlines for the 54 overflows discharging to bathing waters and shellfish waters present a significant business risk. Approximately £200m of the £500m investment required by 2027 is on large, grey infrastructure projects. The scope and scale of work required by 2027, the affordability of this approach and the deliverability based on the capacity of the supply chain in the UK all contribute towards the risks.

Our preferred approach for reducing spills from storm overflows is to engage communities and work in partnership with them and local councils, Highway Authorities, and other community organisations to green the urban landscape and change the way rainwater and groundwater is managed at source. It's about delivering green solutions, then following up with smaller grey solutions if required to meet the spill reduction targets. This approach will not enable us to achieve the targets for all 54 overflows by 2027.

We need to revert to traditional grey solutions to maximise the chance of fully delivering the EA requirements by 2027, including large-scale grey engineering projects as a major part of the solutions for these overflows. This includes the new super sewer for Portsmouth Harbour.
The accelerated programme will push up costs considerably. There is also a very high risk this project cannot be delivered by 2027, but we will use best endeavours to deliver it by the regulatory date.

It is not our choice to deliver large, grey infrastructure projects to store mostly rainwater. The regulatory timescales do not afford the opportunity to try higher levels of green first. The grey option gives us the best chance of meeting the 2027 dates.

We are proposing that these 54 overflows are delivered as a programme of work (the 2027 storm overflows delivery programme) under the **Enhanced Engagement and Cost Sharing** (EE&CS) mechanism proposed by Ofwat in their Draft Determination. This will facilitate greater co-operation and collaboration to find routes through the regulatory issues to facilitate efficient delivery of the solutions to reduce spills into bathing and shellfish waters.

We have identified the need to commence work on 114 overflows in 2028 to achieve the regulatory completion date of March 2035. We are proposing that these 114 overflows are packaged into the **Delivery Mechanism**, ensuring the delivery focus remains on the earlier statutory dates. We will develop a Delivery Action Plan to set out the actions to expand our delivery capacity to start delivery of these extra schemes in AMP8. We will develop a Delivery Plan for this programme and report on progress.

In summary, our storm overflow programme for AMP8 consists of 3 groups, and 3 proposed delivery routes as shown in Table 9.

Table 9: Storm overflow programme groups and delivery mechanisms

Group	Number of overflows	Regulatory Date	Value	Delivery Route
2027 Programme	54	31/3/27 & 30/6/27	£499m	Enhanced Engagement and Cost Sharing
2030 Programme	129	31/03/2030	£338m	Normal delivery route
2035 Programme	114	31/03/2035	£296m	Delivery Mechanism
Total	297		£1,133m	

Note: The total in the above table excludes the 210 storm overflow investigations required by the EA to be delivered by 30 April 2027. The cost for these 210 investigations is £14.7m.

Ofwat proposed a **Storm Overflow Uncertainty Mechanism** in their Draft Determination to enable water companies to swap in or out overflows if the regulatory requirements change during AMP8. It also allows water companies, where it is not possible to swap out existing schemes, to deliver additional storm overflow schemes and storage in the 2025-30 period. The uncertainty mechanism will provide additional funding for companies through the PR24 reconciliation at PR29, if companies have delivered additional work in AMP8 and have overspent storm overflow storage scheme allowances. We support the introduction of this uncertainty mechanism and we have proposed in SRN-DDR-046 WINEP Monitoring Enhancement Cost Evidence Case that this mechanism should be used for any additional work required by Defra under the U_MON6 WINEP driver on MCERTS certified monitoring of emergency overflow operation on network sewage pumping stations.

6. Price Control Deliverable (PCD)

Ofwat proposes specific PCDs for storm overflows, including assessing the equivalent storage, screens, pass forward flow and wetlands.

The proposed PCDs using ‘equivalent storage’ means that Ofwat will track delivery of schemes and equivalent storage and allow flexibility for companies to deliver equivalent storage through a combination of grey and grey-hybrid solutions. Ofwat defines equivalent storage as “the volume of storage required to meet the target spill frequency set by the Storm Overflow Discharge Reduction Plan (for EnvAct_IMP2 and EnvAct_IMP4 this is the lower of the number required to meet UPM FIS and 99 percentile standards or no more than 10 times per year over a 10 year period)”. Ofwat requires that the hydraulic model used to assess equivalent storage should be fit for purpose and constructed in accordance with the Code of Practice for the Hydraulic Modelling of Urban Drainage Systems, CIWEM UDG, 2017.

For non-storage solutions, equivalent storage is calculated by running a hydraulic model with the alternative solution included within the model, and assessing the extent to which the storage requirement is reduced.

Ofwat says that equivalent storage must be assessed against the storage volume required at the storm overflow. Theoretical conversion rates based on area removed should not be used unless the impact of the alternative works on the required storm overflow storage volume can be clearly demonstrated.

We are concerned about this approach by Ofwat and the delay caused to delivering the spill reductions required to achieve the Defra and EA targets. We set out the reasons below.

We have calculated the equivalent storage during the development of our storm overflow action plan using a combination of a theoretical conversion rate based on area removed and on model outputs used for our DWMP. This data feeds into our sizing and costing of the solutions depending upon the root cause of the spill.

There is considerable uncertainty in our storm overflow programme over the scale of solutions required and the deliverability of the preferred option. Hydraulic models, where available, will be used at the design stage where required to support the solution design, although typically the hydraulic models will be used for grey engineered solutions. It means that the preferred option may need to change once design commences and we get on site to complete initial surveys, although our focus will continue to be on rainwater separation and attenuation through sustainable green options. Our desired outcome is to reduce spills by delivering long-term sustainable green options to tackle the problem at source and contribute towards “greening” communities to make them more climate resilient.

One option could be to adopt a ‘design equivalent storage’, where this is the offline storage maximum stored volume before spills commence. It would need to consider:

a) the rate of emptying once flows subside at a water company specific rate (e.g. equivalent to 17% (1/6) of the pass forward flow at the overflow), and
b) the results in an average of 10 spills or less per annum when tested with a ‘fit for purpose’ hydraulic model updated to represent a 2050 design horizon (inclusive of growth, creep and climate change).

Our concern regarding the use of assessments relating to equivalent storage is the availability and suitability of hydraulic models. Firstly, the availability of models for wastewater catchments – we have around 130 models for our 381 wastewater systems (covering approximately 96% of our customers). Secondly, the availability of hydraulic modellers in AMP8 given the limited resources available to the UK market and the demands for modellers for other actions in AMP8. Thirdly, the ability for hydraulic models to accurately replicate and model not only grey solutions but also hybrid and green solutions. And fourthly, the likelihood of vastly different outcomes that companies could come to based on differing input assumption into the modelling. Overall, the Ofwat metric risks reducing comparability rather than improving it. A simpler, more comparable metric would be easier for cross-company comparisons.

The benefit though is that solutions which contain different measures to deliver a 10 spills or less outcome will share the same total design equivalent storage. Through subtraction of the volume of grey storage provided, the volume from green options can be defined. For example, if the design equivalent storage is 1000m^3 and the solution includes provision of a 600m^3 storage tank, the 'other' measures will be 400m^3. This approach can be used for other measures such as increasing the network pass forward rate, the removal of inflows, the deployment of attenuation measures and the use of Real Time Controls that activate existing storage. But this depends on the original volume of effective storage from the model being accurate and reliable. Our trials on site providing the modelled effective storage as a grey solution have shown that it is not sufficient to achieve the 10 spill outcome. The only way forward is to monitor the actual number of spills and keep delivering more SuDS and separation until the spill targets are achieved.

Considering the above, we are requesting that Ofwat reconsiders its approach to customer protection and uses instead our wastewater WINEP PCD, which we set out below. The principles we applied to our PCD proposals are set out in SRN-DDR-052 Price Control Deliverables.

The details of the PCD are subject to our AMP8 WINEP being finalised.

Table 10: Wastewater WINEP PCD

Component	Output based on WINEP action completion
Description	Completion of AMP8 WINEP actions as submitted in our business plan (including Delivery Mechanism and DPC), and are within the scope of the WINEP drivers listed in Table 11 below. We will return funding to customers on a unit cost basis for non-delivery of AMP8 WINEP actions within the scope of the drivers listed in Table 11 below that are not completed by 31st March 2030 because the WINEP need has changed.
Output - WINEP actions	Output: The total number of actions in scope of PCD is 1,419
Total Cost	£2,187 million
Unit cost	£1.464 million per action (total cost / number of actions)
Penalty rate	£1.464 million per action not completed (no cost sharing assumed)
Materiality of future scope alterations	£21.867 million
Output delivery date with current scope	31 March 2030

Component	Output based on WINEP action completion
Gated dates	Assurance of the WINEP being forecast for completion by 31 March 2030 will be provided by 31st of March 2028 to support draft reconciliation for performance during PR29.
Conditions on allowance	Should we receive confirmation from a regulator of a necessary change to the timing or scope of a scheme, or in fact the change of scheme to address the core issue, which either changes the benefit delivered or the solution being more expensive, the implication of this change would be reflected in the PCD. Where this change leads to a material variance greater than 1% of the original enhancement investment, then the PCD would symmetrically account for this change in a reconciliation at the end of the AMP.
Assessment of PCD	In the event of not delivering the output by the end of AMP8 (i.e., by 31 March 2030), but the need is still required, this PCD remains in place until the end of AMP9 (i.e., 31 March 2035). Ofwat will assess the completion of this PCD by 31 March 2035 as part of the PR34 process.
Late penalty	Not required as being late would mean non-compliance with WINEP statutory requirements.
Measurement	Progress and performance will be reported in our annual performance report (APR) We will report progress on number of in scope WINEP actions completed by 31 March each year.
ODIs to be netted off in the event of non-delivery	Storm Overflows Discharge Permit Compliance (part) Operational Greenhouse gases (part)
Assurance	Third party APR assurer will assure that the output and conditions have been met.

Table 11: Drivers and number of wastewater WINEP actions and business plan costs within scope of the PCD as reported in table ADD15

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
U_IMP1	8	6.309
U_IMP2	2	0.100
U_IMP3	0	0
25YEP_IMP	0	0
25YEP_INV	1	0.370
WFD_INV_WRHMWB	0	0
WFD_NDINV_WRHMWB	0	0
WFD_ND_WRHMWB	0	0
WFD_IMP_WRHMWB	0	0
BW_IMP1	0	0
BW_IMP2	3	0

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
BW_IMP3	0	0
BW_IMP4	0	0
BW_INV1	0	0
BW_INV2	4	0.464
BW_INV3	0	0
BW_INV5	0	0.284
BW_ND	4	120.478
BW_NDINV	7	0.545
NERC_INV	0	0
NERC_IMP	0	0
WFD_NDLS_CHEM1	11	0.006
WFD_NDLS_CHEM2	23	3.827
WFD_ND_CHEM3	6	11.213
WFD_ND_CHEM4	5	0
WFD_IMP_CHEM	8	3.920
WFD_INV_CHEM	24	2.442
EnvAct_INV1	2	0.150
EnvAct_MON1	0	0
EnvAct_INV2	0	0
EnvAct_MON2	0	0
EnvAct_INV3	0	0
EnvAct_MON3	0	0
EnvAct_MON4	1	43.000
EnvAct_MON5	1	0
DrWPA_INV	0	0
DrWPA_ND	0	0
DrWPA_IMP	0	0
EE_INV	1	0.031
EE_IMP	1	1.836
U_MON6	3	39.707
HD_IMP	11	119.309
HD_ND	0	0
HD_INV	14	3.321
HD_IMP_NN	37	223.355
WFDGW_INV	7	1.910
WFDGW_NDINV	0	0
WFDGW_ND	0	0
WFDGW_IMP	0	0
U_IMP5	0	0

WINEP driver	Number of actions	AMP8 totex, £m 2022/23 prices
U_IMP6	0	0
INNS_INV	0	0
INNS_ND	0	0
INNS_IMP	0	0
INNS_MON	0	0
MCZ_ND	0	0
MCZ_IMP	0	0
MCZ_INV	14	2.536
WFD_INV_MP	3	0.589
U_MON3	260	8.323
U_MON4	255	69.976
EPR_MON1	0	0
WFD_INV_N-Tal	4	3.052
WFD_INV	37	8.212
WFD_IMP	59	227.869
EnvAct_IMP1	5	24.585
WFD_ND	29	73.973
SAFFA_IMP	0	0
SAFFA_INV	0	0
U_IMP7	0	0
SUiAR_IMP	2	51.069
SUiAR_ND	0	0
SW_IMP	6	63.529
SW_ND	56	419.421
SW_INV	3	0.323
SSSI_IMP	18	58.708
SSSI_ND	0	0
SSSI_INV	32	8.588
EnvAct_INV4	210	13.256
EnvAct_IMP2	212	417.122
EnvAct_IMP3	20	83.267
EnvAct_IMP4	6	67.257
EnvAct_IMP5	2	2.086
WFD_INV_MOD	0	0
WFD_IMP_MOD	2	0.548
Totals	**1,419**	**2,186.686**

7. Business Plan dependencies

This document is supported by our **Enhancement Business Case of Storm Overflows (SRN40)** which sets out our strategy and approach to delivering the Defra SODRP and the Environment Agency WINEP requirements.

The Data Tables impacted by the representation are:

Table/s Impacted	Data Lines Impacted
CWW3	CWW3.13 to CWW3.48
CWW20	CWW20.36 – 48 and 57 – 60.
SUP12	Wetlands & Local Authority Highways SuDS
ADD15	Storm overflow rows
ADD20	All rows

Appendix A: Storm Storage Case Studies

Practical Applications of Additional Storage Provision for Storm Overflow Reduction

[redacted], Cleaner Rivers and Seas Taskforce
June 2024

Storage has been a popular, default option for water and sewerage companies when required to increase the capacity of their wastewater treatment systems. This has largely been driven by regulators in the form of the WINEP (Water Industry National Environment Programme) which specifies a required storage volume at each sewage works. As such, during each 5-year investment period, water companies are periodically required to increase the storm storage at chosen sewage works as permits change.

The volume of storage specified through WINEP or permitting is based upon population and dry weather flow, not storm overflow reduction. This means building additional storage at pumping stations or treatment works does not guarantee a particular environmental outcome or improvement.

In 2021, the Government passed the Environment Act and subsequently Defra's Storm Overflow Reduction Plan. This legislation effectively limits combined sewer overflow activation to 10 instances per calendar year for each outfall.

Southern Water's Cleaner Rivers and Seas Taskforce has been experimenting with new ideas and techniques to reduce storm overflows. Additional storm storage has been tested in a range of sites and settings to determine how effective it can be in storm overflow reduction.

This report describes and analyses these interventions and provides recommendations on utilising storage as a solution to reduce storm overflows.

Case Study 1: Fairlee WPS

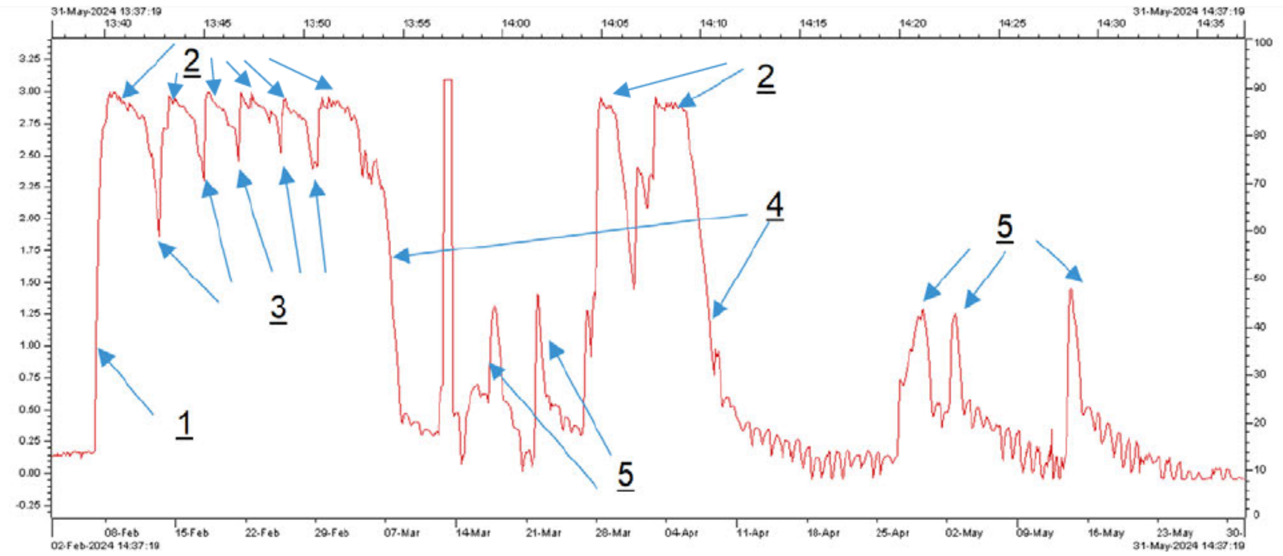
Background

Fairlee Pumping Station is required by permit to pass forward 218 l/s and store 3,000m3 of stormwater before discharge. During a storm, over 1500 l/s can pass through the site. Fairlee releases 81 times per year on average. The regional plan has estimated the site requires 10,970m3 of additional storage to reduce the spill count to 10 spills per year.

In May 2023, an additional 10,000m^3 of storm storage was utilised by bringing online redundant aeration ditches.

Performance

The below chart plots the level in the additional 10,000m^3 storage between Feburary and May 2024.



Key

1 – Storage fill time – up to 24 hours
2 – Storage is exceeded and the site spills
3 – Site attempts to return but subsequent rainfall causes further spills
4 – Excessive return time of over 4 days
5 – Instances where storage has prevented a release.

- Fairlee released 78 times in 2023 despite the storage being tripled.
- Approximately 30 releases were avoided due to the additional storage.
- The additional storage remained full for all of October 2023 and February 2024 and was unable to return.
- Isolated rainfall events of up to 20mm were captured by the storage.
- Cumulative rainfall events over consecutive days filled up the storage and resulted in spills as the site could not return.

Commentary

This case study demonstrates the outcome of upgrading a reasonably large, urban works with a significant amount of storm storage. Building over 10,000m3 of storage from new would cost over £10,000,000, excluding land purchase costs.

The results were largely disappointing and the upgrade did not significantly reduce storm overflows. Whilst 2023 was a wet year, the storage was only effective in capturing isolated storms which were common during the summer. During winter months, the storage was exhausted when storms occurred on consecutive days because the site was unable to return flows quickly enough. It is not possible to increase the return rate of the site without increasing the pass forward rate and capacity of the downstream wastewater network.

Even if the storm return rate was increased, or optimised, many storm events lasted several days. Significantly increasing Fairlee's storm storage further would not reduce storm overflow events to 10 per year on average.

Case Study 2: Shorwell WTW

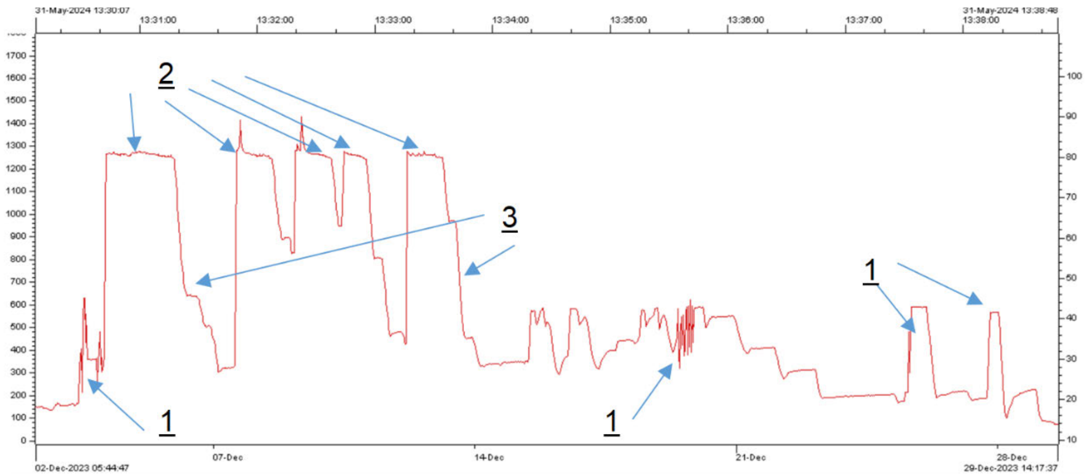
Background

Shorwell Wastewater Treatment Works is required by permit to pass forward 3.5 l/s and store 12.7m3 of stormwater before discharge. During a storm, over 20 l/s can pass through the site. Shorwell releases 47 times per year on average. The regional plan estimates the site will require 794m3 of additional storage to reduce the spills to 10 per year.

In September 2023, an additional 375m3 of storm storage was utilised by installing 5 mobile 'nurse tanks'.

Performance

The below chart plots the level in Shorwell's storage tanks in December 2023.

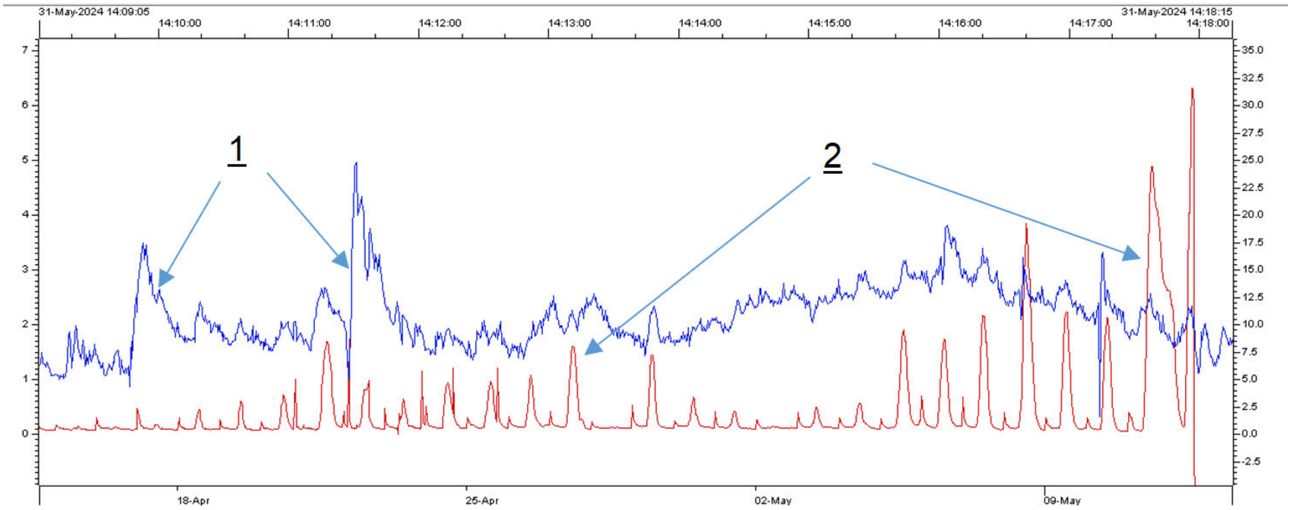


Key
1 – Pumps fill nurse tanks and avoid release
2 – Storage exhausted and site releases
3 – Excessive drain/return time

- Shorwell released 46 times in 2023 despite having nearly 30 times the storage capacity.

- Approximately 27 releases were avoided due to the additional storage.
- The additional storage remained full for all of October 2023 and February 2024 and was unable to return.
- Isolated rainfall events of up to 15mm were captured by the storage.
- Cumulative rainfall events over consecutive days filled up the storage and resulted in spills as the site could not return.
- Flows above the permitted 3.5l/s occurred for many days after a storm resulting storage being filled and the inability to return.
- The inability to return resulted in detriment to the downstream treatment in the form of sludge and septicity.

Chart showing Turbidity and Ammonia spikes during storm return



Key
1 – Turbidity spikes
2 – Ammonia spikes

Commentary

This case study demonstrates the outcome of upgrading a small, rural works with a significant amount of storm storage.

The results were largely disappointing and the upgrade did not significantly reduce storm overflows. Whilst 2023 was a wet year, the storage was only effective in capturing isolated storms which were common during the summer. During winter months, the storage was exhausted when storms occurred on consecutive days because the site was unable to return flows quickly enough. Furthermore, excess flow persisted for several days after a storm which exhausted the storage as well as stopped the site from returning. It is not possible to increase the return rate of the site without increasing the pass forward rate and treatment capacity.

The storm storage tanks were ultimately dismantled due to the risk posed to the downstream treatment.

If the storm return rate was increased or optimised the outcome would not change because many storm events lasted several days. Significantly increasing Shorwell's storm storage further would not reduce storm overflow events to 10 spills or less per year.

Case Study 3: Prichetts Way WPS

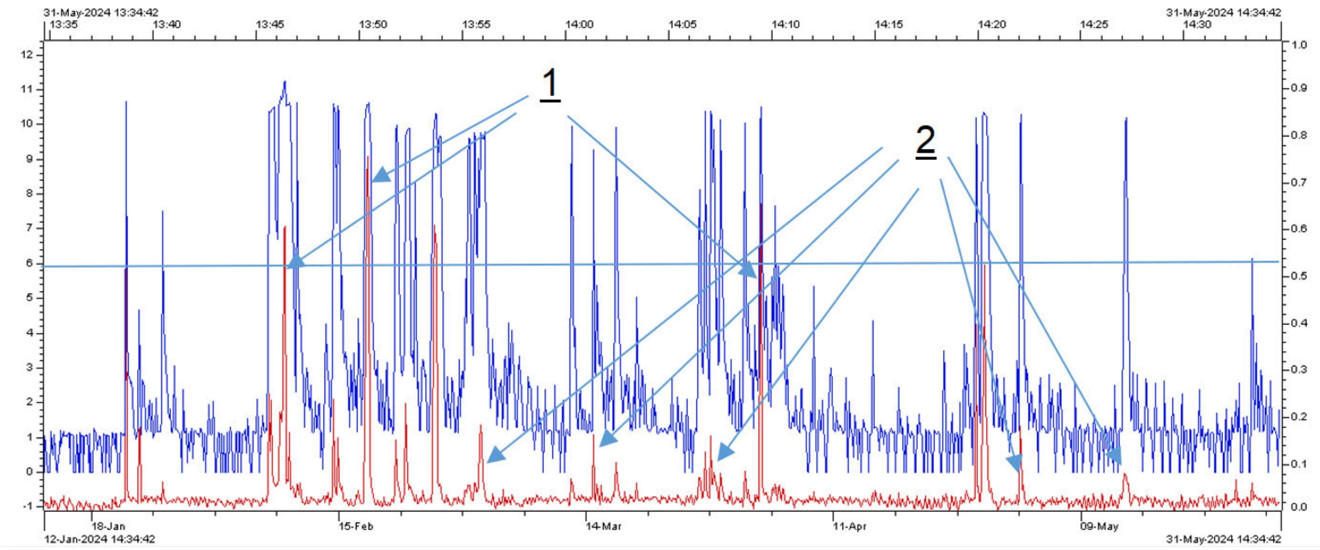
Background

Prichetts Way Pumping Station is required by permit to pass forward 10 l/s and does not have any storm storage before discharge. During a storm, over 30 l/s can pass through the site. Prichetts Way releases 46 times per year on average. The regional plan estimates the site requires 799m3 of additional storage to bring the spills down to 10 spills per year.

In November 2023, 225m3 of storm storage was utilised by installing 3 mobile 'nurse tanks'.

Performance

The below chart plots the flow rate of Prichetss way (blue) against the level in the CSO chamber between January and May 2024.



Key
Flow rate (l/s) Blue
CSO level Red
1 – Releases due to storm surge or mechanical failure
2 – Releases prevented due to additional storage.

- Between January and May 2024, Prichetts Way released 5 times.
- These releases were due to an initial storm surge triggering the EDM equipment or mechanical failure rather than the storage becoming exhausted.
- Approximately 27 releases were avoided due to the additional storage.
- The return rate of the additional storage was 6 l/s which was very high compared to the dry weather flow of the site.
- Following a storm, the incoming flow dropped very quickly which further aided the return rate.

Commentary

This case study demonstrates the outcome of installing additional storage on a small and flashy, rainfall-dominated catchment that currently does not have any storage.

The storage was effective in preventing storm overflows owing to several factors including short storm duration, fast return rate and relatively low flows due to it being a small catchment. Spills were observed due to mechanical failure and an initial storm surge which overwhelmed the pumps, triggering the EDM equipment.

There is a possibility that the installation of additional storage at this site will decrease releases to under 10 per year without the requirement for further intervention.

Appendix B: Case Study – Lavant WwTW Wetland

The River Lavant and Lavant WWTW

The River Lavant is a winterbourne chalk stream which rises at East Dean and flows through the parishes of Charlton, Singleton, West Dean and Lavant to Chichester.

Lavant WWTW serves a population of approximately 2,600 from these parishes, the sewerage network draining to a WWTW which is situated in a chalk catchment with a high groundwater table. The groundwater infiltrates the sewerage network during some months of the year.

During high groundwater periods infiltration can cause the works to be overwhelmed, resulting in storm tanks discharging for many weeks. Resulting spills are often referred to as 'dry-day spills'.

What can we do to reduce the impact of spills to the environment?

Alongside relining the private and public sewer networks to reduce infiltration and the duration of number of spills, we have constructed a wetland to treat flows from the storm tank to meet the discharge standards required by the Environment Agency.

What is a Wetland and why use them?

An integrated constructed wetland (ICW) is one of a group of 'nature-based solutions' which can be used as part of wastewater treatment processes and deliver a variety of wider multiple benefits. The main benefits to wastewater treatment are water quality improvements and the management of water flows to reduce the impact of downstream flooding. However, by using a nature-based solutions we can deliver multiple wider benefits including:

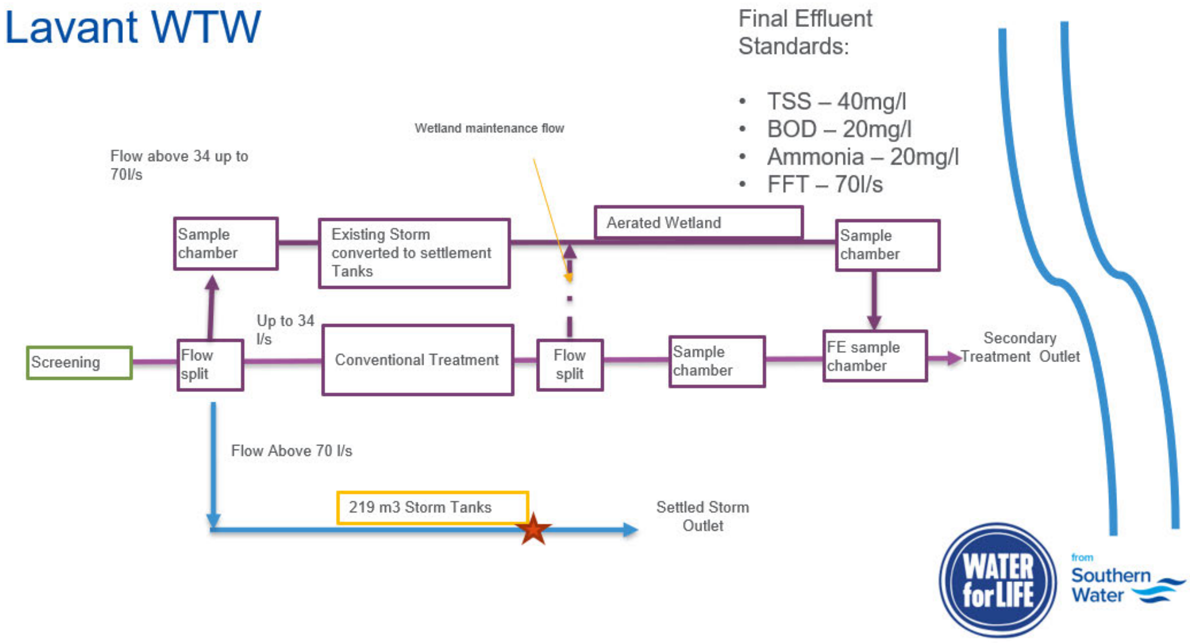
- an increase in biodiversity
- carbon dioxide sequestration
- other social and economic benefits as result of increasing the visual amenity value of an area.

Integrated constructed wetlands can be designed in several ways, ranging from vertical aerated reedbeds through to naturally designed wetlands.

Lavant WWTW treatment process

Before we created the wetland the permitted Full Flow to Treatment (FFT) was 34l/s, with flows treated by a conventional trickling filter process (FFT is the amount of flow we must treat before discharging to storm tanks). At times of high groundwater flows exceeding FFT are discharged to the environment after being settled in a storm tank.

An aerated wetland has been added downstream of the storm tank to treat flows above 34l/s. Using the wetland we can treat a further 36l/s to current permitted effluent standards during high groundwater conditions. This increases FFT to 70l/s and reduces spills to the environment on ‘dry days’. Flows from the wetland combine with flows from the conventional process stream prior to discharge to the River Lavant.



How is the wetland performing?

The required Environment Agency permit discharge standards for Lavant WWTW are:

Total Suspended Solids (TSS)	40mg/l
Biochemical Oxygen Demand (BOD)	20mg/l
Ammonia	20mg/l.

We have set up a monitoring programme for both conventional and wetland process streams for parameters which are required by the permit and some others as well. Both show good compliance with required standards and the performance for both streams is similar. In some cases it is better for the wetland process. For example, TSS, BOD, Total Nitrogen and Total Phosphorus are often better from the wetland than from the conventional process.

Data is presented in the tables below.

Wetland Data:

	permitted parameters			non permitted parameters			
Date	TSS mg/l	BOD mg/l	Ammonia mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	E.COLI (PRESUMPTIVE) number per 100 ml	ENTEROCOCCI (SPECIES) number per 100 ml
15/11/23	3.9	2.32	2.76	6.97	0.440	1300	250
13/12/23	2.9	2.23	1.7	5.21	0.401	7000	970
17/01/24	4.80	2.64	3.49	6.08	0.524	5000	1300
08/02/24	4.2	3.00	1.49	6.72	0.393	6000	3000
19/02/24	2.0	3.3	1.41	4.25	0.5	5000	670
04/03/24	2	2.18	0.884	5.77	0.401	11000	2300
21/04/24	2.75	4.5	1.03	5.74	0.490	50000	6600

Conventional Treatment process data (Trickling Biological Filters)

	permitted parameters			non permitted parameters			
Date	TSS mg/l	BOD mg/l	Ammonia mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	E.COLI (PRESUMPTIVE) number per 100 ml	ENTEROCOCCI (SPECIES) number per 100 ml
15/11/23	17	4.01	0.692	8.58	0.767	8000	3200
13/12/23	17.2	3.26	0.446	7.51	0.697	21000	3400
17/01/24	16.20	4.24	0.183	7.00	0.699	2000	1500
08/02/24	13.6	4.9	0.523	9.41	0.773	200000	3100
19/02/24	11.2	5.6	0.284	7.14	0.803	5000	1500
04/03/24	15.5	3.94	0.21	8.5	0.773	no result	no result
21/04/24	9.1	5.86	0.256	7.94	0.663	30000	2100

Appendix C: Case Study - Practical Application for Storm Overflow Reduction

Introduction

For many decades, water companies have delivered environmental improvements through 'end-of-pipe' solutions such as increases in treatment capacity or storage. Following the publication of the Environment Act and Defra's Storm Overflow Reduction Plan, water companies are required to reduce annual releases from each CSO to under 10 per year.

It is common for an urban, combined wastewater system to receive 10 times its dry weather flow during a storm. As such it is simply not practical or economical to build storage or treatment capacity big enough to meet this requirement. Moreover, due to the absence of any stormwater carrier system, a wholescale stormwater separation scheme would be too disruptive and expensive.

Around 40% of the flow in a combined system during a storm comes from the public highway. To achieve the required reduction in releases, a large amount of the contributing impermeable area needs to be managed or disconnected.

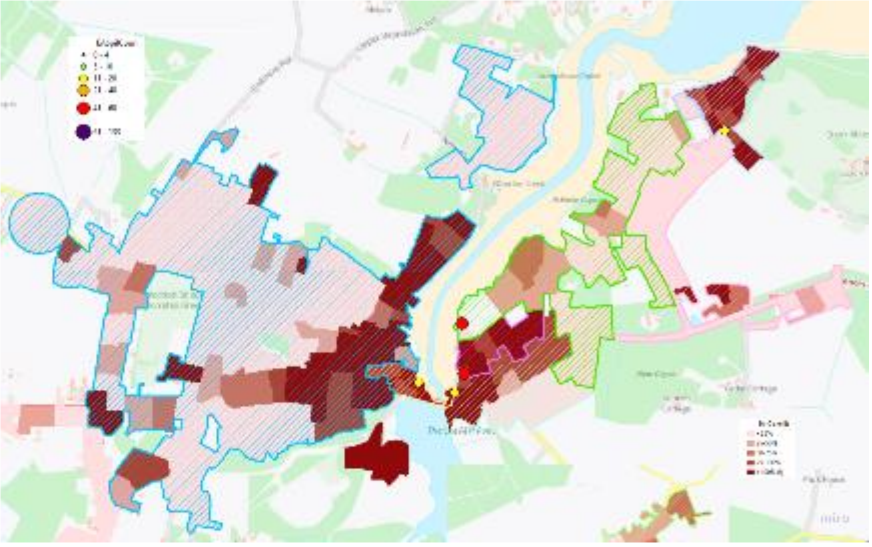
SuDS have become mandatory for larger developments and are often used for the purpose of flood alleviation. Southern Water's Cleaner Rivers and Seas Taskforce has been experimenting with new ideas and techniques to reduce storm overflows. Several projects are currently ongoing to deliver SuDS in a range of environments and settings.

This report uses the experience and findings from 7 SuDS schemes to make recommendations on how to accelerate the delivery of SuDS with local authorities.

Desk Study and Targeting

Prior to any intervention, it is important to understand the root cause of the excessive CSO activations and the seasonality factor. If the root cause is infiltration, tidal or operational, then SuDS will not be an effective solution.

If the dominant factor of the CSO activations is rainfall, then the hydraulic model must be consulted to understand which areas of the catchment are contributing. The diagram below shows a 'heatmap' of the impermeable area contributing towards excessive flow.



From this, a shortlist can be made of the car parks, pavements and roads which would need to be managed to remove or attenuate flow from the combined system. At this stage, some sites may be discarded due to road width, traffic or other local factors.

Connectivity and Feasibility

Once a shortlist has been created, an extensive connectivity survey needs to take place to confirm that all the water from the publicly maintainable highway does indeed communicate with the combined sewerage system.

Initial site visits can then take place with designers and landscape architects to check levels and practicalities for each site.

Design Considerations

SuDS have previously been utilised to alleviate flooding, and as such have design standards to cope with 1–50-year events or greater. To reduce storm overflows, SuDS need to intercept and manage around 20-30mm of rainfall. This is significantly less, which reduces the cost, capacity and footprint of any apparatus installed.

CSO activation is a function of how much connected impermeable area the catchment serves. To significantly reduce CSO activation, a large percentage of this impermeable area will need to be disconnected or managed. Having a range of designs agreed by both the water company and local authority which can be installed in a variety of urban settings can accomplish this. Stock designs for rain gardens, pocket basins, tree pits and permeable paving have been created. With minor adjustment, they can be installed in almost every urban setting. Where there is existing unmade ground or green area, consideration should be given for an appropriate attenuation feature. This would be cheaper and more effective than designing a new one.

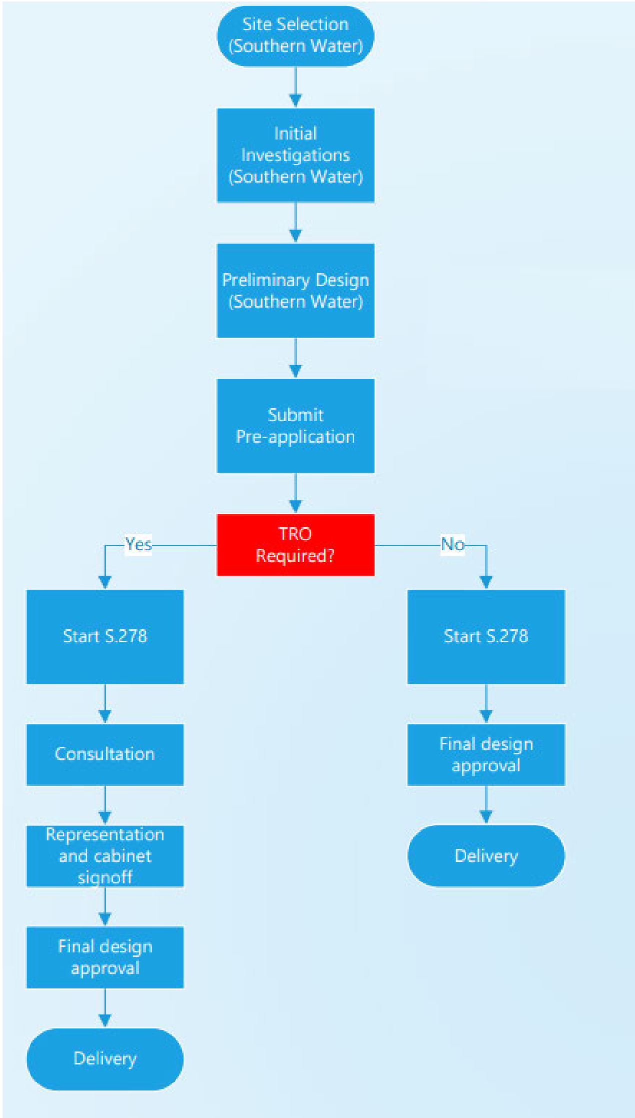
When installing sustainable drainage in an urban setting, it is likely designs will encroach on buried services. There is a lack of statutory guidance or best practice when it comes to the requirement to divert or incorporate services within a SuDS feature. An argument was made that SuDs features will make it easier to access buried services, cheaper to reinstate and offer more favourable conditions than the sub-base of the highway.

Governance

A significant amount of red-tape is required to install retrofit SuDS on the Public Highway. Once a provisional design has been created, the applicant must have a pre-application meeting with the Highway Authority. At that meeting advice will be given on the acceptability of the design and what the recommended next steps are. This usually involves minor amendments to the design. A Road Safety Audit must also take place to ensure any alterations to the public highway will not cause unacceptable risk.

The final designs are submitted to the local authority who will scrutinise and advise whether a Traffic Regulation Order is required. This will be in conjunction with a S.278 which covers the adoption standards of new highway installations as well as maintenance and bonds.

If a traffic regulation order is not required for the works, then they can commence through the normal highways notification process. If a TRO is required, there is a period of formal consultation followed by a representation period. This then needs to be approved by the cabinet of the council. In designing the SuDS this report recommends making use of the preapplication process to ensure that TRO works will not be required.



Delivery

Some local authorities have in-house engineering teams whereas others have contracted PFI arrangements for highways. Due to resource constraints, neither has been a suitable method to deliver highway SuDS for storm overflow reduction. This may change in AMP8 when water companies will be required to scale up their investment. The ability to create capital may incentivise; local authorities to deliver more of this work.

For AMP7 schemes Southern Water has utilised its existing framework and delivery partners owing to the flexibility and agility of the delivery route.

Despite this, water companies need to be vigilant for opportunities to collaborate with any works where SuDS could be installed at the same time. Examples of this would be regeneration schemes, traffic calming schemes or resurfacing works. Making a financial or design contribution to a project is extremely beneficial to both parties, maximising the scope of works as well as manging impermeable area.

Organisational Considerations

Local authorities are generally risk averse and have significant concerns regarding ownership, maintenance and liability of new apparatus. After spending a significant amount of time progressing these issues with local officers, it was effective to have executive level buy in for new SuDS schemes. This was governed by a Memorandum of Understanding to agree maintenance costs as well as adoption.

Local authorities are multi-disciplinary and have many targets and drivers. Many of these drivers align with sustainable drainage and CSO reduction including flooding (LLFA), beach safety, Net Zero, Local Nature Recovery (LNRS) and biodiversity net gain (BNG). In proposing such schemes, it is important to link benefits to other local authority drivers.

Conclusions

In many urban catchments, retrofitting SuDS will be the only practical way to remove or attenuate stormwater to reduce CSO activation frequency. Water companies will need to find a way to fast track the design and delivery of SuDS features.

This will involve creating a range of suitable designs that can be applied to a diverse range of settings and seeking opportunities to collaboratively install SuDS where other utilities or organisations are working.

Executive leadership and desire from both organisations is essential to support teams who are not currently resourced or required to deliver schemes such as this. Leadership can support with removing constraints as well as hasten decision making.

End