Groundwater Impacted System Management Plan

Reading, River Kennet

September 2021

Thames Water

Version control

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1-d2	25/08/2021	Final Draft for EA	AJ	SE	DJ
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Annual Update 2022	October 2022	Addition of Annual Update 2022	MB/JH	DJ	DJ
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Introduction

This document sets out Thames Water's approach to the management of groundwater infiltration in sewerage systems where the influence of groundwater infiltration is viewed as significant likely leading to the sewerage system, on occasions, to become overwhelmed.

All sewerage systems combined and separate will experience some groundwater infiltration[1] and a nominal allowance in design will be made for this. However, in some catchments the impact of groundwater infiltration can be considerable leading to impacts on service during periods of high groundwater, typically during the winter.

Groundwater can enter the sewerage system through the pipes and manholes, this may occur at a defect (crack, hole, displaced joint) or on a normal joint on the sewer or in the manhole. A key point to note is that where infiltration occurs it is not necessarily an indicator that the sewer is in poor structural state simply that jointing techniques used are not completely watertight.

Ingress of groundwater is not limited to the public system that Thames Water owns and maintains but potentially the private drains, manholes and sewers that connect to our system.

Preventing and reducing the impact of groundwater infiltration is predominately achieved through the lining of sewers and sealing of manholes. This entails the application of a synthetic liner within the pipe that creates a contiguous membrane for the length of the pipe or possibly section if the source of ingress can be narrowed down. For manholes it will typically entail sealing in a similar manner.

To line all sewers and manholes within most catchments would be prohibitively expensive to do so. Our approach to date has been centred on a 'find and fix' basis which has involved monitoring and investigating the networks in periods of high groundwater to identify sources of ingress and fix as we find them. This approach is constrained for the reason that investigations are typically limited to periods of high groundwater and when high groundwater occurs there are limited windows of time in which investigations can be successfully undertaken before flows either subside or the system is fully surcharged meaning CCTV surveys are not possible[2]. Once sections of sewers have been lined, it will be a case of waiting until high groundwater levels reoccur to assess the effectiveness of the work undertaken, which may not be the subsequent winter but several years later.

It is recognised that the 'find and fix' approach to date lacks a degree of certainty of resolution and for this reason Thames Water in 2020 undertook a different approach for long term management of groundwater, which is covered within this

1 Sewers for Adoption makes an allowance for 10% of peak wastewater flow to allow for unaccounted flows such as groundwater infiltration.

2 On occasions it is possible to over-pump between manholes to isolate sections of sewer tsurvey, this is not always feasible when the flows involved are simply too great to over-pump or the location prohibits this approach.

document under the plan section. These plans require significant investment which Thames Water will seek to secure through the price review process as service enhancement. In the meantime, we will continue to investigate sources of infiltration when it occurs and where feasible, undertake the work through our capital maintenance budgets. We refer to these as 'minor works' opportunities i.e. where we have high degree of certainty of reducing point sources of infiltration and can do so with reasonable costs and time.

The structure of this document has been created with input from the Environment Agency. Sections covered in this document include our 'Outline Plan' with timescales, Mitigation i.e. how we intend to manage the risk until our plan is fully implemented and when we will publish future updates on progress against this plan.

Brief description of Reading catchment

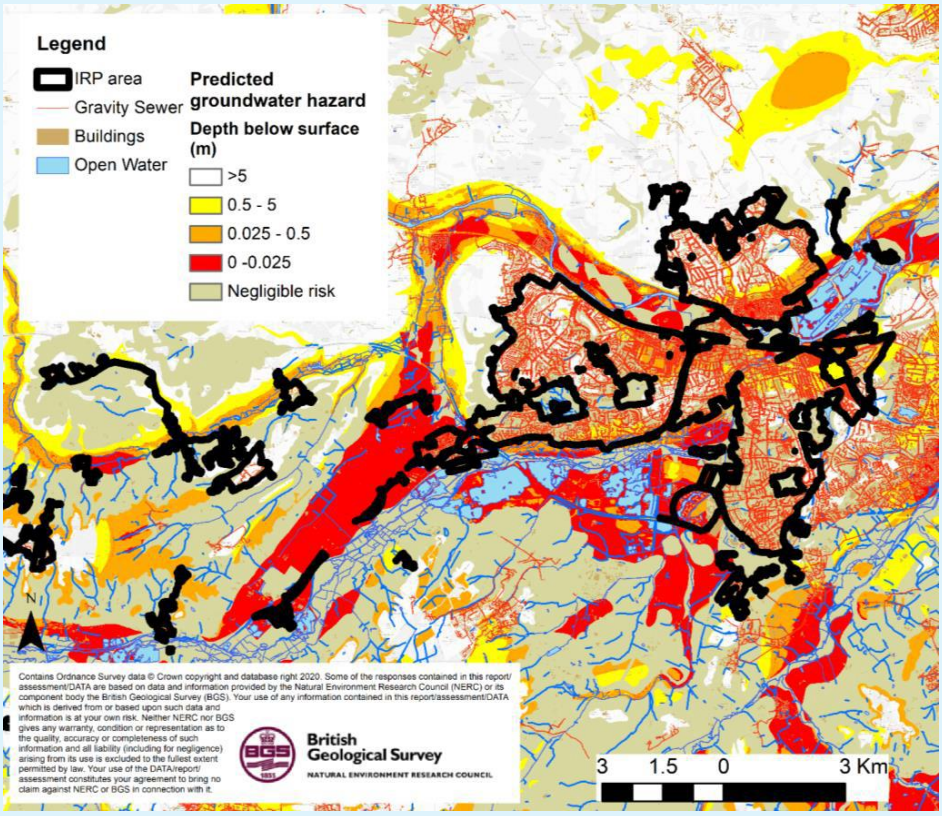

Figure 1.0 – Reading catchment

Reading is located in Berkshire, England, approximately 15 miles east of Newbury. Reading serves a population equivalent[3] of 223,106 with a predominantly separate sewerage network totaling some 1,656 km in length excluding private drains and sewers. The extent of the catchment is shown in Figure 1.0 above.

Problem Characterisation

Groundwater has potential to enter our sewers when levels are high and a positive head above the soffit of the sewer is created. Significant groundwater ingress can impact sewer capacity and increase the risk of the network being overwhelmed. There's a strong link between the rising river levels that cause rising groundwater levels across the Reading area, and the drainage issues some of our customers have experienced, including sewer flooding and restricted use of their toilets and bathrooms.

[3] Population equivalent based on unit per capita loading (PE), in waste-water treatment is the number expressing the ratio of the sum of the pollution load produced during 24 hours by industrial facilities and services to the individual pollution load in household sewage produced by one person in the same time.

Additionally, prolonged and heavy rainfall and raised groundwater levels have overwhelmed the sewer system causing problems with properties suffering from significant sewer flooding.

The sewerage system is identified on the public sewer records as being a predominantly separate foul system, rather than a combined system. We believe that significant volumes of surface water runoff from surrounding saturated fields and built-up land have entered the foul sewerage network during recent wet winters, causing the network to become overloaded and surcharge (mainly through submerged manholes).

The historical surveys we have carried out have detected that there is some evidence of unwanted flows in the foul sewer network when groundwater levels are high, and surface water inundation from highways, public spaces and properties and fluvial flooding from local watercourses. Surface water misconnections (i.e. down pipes from roofs into the sewer network) are also suspected to be a contributing factor, hence further analysis is required to determine the extent to which this has contributed to sewer flooding. The previous studies have areas of Theale, Padworth and Aldermaston Wharf as particularly prone to groundwater infiltration, however CCTV surveys currently ongoing will improve our understanding.

A number of our sewerage systems include for overflows, these structures are there to protect against sewer flooding as a result of rainfall or equipment failure where appropriate. Discharges from these structures should not be impacted by excessive infiltration as detailed by the EA Regulatory Position Statement on groundwater impacted sewerage systems. The use of storm sewage overflows is accepted by our regulators, subject to conditions.

We believe it is likely that groundwater infiltration in the Reading catchment is the most probable cause of incidences where the network has not been able to cope with all incoming flows, triggering problems to homes. The root causes of sewer surcharges require all stakeholders responsible for drainage in the catchment to resolve them together.

Our permit conditions for Reading STW state: *"The discharge shall only occur when and only for as long as the flow passed forward is equal to or greater than the overflow setting indicated due to rainfall and/or snow melt."* and *"Off-line storm storage must be fully utilised before a discharge occurs. It shall only fill when the flow passed forward is equal to or greater than the overflow setting indicated due to rainfall and/or snow melt and shall be emptied and its contents returned to the continuation flow as soon as reasonably practicable."*

Reading STW is not experiencing prolonged spills as a result of groundwater infiltration.

The Flood and Water Management Act 2010 places a responsibility on Lead Local Flood Authorities (LLFAs), to manage flood risk from surface and groundwater, plus a duty on all Risk Management Authorities (RMAs), to cooperate regarding flood risk. In our role as an RMA, Thames Water will work with Wokingham Borough Council and Reading Borough Council, West Berkshire Council as Lead Local Flood Authorities, Council and Planning Authorities, in addition to the Environment Agency to ensure that a collaborative approach can be developed to address the problems.

Thames Water also has a statutory obligation to comply with environmental legislation. The Water Framework Directive establishes a strategic approach to managing the water environment, which the Environment Agency achieves through River Basin Management Plans and setting environmental objectives for groundwater and surface water. The environment is also protected from adverse effects of discharges of urban wastewater through the Urban Wastewater Treatment Directive, which requires us to improve and extend the sewerage system according to section 94 of the Water Industry Act (1991).

Anticipated unavoidable discharges

Within recent years there have been unavoidable sewage escapes in the network as a result of surcharging manholes causing pollution.

We anticipate that this situation may continue until such time we are able to implement a long-term solution.

No mitigation in the form of temporary overflows has been undertaken in this system.

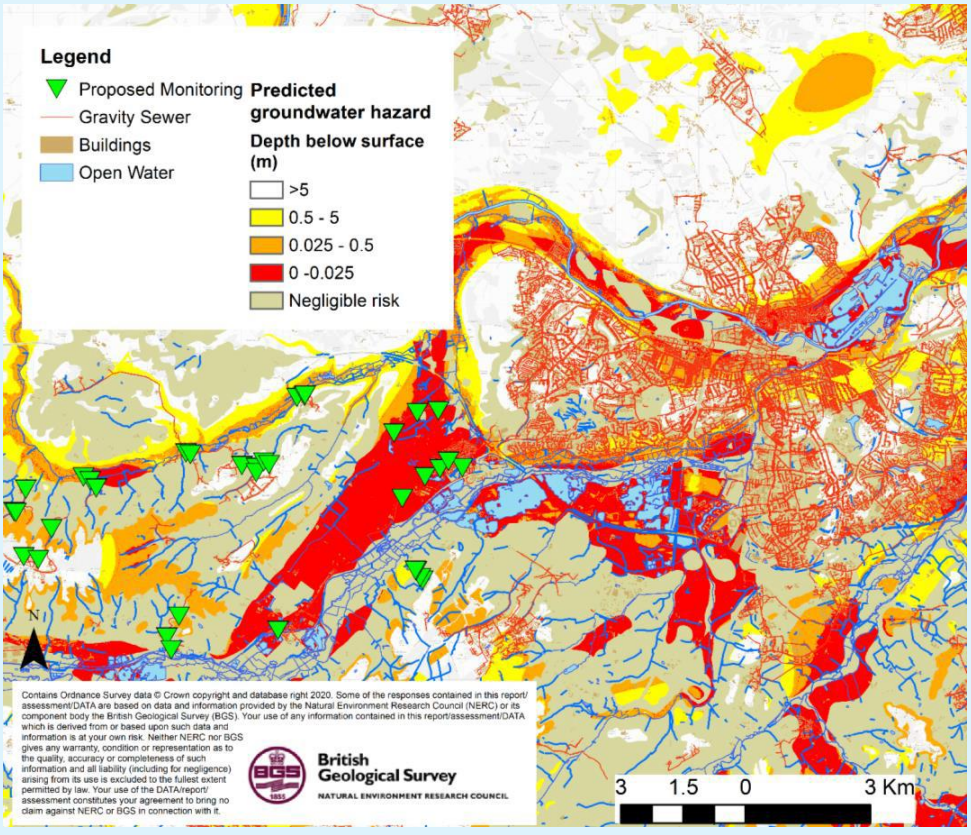

Figure 2.0 – Reading monitoring plan area and infiltration zones

Key to bringing the impact of groundwater infiltration under control is an enhanced monitoring regime. We have identified zones and areas over which telemetered depth monitoring will be installed. Figure 2.0 presents a plan of currently proposed installation locations.

Complementing the flow [at the treatment works] and depth measurement [in the sewer network] we will use pumping station run time data, rainfall data, river level data, and groundwater level data to create a full picture of movement and source of flows around the catchment.

Zones of Groundwater Risk

We engaged with JBA Consulting to develop plans for Reading that identify zones of groundwater risk, see Figure 2.0. These zones are modelled areas where the groundwater has been determined to be above the sewer and hence pose a potential risk for groundwater ingress.

The sewer depth monitors referred to earlier will be sited in and around these zones to verify and calibrate the risk in each of the zones.

If following the proposal to the sealing in part or wholly[4] of the high risk zones, should it be required, the system is found to be still experiencing excessive infiltration we would then look to potentially seal 'private' laterals and/or drains along with starting to seal the medium to low risk zones.

This document sets out an unconstrained approach to resolving the impact of groundwater infiltration within the system.

Investment to address infiltration will be assessed and prioritised against other drivers e.g. STW upgrades, both in the catchment and across the region at each price review.

With this plan we remain committed to minimising the impact of groundwater on the sewerage system in Reading.

Our general medium to long term plan is therefore to apply a hierarchy to sealing the sewer as follows:

Activity	When	Description
Model Zones	2020/21	JBA have been engaged to undertake modelling activities to identify the areas (zones) to be targeted for sealing in the 56 systems identified as being impacted by infiltration in the Thames Water region.
Install monitors	2021-2023	Monitoring plans are being developed to help calibrate and validate the zones. Each year completeness / coverage monitors will be reviewed and added to / or modified as necessary.
Calibrate zones	Refined each year	Following each winter, we intend to review the data from the monitors and if necessary, redefine the zones.
Look & Lift	Each winter	The look & lift surveys have two purposes, firstly to compliment the monitoring and secondly to identify 'quick fixes' that we would address through our normal capital maintenance.
CCTV	2020-2023 (ongoing)	Required to confirm sewer condition and provide information to assist with costing any sewer lining.

[4] Decisions regarding the extent of sealing will be based on outcomes of works undertaken to date, result of monitoring and successful submission of our plans for investment.

Activity	When	Description
Minor works	2020-2023	As mentioned, if we detect minor works being required, we will look to resolve these as and when we find them.
PR24 / Price Review	2023/24	Ideally through monitoring and on-going investigations work towards managing the infiltration risk, in AMP7, will be successful. However, in the absence of evidence justifying the need not to undertake sealing of the high-risk zone this is to be included as part of PR24 investment plan. This work will be subject to Cost Benefit Analysis and Best Technical Knowledge Not Entailing Excessive Cost (BTKNEEC assessments).
High risk zone sealing	2025-30	Sealing of high-risk zone undertaken subject to need being demonstrated.

As detailed above the impact of infiltration is experienced in the network.

Our approach to the resolution of infiltration impacting the Reading

sewerage system is outlined below.

High level approach statement

For Reading our approach to tackling infiltration will be undertaken as follows:

1. We will investigate the network with a view to identifying sources of ingress of infiltration that are cost effective[5] to address. To investigate the network, we have:

- Undertaken a desktop analysis to determine infiltration high to low-risk zones (October 2020);

- Undertaken sample CCTV in the high to low-risk zones to assess the general asset health of the sewers and manholes (ongoing).

To investigate the network, we will:

- Install monitoring to back up the analysis and to aide focusing of locations for identification of infiltration (2021 to 2023). Each year we will assess the completeness of monitoring and if required add to or modify the current locations.

We will also review results of Winter 2019/20 and 2020/21 with historic data to build up evidence to support interventions in the network (Autumn).

2. Where interventions can be undertaken as part of normal sewer maintenance activities these will be communicated and progressed.

3. If significant investment is identified as being required, then this will need

   to be considered in terms of relative need compared to other systems being investigated for infiltration reduction. However, where viable opportunities are identified these will be included in our AMP9 (2030-35) programme of investment.
   Significant investment needs may need to be included in our future investment cycles.

5 Assessment of cost effectiveness is based on assessment of the ratio of the cost of a solution to the monetised benefit gained from implementing the solution i.e. reduction in flood/pollution risk and/or reduced operating costs.

Investigations

As mentioned above JBA Consulting have been supporting by undertaking an exercise involving assessing groundwater elevation data to determine which areas of the network are potentially below the groundwater table during high groundwater periods.

Site investigations, undertaken by Dene- Tech and our Customer Field Services (Thames Water Operations) have included 'look & lift' surveys, CCTV and where necessary dye tracing to confirm connectivity.

A table of the work undertaken is included in the appendix to this report.

Monitoring

Sewer Depth Monitors will be installed in the catchment from 2021 onwards. These devices are telemetered and provide real time data on the level of flow in the sewer.

The purpose of these units is to act as alerts for high groundwater impact in the sewer, calibration of the zones of infiltration risk and to demonstrate benefit gained from work undertaken to reduce infiltration. They will also provide evidence in the future of further need to manage the impact of infiltration.

Mitigation

On occasions to avoid flooding of properties or to manage the risk of damage to the environment we may undertake tankering from (manholes) points on the network, make use of pumps to manage flows or deploy settlement tanks to part treat sewage before release to the environment.

With regard to Reading we do not envisage needing to undertake mitigation work within the network.

Updates

Work on the Groundwater infiltration management plan will continue, and we will aim to provide updates annually by the end of October each year

Appendix
Groundwater infiltration potential analysis

The sewer network classified by the groundwater infiltration risk zones. The lengths of sewers within these zones are presented in the table below.

Risk category	Description	Length (km)	Percentage
High	Predicted groundwater extreme >1m above pipe invert	95.21	20.7
Medium	Predicted groundwater extreme 0-1m above pipe invert	16.62	3.6
Low	Predicted groundwater extreme 0-1m below pipe invert	29.42	6.4
Very Low	Predicted groundwater extreme >1m below pipe invert	318.59	69.3
Total		459.84[6]	100

In addition, the table below presents the surface water flood risk classification for manholes within the catchment.

Manholes by Surface Water Inundation Risk Category

Risk category	Description	Number	Percentage
High	Inundation risk in 3.3% AEP fluvial or pluvial event	2353	13.7
Medium	Inundation risk in 1% AEP fluvial or pluvial event	1114	6.5
Low	Inundation risk in 0.1% AEP fluvial or pluvial event	3028	17.6
Very Low	All other manholes	10666	62.2
Total		17161	100

6 Total of sewer length is for length of mapped sewers only and will not include unmapped S105a transferred sewers in all cases.

Investigations & remedial work undertaken since 2019/20 and future plans

At the time of writing we are currently on site undertaking lift and look and CCTV surveys in the Reading system. A summary of findings will be provided in the next update of this report.

Glossary of terms

AEP – Annual Exceedance Potential

AMP – Asset Management Plan

CCTV – Closed Circuit Television

EA - Environment Agency

IRP – Infiltration Reduction Plans

MH – Manhole

STW – Sewage Treatment Works

WINEP – Water Industry National Environment Programme

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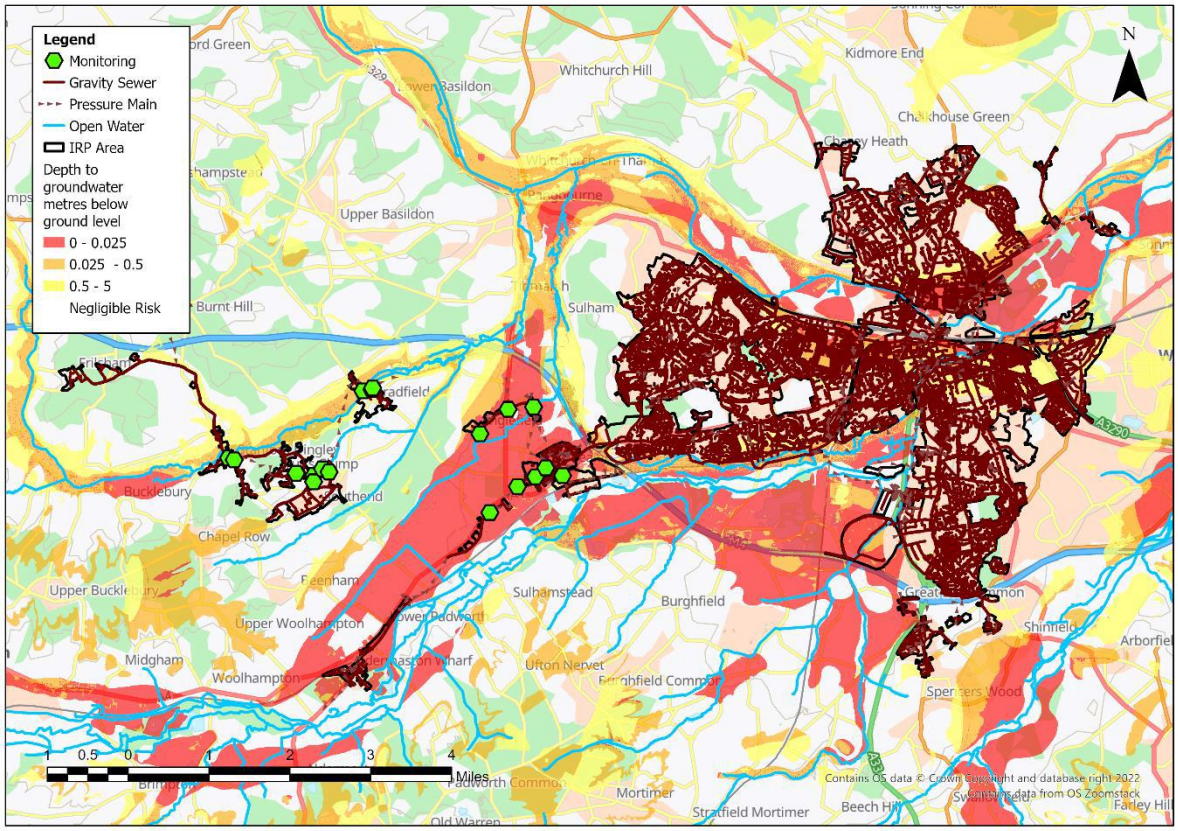
Overview

This addendum to the Reading Groundwater Impacted System Management Plan 2021 (GISMP) provides an update on performance/work undertaken in the Hydrological Year October 2021 to September 2022. The key points covered include:

- Hydrological conditions
- How the sewerage system has performed over this period
- Mitigation / remedial measures progressed over the last year and being planned
- Summary and plan for 2022/23

Figure 1 – Reading Monitoring Plan



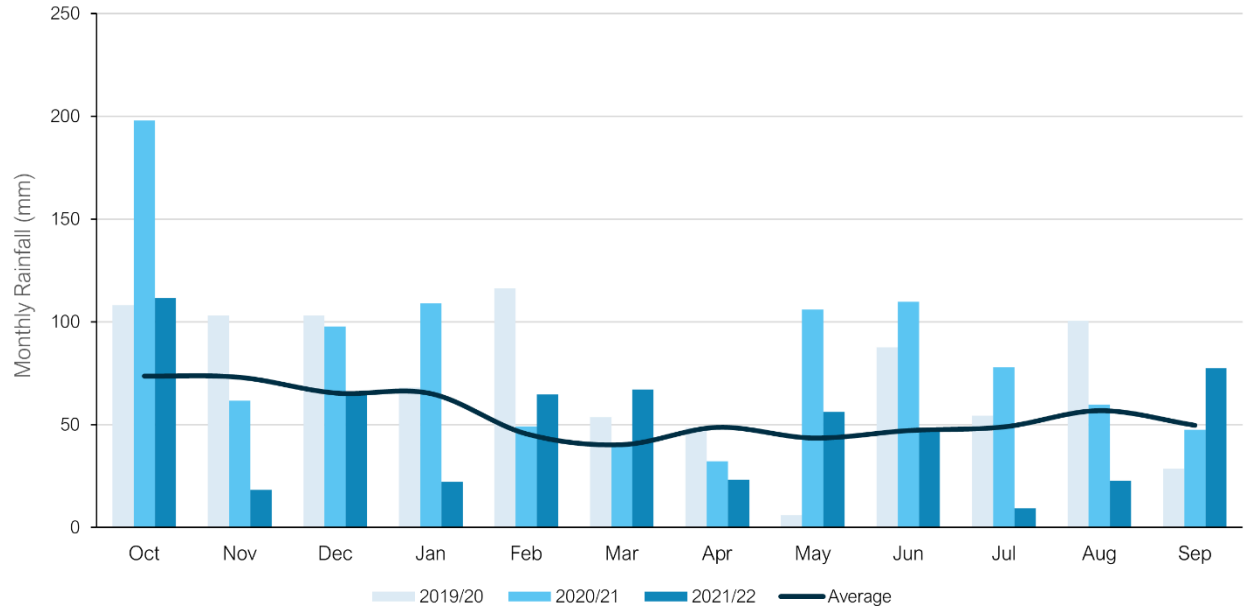
Hydrological Review – 2021-2022

This section summarises the hydrological conditions within the Reading catchment within the period under investigation and provides comparison against previous year's performance to put the annual performance into context. The hydrological review has been undertaken based on the Hydrological Year which runs October 1st to September 30th.

Catchment Rainfall

Representative Radar rainfall has been used to generate monthly data at catchment level for comparison with average data generated by local Met Office Weather Station Records. Figure 2 presents the comparison of this data for the last three hydrological years to support longer term trends within the local system.

Figure 2 – Monthly Rainfall Performance



Average values taken from Met Office Weather Station at Reading University based on the period 1991-2020

The total rainfall for the 2021/22 hydrological year is 10% below the annual average total. Total rainfall values are presented in Table 3 below.

Table 3 –Total Rainfall Based on Hydrological Year

Average (mm)	2019/20 (mm)	2020/21 (mm)	2021/22 (mm)
658	879	989	594

Groundwater / Local River Level

The Reading catchment is situated in the Chilterns West, Berkshire Downs, Enborne and Loddon water resources areas. It primarily sits in the Seaford Chalk Formation and Newhaven Chalk Formation, the Lambeth Group of clay, silt and sand, and the London Clay Formation of clay, silt and sand. The Seaford Chalk Formation and Newhaven Chalk Formation are designated principal aquifers within the UK.

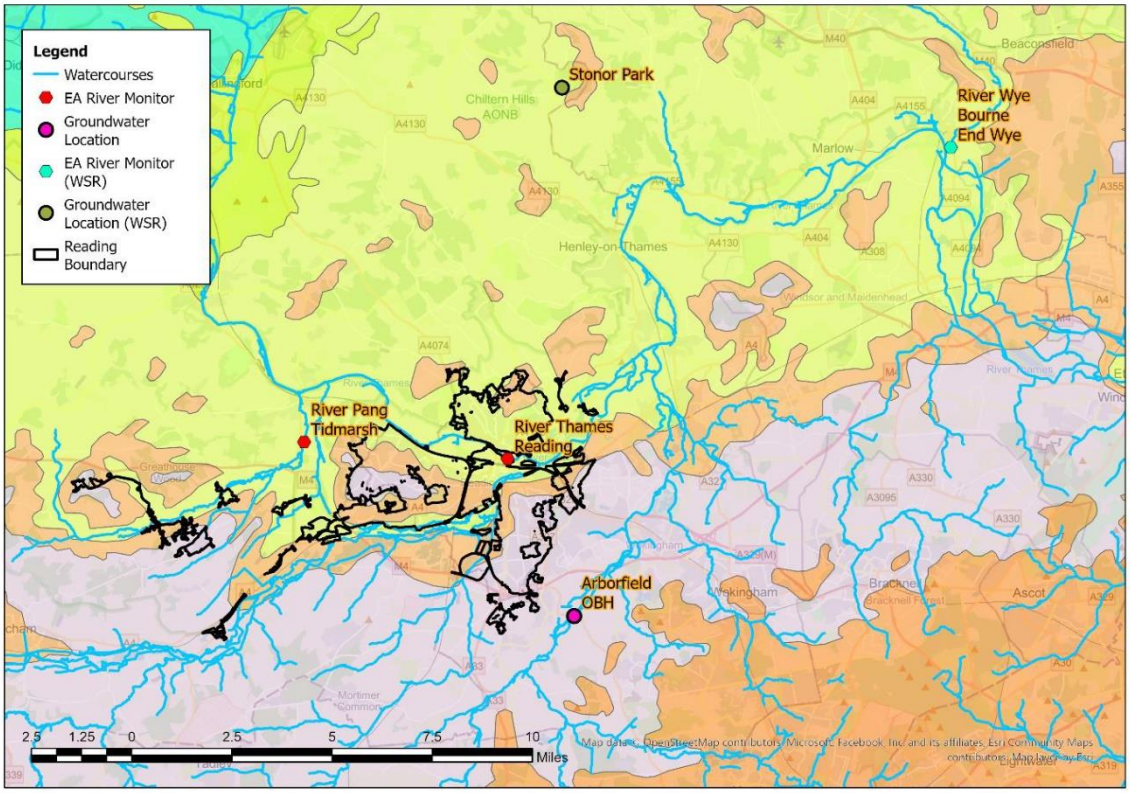
The Environment Agency has gauging stations on local watercourses measuring stage and observation boreholes measuring groundwater levels locally to the catchment which can be used to provide indicative local groundwater performance.

From previous investigations we have identified the following sites are good indicators of groundwater levels within the catchment.

- River Pang, Tidmarsh.
- River Thames, Reading.
- Arborfield OBH.

These sites are illustrated in the figure below, alongside the closest groundwater reference station and closest gauging station from the Water Situation Report.

Figure 4 – Local Monitoring Stations



The following figures represent the last three hydrological years of level information at the indicator sites to build a picture of the relative conditions prevalent in the current year. It is presented against both the daily total rainfall values for the catchment and a rolling 15 day total rainfall.

Figure 5A – River Pang, Tidmarsh

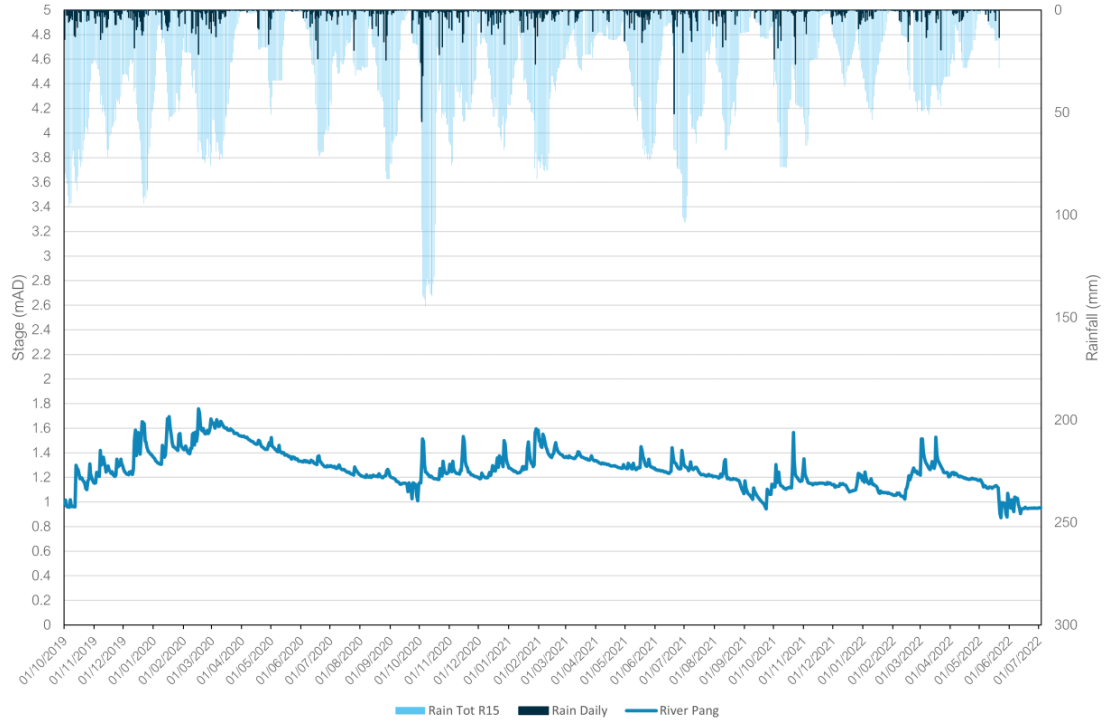


Figure 5B – River Thames, Reading

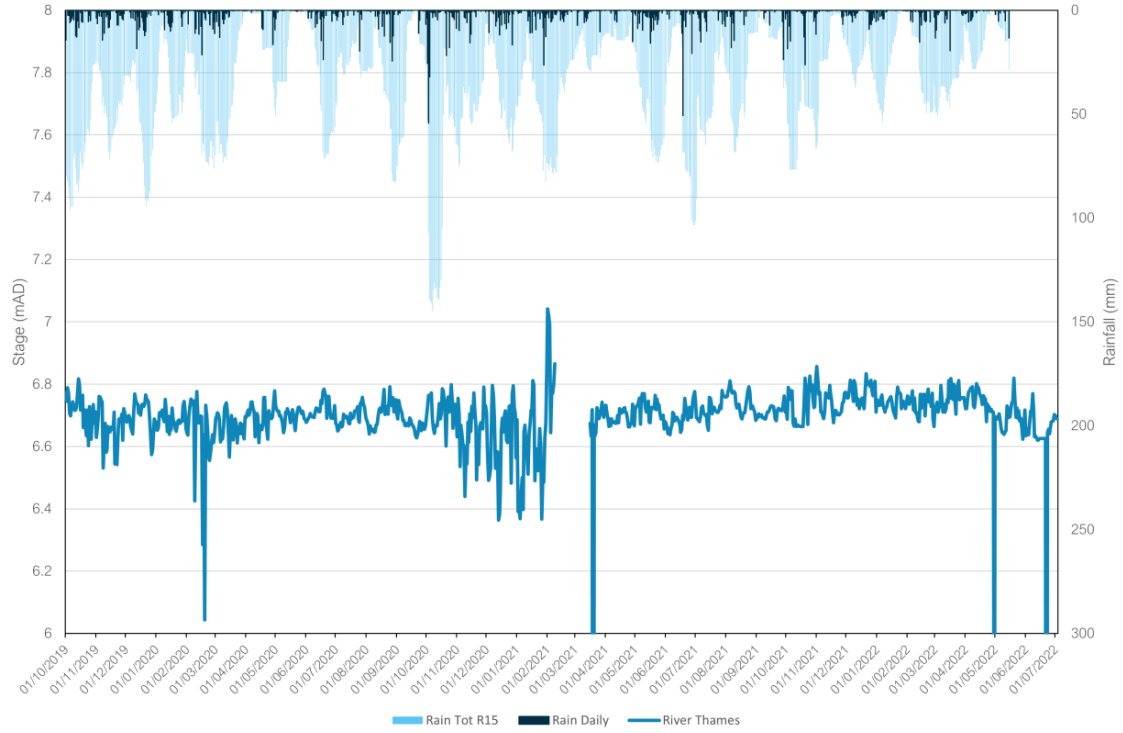
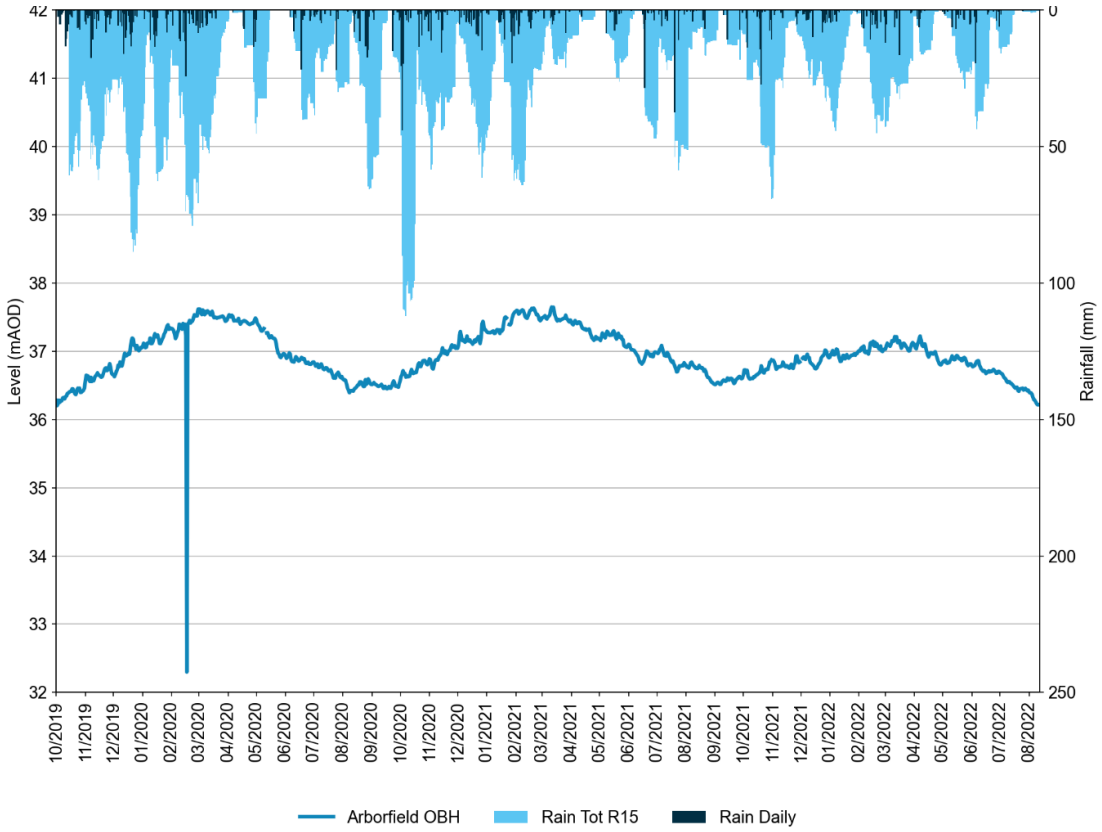
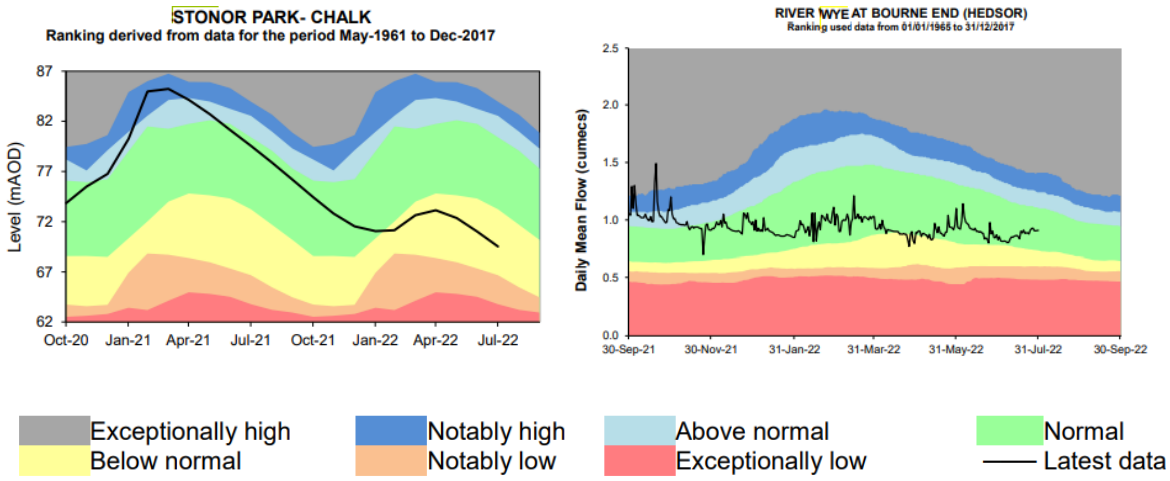


Figure 5C – Arborfield OBH



In addition to these specific stations, the wider groundwater context is illustrated in the Water Situation Report for the Chilterns West. The nearest groundwater reference station is Stonor Park. This site shows significantly lower overall groundwater than the previous year. This can be seen in the figure below alongside the river indicator location at Bourne End on the River Wye.

Figure 6 – Water Situation Report



Extract from - [Water Situation Report (publishing.service.gov.uk)]

Network Performance

Within the Reading catchment there is one site detailed within the Environment Agency Consents Database which has an Event Duration Monitor (EDM) fitted.

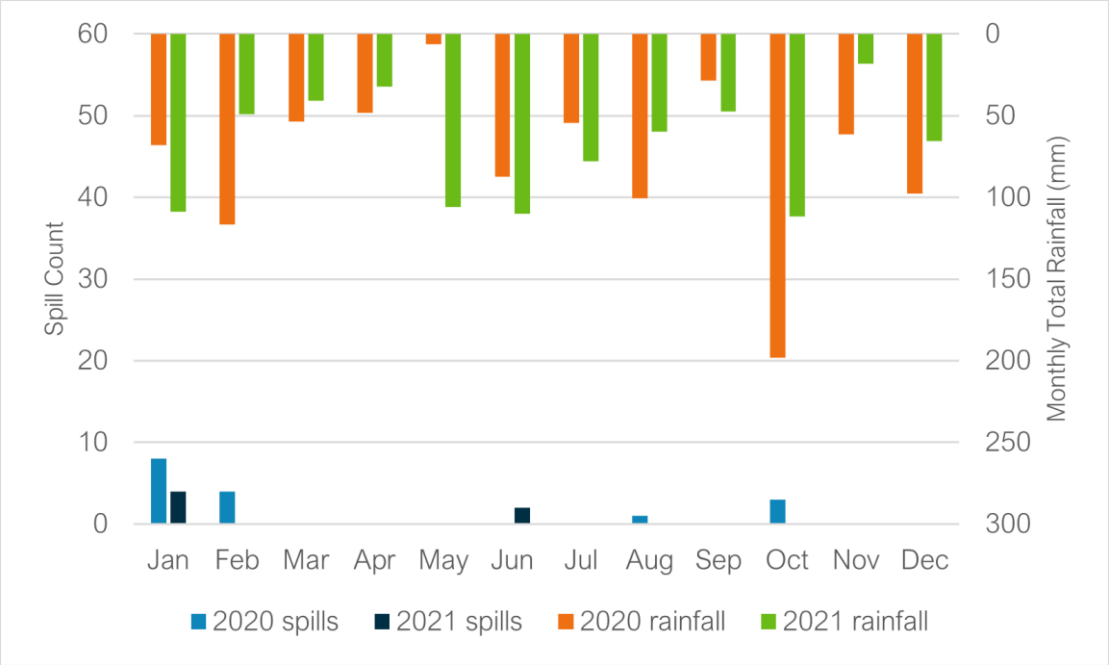
Table 7 below details the last 2 years performance of overflows within the catchment.

Table 7 – Event Duration Monitoring

Overflow	2020		2021	
	Spills	Duration (hours)	Spills	Duration (hours)
Reading STW	16	267.41	6	50.11

A critical part of the assessment of EDM performance and its relation to groundwater inundation is to review the month-on-month spill performance, against previous years and the monthly total rainfall values to give context to the performance. Figure 8 below presents the EDM performance trend and rainfall for recent years.

Figure 8 – EDM Monthly Performance



The trend in spill performance across the two recorded years does show variation in spills, with an overall focus on spills during the autumn and winter months, when the indicator sites shown in Figure 5 suggest groundwater levels in the catchment were higher. This suggests a wider relationship between rainfall, elevated groundwater levels and spill frequency.

Investigations & Interventions

This section details the activities that have been undertaken within the catchment within the Hydrological Year 2021-22.

Monitor Installations

The sewer depth monitor (SDM) programme supports long term groundwater understanding within GISMP catchments. Currently, there are a total of 15 monitors installed within the Reading catchment. There are currently 3 further monitor installs planned.

The data from these will be cross-referenced with other long-term records (where available) within the catchment.

Remediation Works Undertaken this Hydrological Year

Table 9 below provides a summary of the investigations and remediation works undertaken or planned within the Reading catchment in the 2021-22 Hydrological Year.

Table 9 – Works Undertaken in the 2021/22 Hydrological Year

Investigation/ remediation type	Number/ length undertaken
CCTV survey	447 metres
Look and lift survey	N/A
Sewer lining	825 metres planned by end of November 2022 - in progress at time of writing
Patch lining	N/A
Manhole sealing	20 manholes planned by end of November 2022 – in progress at time of writing
Manhole sealing plates	N/A
Manhole covers and frames replaced	N/A

Although the seasonal trends in groundwater have been low in comparison with previous years and the SDM installations are generally not showing significant groundwater presence, targeted surveys and appropriate remedial action have been undertaken where groundwater levels have allowed.

Summary

Rainfall in the Reading catchment over the 2021/22 hydrological year has been below average, with groundwater levels in the aquifer beneath Reading not reaching the levels seen in previous years which triggered groundwater ingress into the sewerage network and elevated flow/depth readings at monitoring sites.

Lift and look and CCTV surveys will be undertaken in remaining wet winter periods if conditions allow and subject to funding and available capacity. The aim of this is to find further priority loca- tions for remediation and investigating/justifying the need for future larger scale lining as part of our Price Review (PR) process if required.

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Overview

This addendum to the Reading Groundwater Impacted System Management Plan 2021 (GISMP) provides an update on work undertaken in the Hydrological Year October 2022 to September 2023. The key points covered include:

- Hydrological conditions
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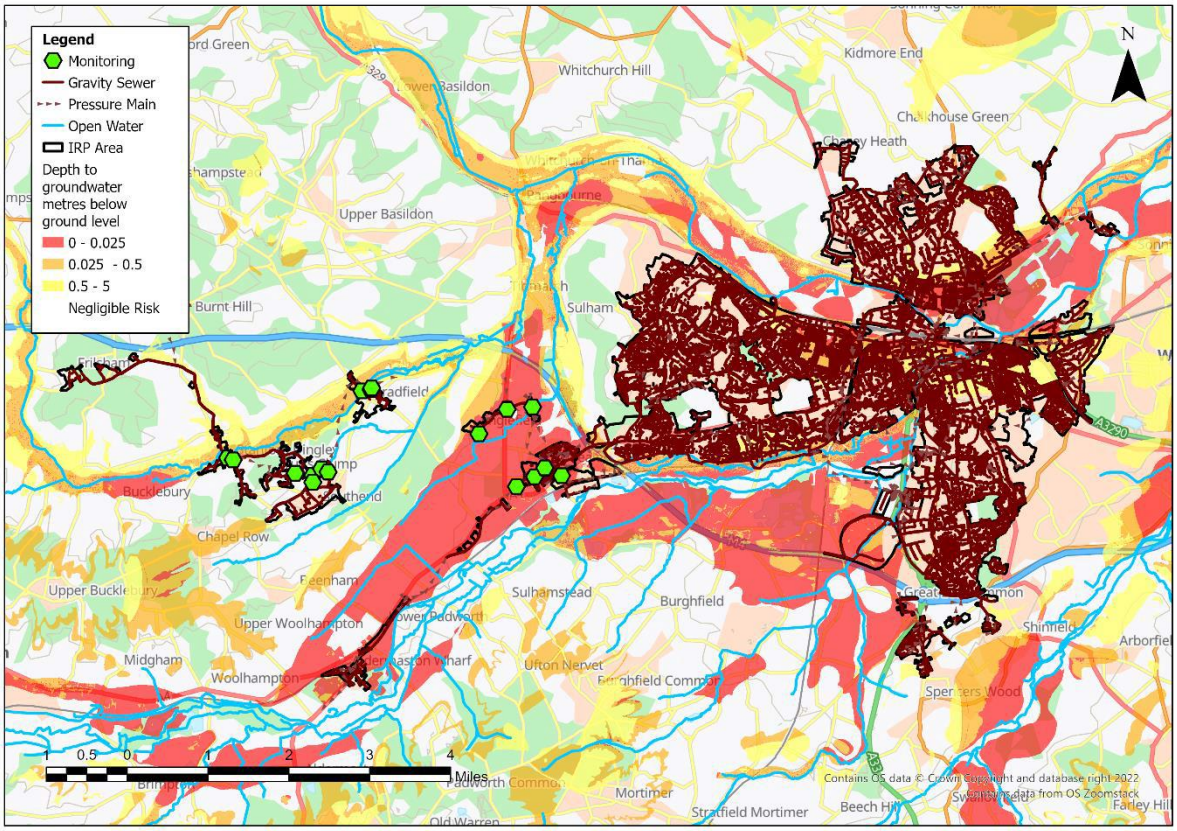

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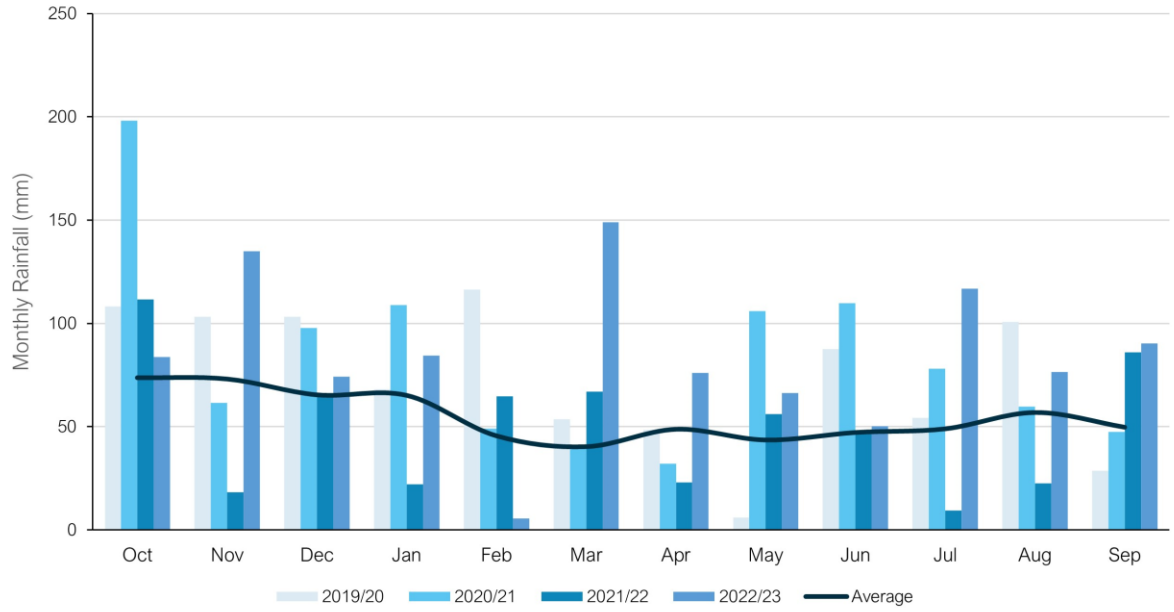

Average values taken from Met Office Weather Station at Reading University based on the period 1991-2020

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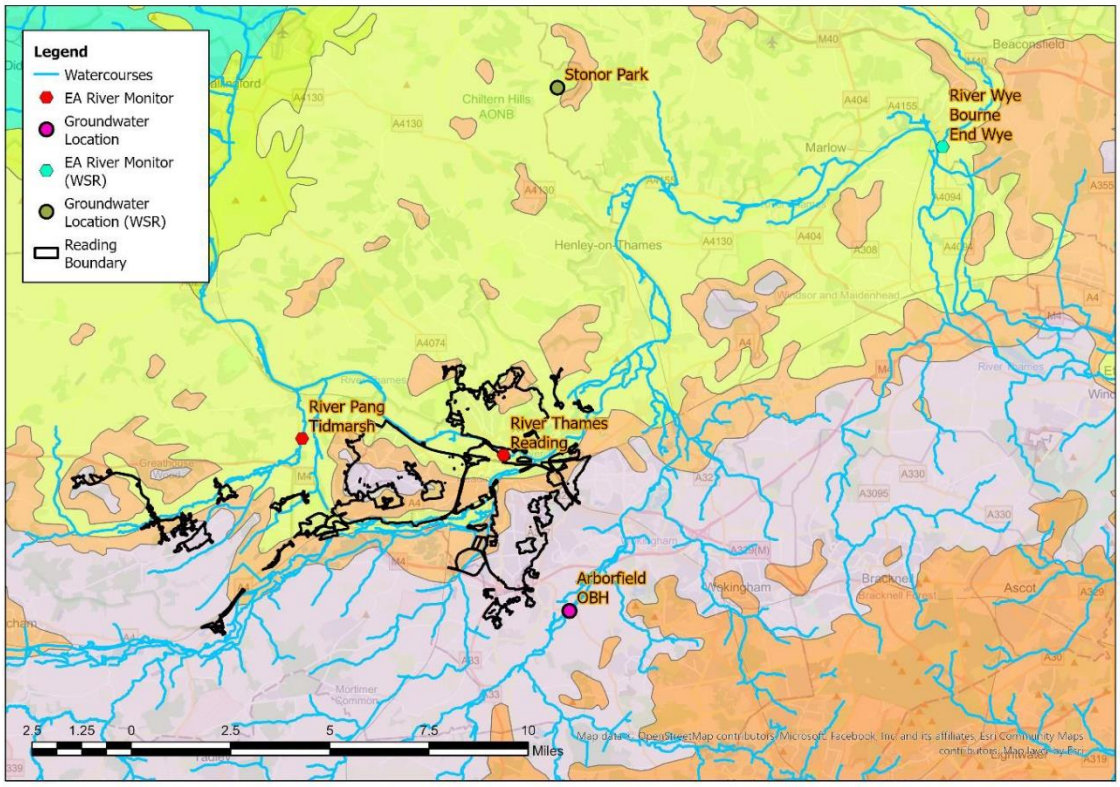


The following figures represent the last three hydrological years of level information at the indicator sites to build a picture of the relative conditions prevalent in the current year. It is presented against both the daily total rainfall values for the catchment and a rolling 15-day total rainfall.

Figure 5A – River Pang, Tidmarsh

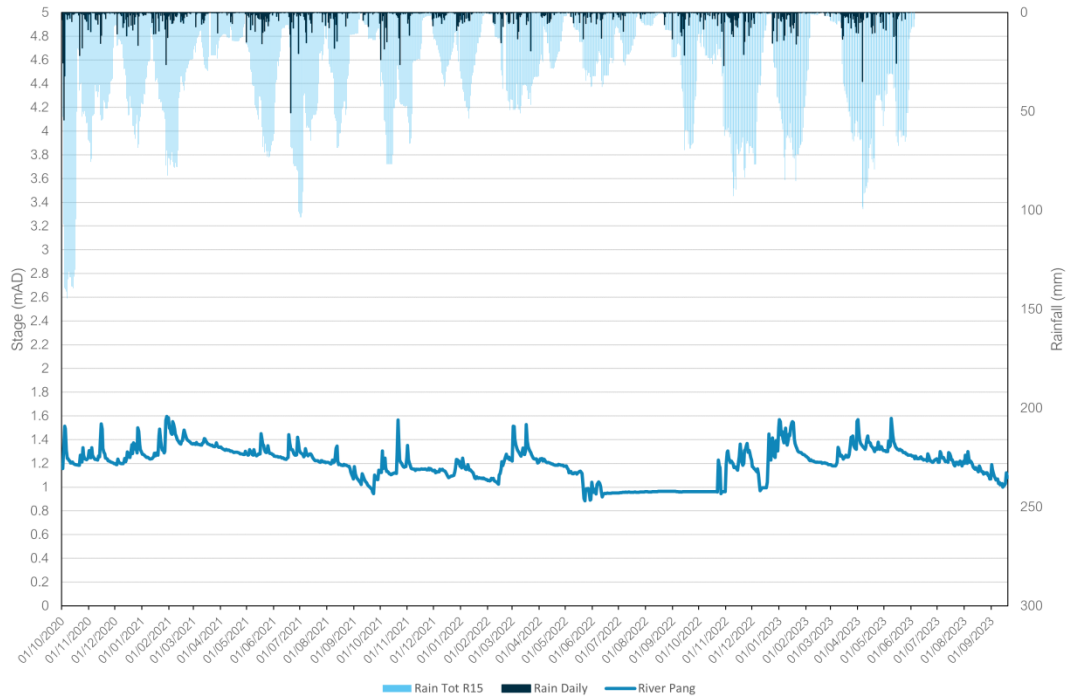


Figure 5B – River Thames, Reading

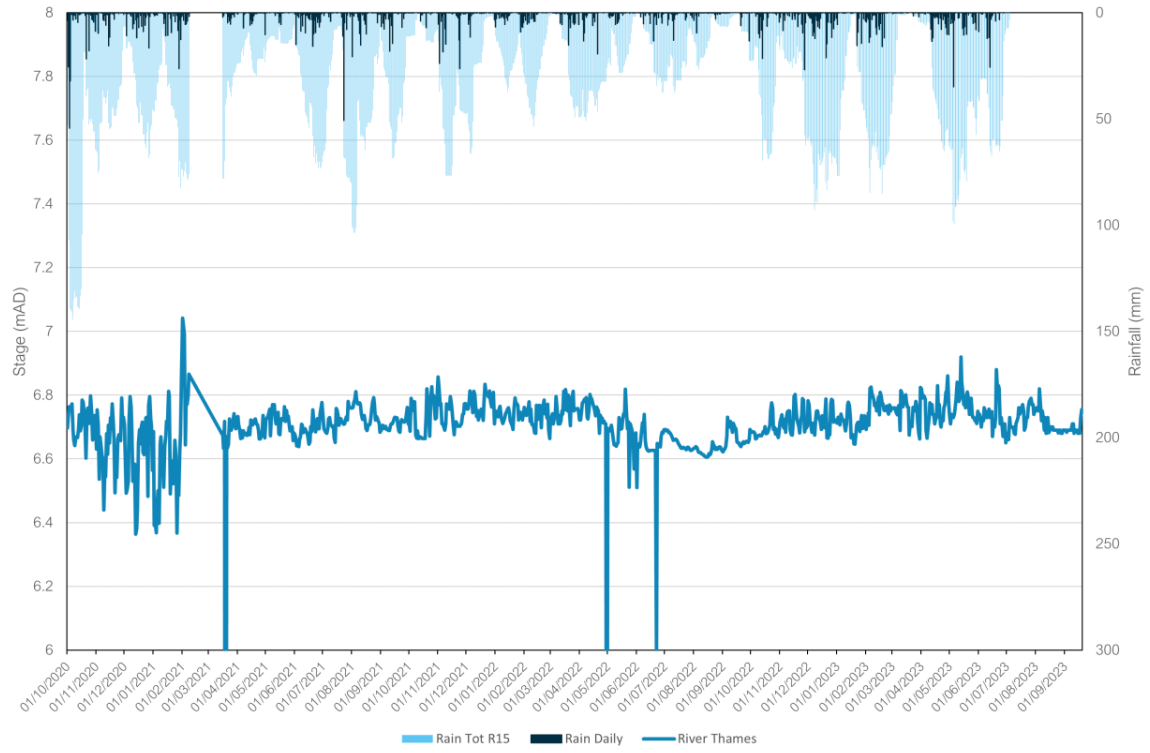
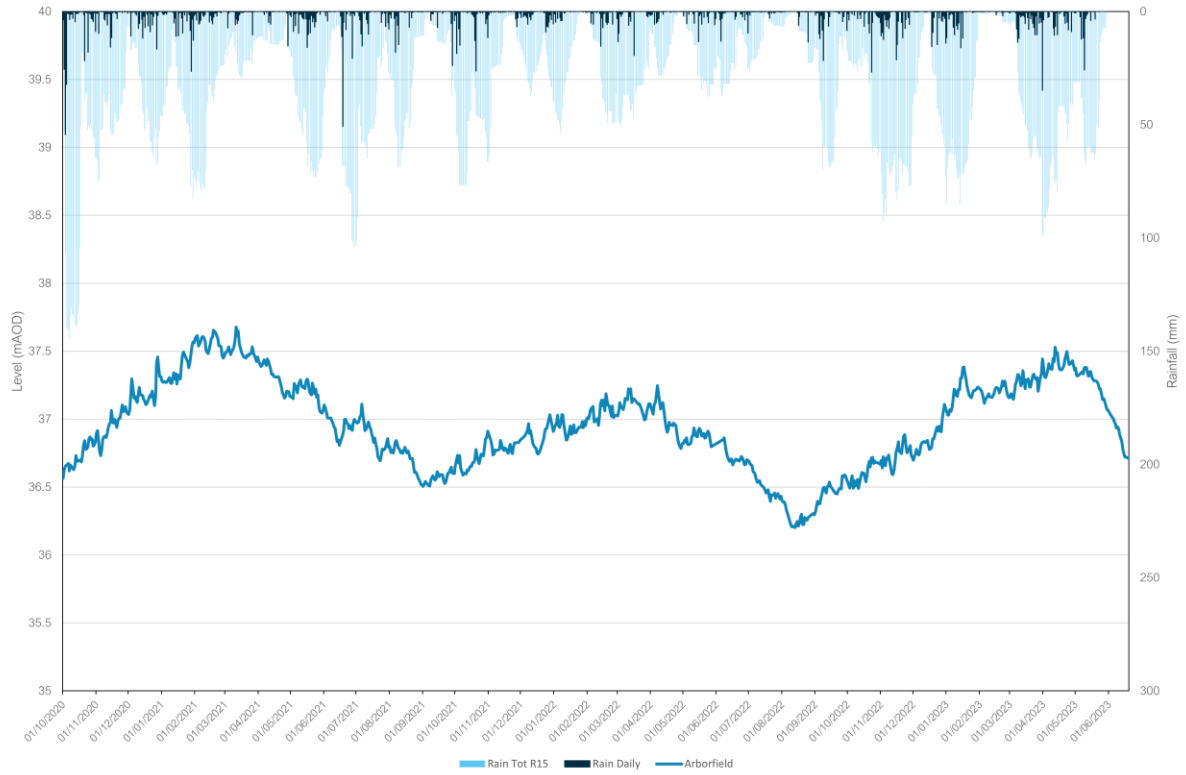
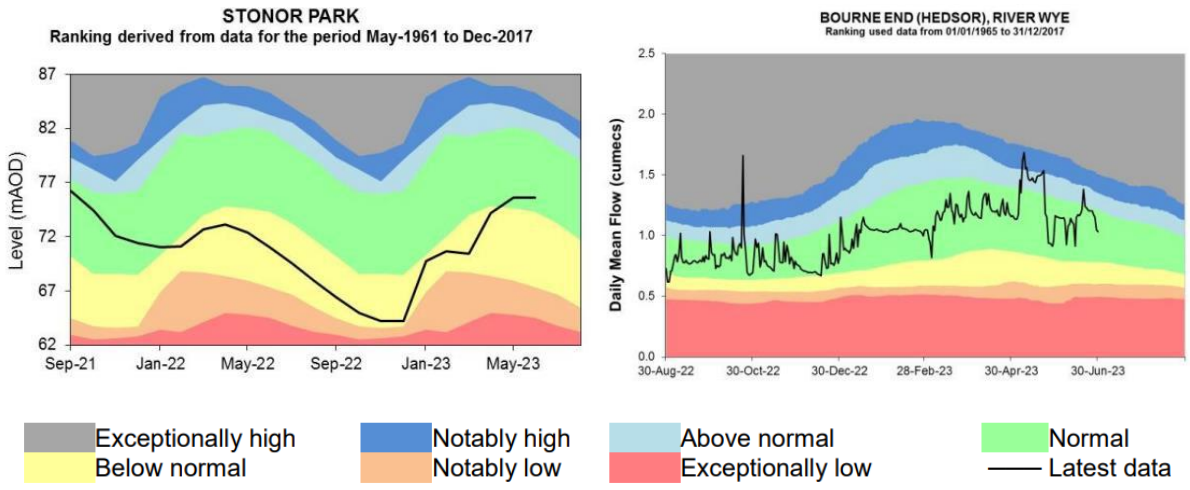


Figure 5C – Arborfield OBH



In addition to these specific stations, the wider groundwater context is illustrated in the Water Situation Report for the Chilterns West. The nearest groundwater reference station is Stonor Park. This site shows groundwater levels consistently below normal in 2022. Groundwater levels are observed to rise towards the end of the year to reach normal levels by April/ May 2023. This can be seen in the figure below alongside the river indicator location at Bourne End on the River Wye.

Figure 6 – Water Situation Report



Extract from - [Water Situation Report (publishing.service.gov.uk)]

Network Performance

Within the Reading catchment there are three sites detailed within the Environment Agency Consents Database which has an Event Duration Monitor (EDM) fitted. As part of the ongoing process of matching GISMP catchments to EDM sites, two additional EDM sites have been identified in the Reading catchment that weren't detailed in last year's report. Both sites – Blakes Lock CSO and Caversham CSO – recorded zero spills in 2022 and in 2021.

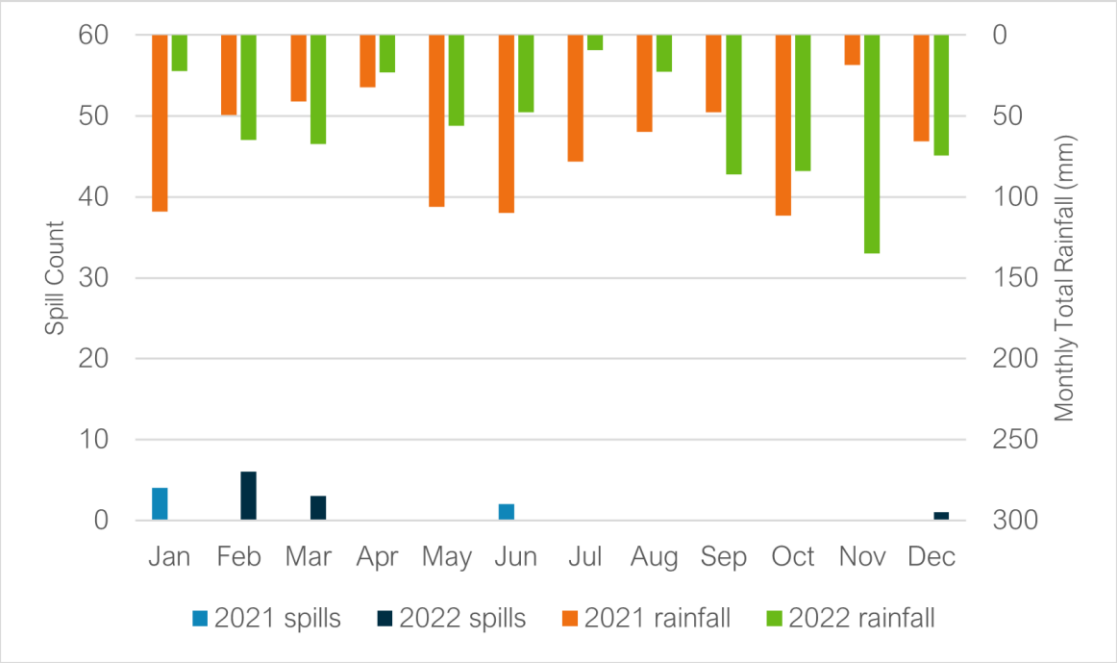
Table 7 below details the last 2 years performance of overflow 'Reading STW' in the catchment.

Table 7 – Event Duration Monitoring

Overflow	2021		2022	
	Spills	Duration (hours)	Spills	Duration (hours)
Reading STW	6	50.11	10	81.55

A critical part of the assessment of EDM performance and its relation to groundwater infiltration, is to review the month-on-month spill performance against previous years and the monthly total rainfall values to give context to the performance. Figure 8 below presents the EDM performance trend and rainfall for recent years.

Figure 8 – EDM Monthly Performance



The utility of the EDM data to suggest a wider relationship between rainfall, elevated groundwater levels and overflow spills in the catchment is limited. The majority of recorded spills at Reading STW were across February - March 2022, however these were a result of operational issues at the site during this period. The EDM data for 2023 will be analysed once available to continue to examine the potential relationship between groundwater levels and overflow spills in the catchment.

Investigations & Interventions

This section details the activities that have been undertaken within the catchment within the Hydrological Year 2022-23.

Monitor Installations

The sewer depth monitor (SDM) programme supports long term groundwater understanding within GISMP catchments. Currently, there are a total of 16 monitors installed within the Reading catchment. There is currently 1 further monitor install planned.

The data from these will be cross-referenced with other long-term records (where available) within the catchment.

Remediation Works Undertaken this Hydrological Year

Table 9 below provides a summary of the investigations and remediation works undertaken or planned within the Reading catchment in the 2022-23 Hydrological Year, as well as works undertaken in the 2021-22 Hydrological Year.

Table 9 – Works Undertaken in the 2022/23 Hydrological Year & in the 2021/22 Hydrological Year

Investigation/ remediation type	Number/ length undertaken 21/22	Number/ length undertaken 22/23
CCTV survey	447 metres	1.253 kilometres
Look and lift survey	N/A	10 surveys
Sewer lining	N/A	850 metres lining*, 1.8km outstanding
Patch lining	N/A	N/A
Manhole sealing	N/A	20 manholes sealed*, 31 manholes sealings outstanding
Manhole sealing plates	N/A	N/A
Manhole covers and frames replaced	N/A	N/A

**Rollover from previous hydrological year*

Note that tankering was required at Gravel Pit Cottages SPS in November 2022, where one tanker was deployed to the location. However, the high wet well levels recorded at the pumping station, may have been a direct a result of the high rainfall totals experienced in the month, rather than significant groundwater infiltration into the network. The indicator site data shown in Figures 5 and 6, suggests that groundwater levels in the catchment, although increasing, were not significantly elevated over the period.

An upgrade is planned for Reading STW. This will improve its ability to treat the volumes of incoming sewage, reducing the need for untreated discharges to the environment. The scheme, which is still in the design phase, is due to be completed in 2027.

Summary

Indicator site data suggests groundwater levels in the Reading catchment have reached higher levels over the 2022/23 Hydrological Year than were observed over the 2021/2022 Hydrological Year. The EDM data for 2023 will be analysed once available to continue to examine the potential relationship between groundwater levels and overflow spills in the catchment.

Lift and look and CCTV surveys will be undertaken in remaining wet winter periods if conditions allow and subject to funding and available capacity. The aim of this is to find further priority locations for remediation and investigating/justifying the need for future larger scale lining as part of our Price Review (PR) process if required.

Addendum - Annual Update 2024
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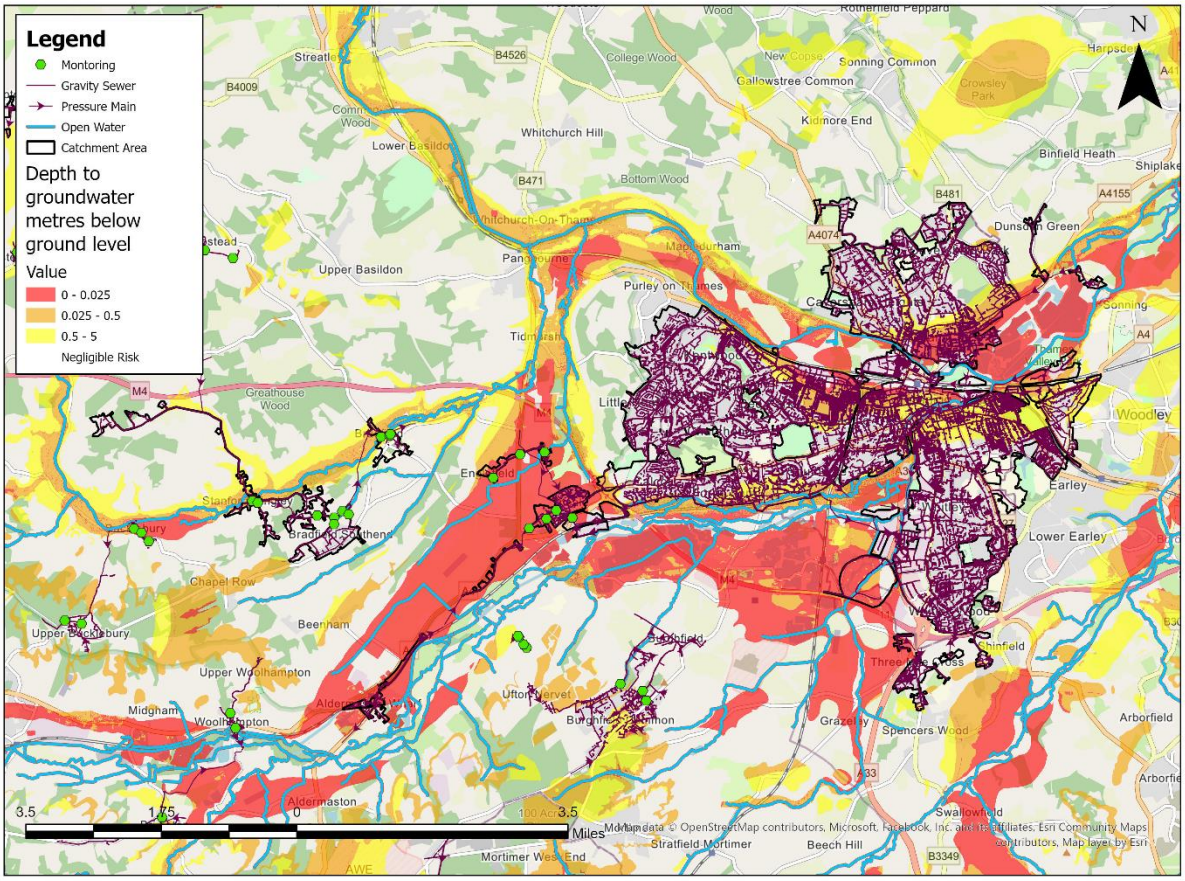
Overview

This addendum to the Reading Groundwater Impacted System Management Plan 2021 (GISMP) provides an update on work undertaken in the Hydrological Year October 2023 to September 2024. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year and those being planned
- Summary and plan for 2024/25

Figure 1 – Reading Monitoring Plan



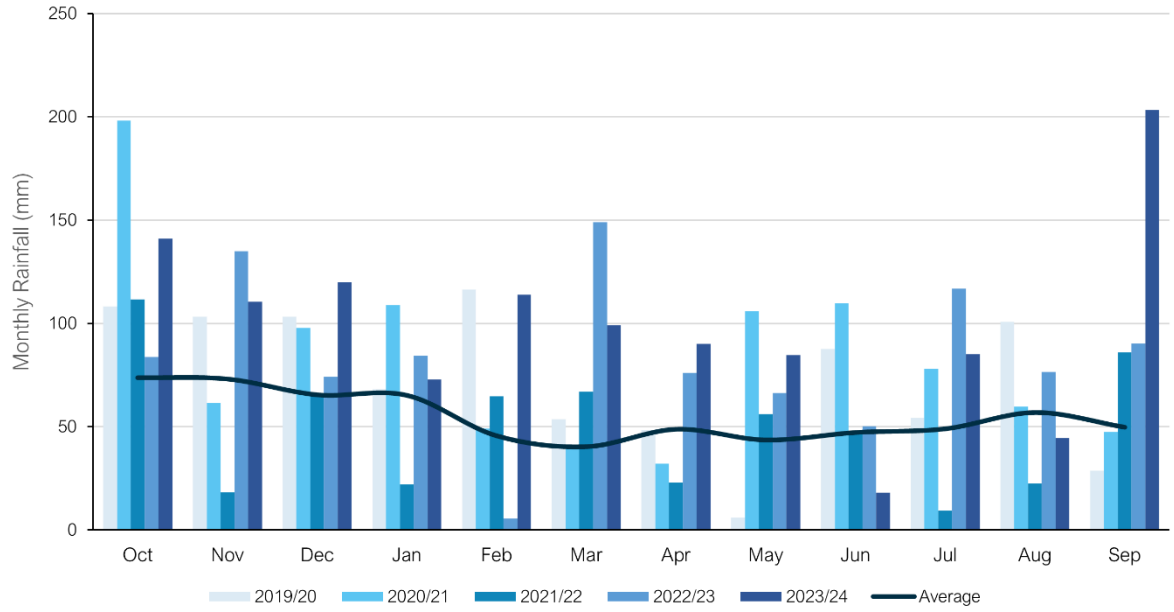
Hydrological Review – 2023-2024

This section summarises the hydrological conditions across the Reading catchment within the period under investigation and provides comparison against previous year's performance to put the annual performance into context. The hydrological review has been undertaken based on the Hydrological Year which runs October 1st to September 30th.

Catchment Rainfall

Representative Radar rainfall has been used to generate monthly data at catchment level for comparison with average data generated by local Met Office Weather Station Records. Figure 2 presents the comparison of this data for the last five hydrological years to support longer term trends within the local system.

Figure 2 – Monthly Rainfall Data



Average Values taken from Met Office Weather Station at Reading University based on the period 1991-2020

The total rainfall for the 2023/24 hydrological year is 80% above the annual average total. Total rainfall values are presented in Table 3 below.

Table 3 –Total Rainfall Based on Hydrological Year

Average (mm)	2019/20 (mm)	2020/21 (mm)	2021/22 (mm)	2022/23 (mm)	2023/24 (mm)
658	879	989	594	1008	1183

Groundwater / Local River Level

The Reading catchment is situated in the Chilterns West, Berkshire Downs, Enborne and Loddon water resource areas. It primarily sits in the Seaford Chalk Formation and Newhaven Chalk Formation, the Lambeth Group of clay, silt and sand, and the London Clay Formation of clay, silt and sand. The Seaford Chalk Formation and Newhaven Chalk Formation are designated principal aquifers within the UK.

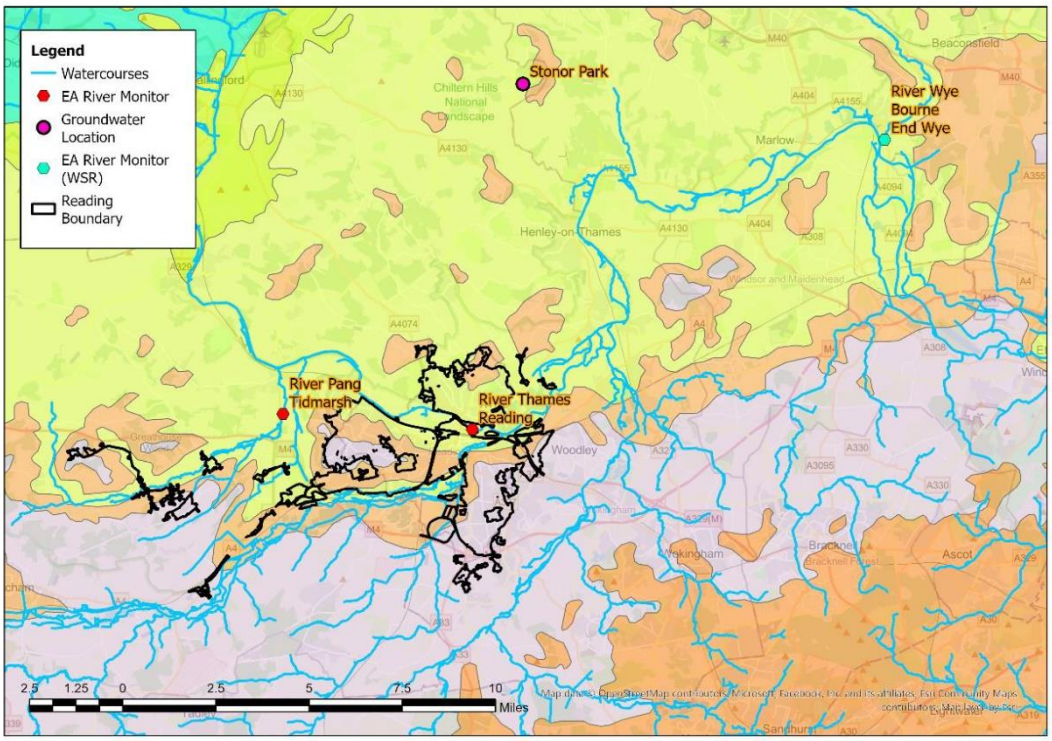
The Environment Agency has gauging stations on local watercourses measuring stage, and observation boreholes (OBH) measuring groundwater levels locally to the catchment which can be used to provide indicative local groundwater performance.

From previous investigations we have identified the following sites as good indicators of groundwater levels within the catchment.

- River Pang, Tidmarsh.
- River Thames, Reading.
- Stonor Park OBH. Note that Arborfield OBH indicator site data was presented in previous years' Addendum Reports, however data for this site is currently unavailable.

These sites are illustrated in Figure 4, alongside the closest groundwater reference station and closest gauging station from the Water Situation Report.

Figure 4 – Local Monitoring Stations



Figures 5A-5C represent the last three hydrological years of level information at the indicator sites to build a picture of the relative conditions prevalent in the current year. It is presented against both the daily total rainfall values for the catchment and a rolling 15-day total rainfall.

Figure 5A – River Pang, Tidmarsh

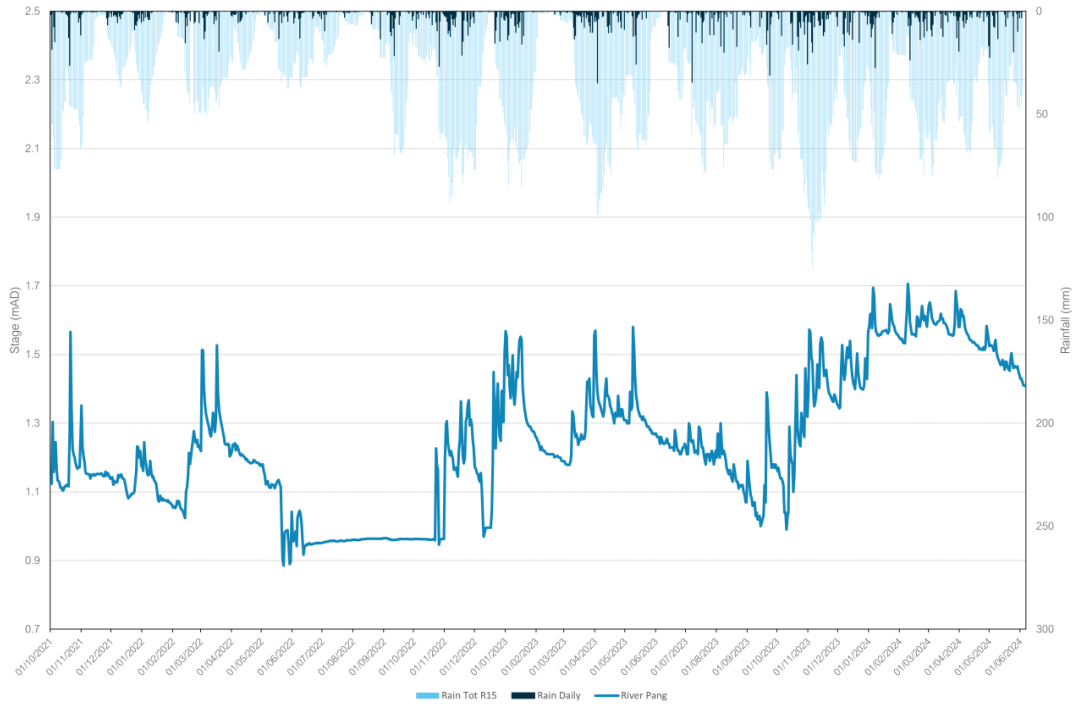


Figure 5B – River Thames, Reading

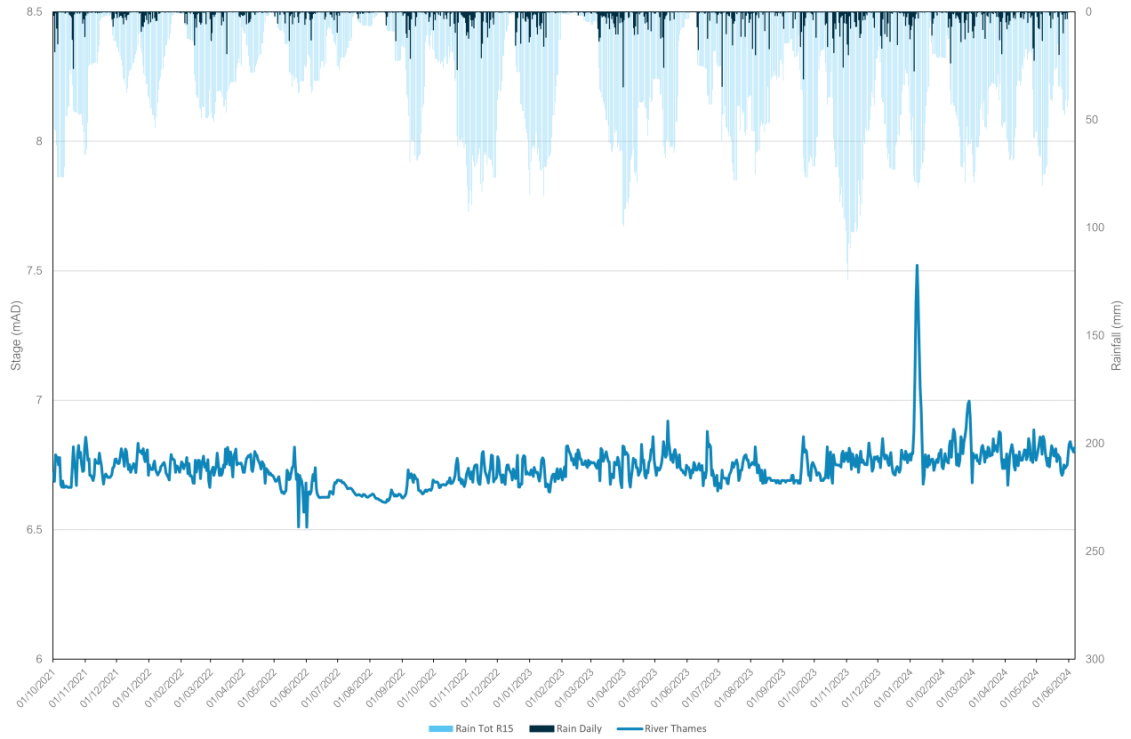
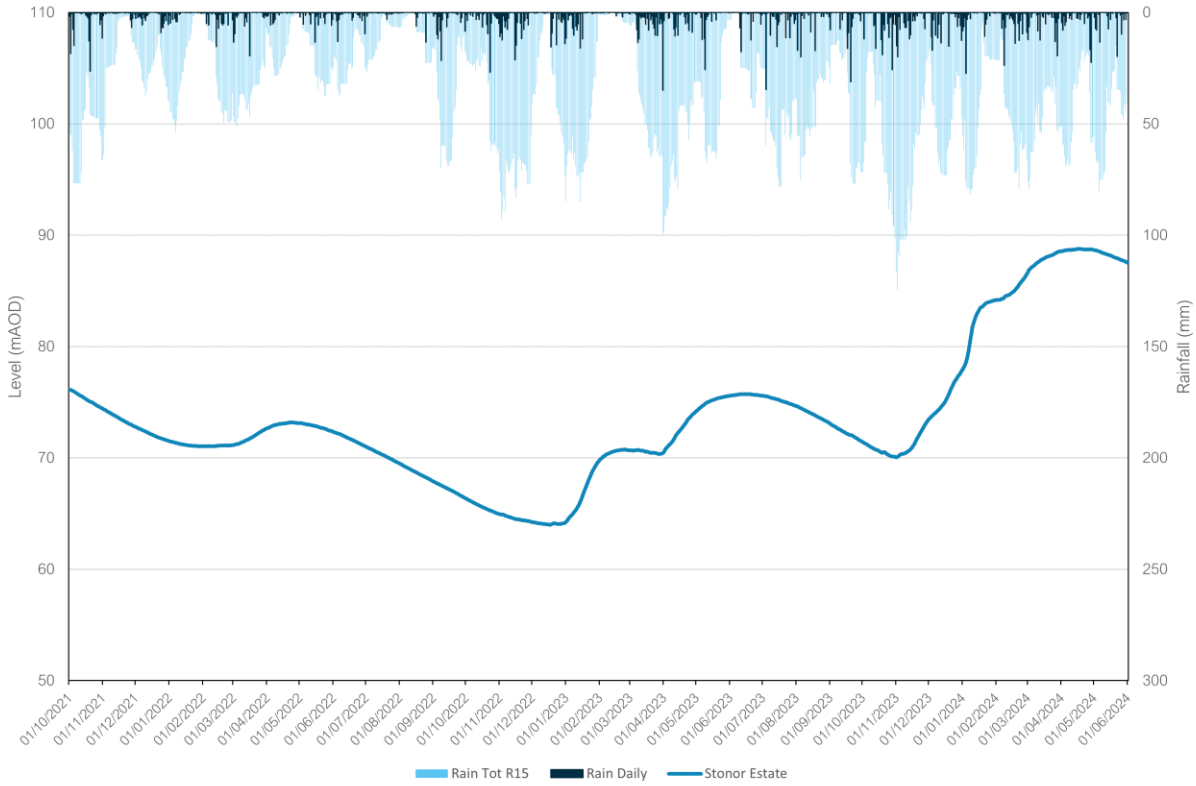
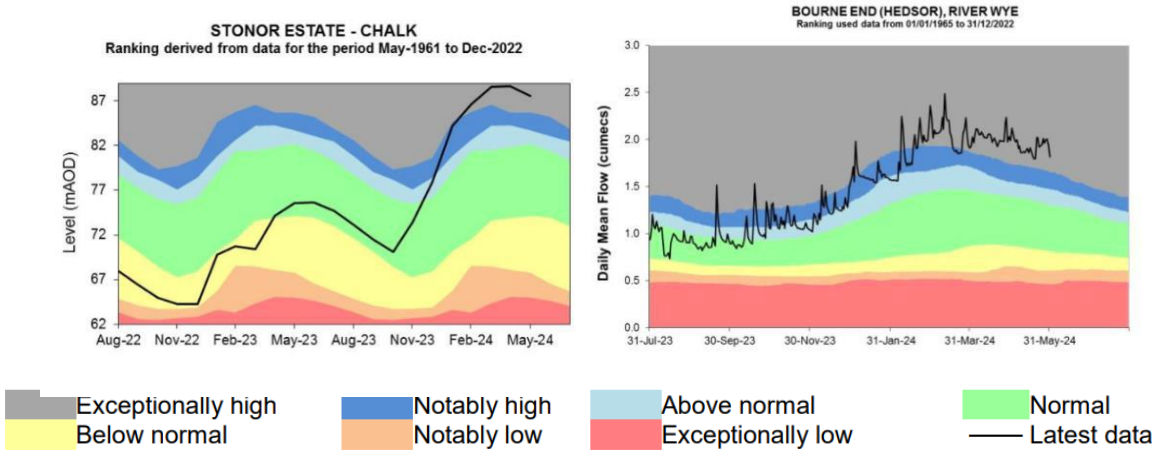


Figure 5C – Stonor Park OBH



In addition to these specific stations, the wider groundwater context is illustrated in the Water Situation Report for the Chilterns West. The nearest groundwater reference station from the WSR is also Stonor Park. Groundwater levels are observed to rise in the spring of 2023 to reach normal levels before increasing significantly from November 2023 to reach exceptionally high levels from February to May 2024. This can be seen in Figure 6 alongside the river indicator located at Bourne End (Hedsor) on the River Wye.

Figure 6 – Water Situation Report



Extract from - [Water Situation Report (publishing.service.gov.uk)]

Network Performance

Within the Reading catchment there are three sites detailed within the Environment Agency Consents Database which have an Event Duration Monitor (EDM) fitted. Blakes Lock CSO and Caversham CSO both recorded zero spills in 2022 and in 2023.

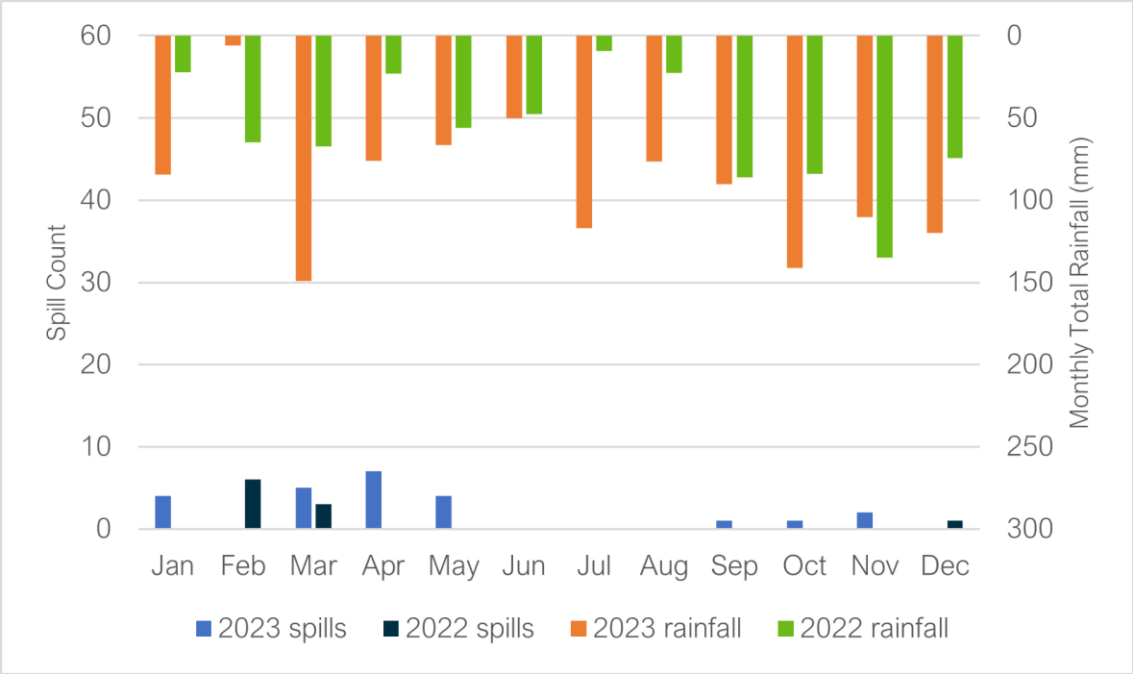
Table 7 below details the last 2 years performance of overflow 'Reading STW' in the catchment.

Table 7 – Event Duration Monitoring

Overflow	2022		2023	
	Spills	Duration (hours)	Spills	Duration (hours)
Reading STW	10	81.55	24	289.75

A critical part of the assessment of EDM performance and its relation to groundwater infiltration, is to review the month-on-month spill performance against previous years and the monthly total rainfall values to give context to the performance. Figure 8 below presents the EDM performance trend and rainfall for recent years.

Figure 8 – EDM Monthly Performance



The data suggests a wider relationship between rainfall, elevated groundwater levels and spill frequency. The majority of recorded spills at Reading STW were across January to May 2023, except for February when limited rainfall may have influenced spill occurrence. Increased groundwater levels across these months can be observed compared to the same period in 2022 (see Figure 5). However, operational flow clipping took place within the catchment which may have impacted spill frequencies in March and May 2023. The EDM data for 2024, once available, will provide an improved insight into the relationship between groundwater levels and spills in the catchment. The indicator site data shown in Figure 6 suggests that groundwater levels in the catchment have reached exceptionally high levels in 2024.

Investigations & Interventions

This section details the activities that have been undertaken within the catchment within the Hydrological Year 2023-24.

Monitor Installations

The sewer depth monitor (SDM) program supports long term groundwater understanding within GISMP catchments. Currently, there are a total of 17 monitors installed within the Reading catchment. There are currently no further monitor installs pending.

The data from these will be cross-referenced with other long-term records (where available) within the catchment.

Remediation Works Undertaken this Hydrological Year

Table 9 below provides a summary of the investigations and remediation works undertaken or planned within the Reading catchment in the 2023-24 Hydrological Year, as well as works undertaken in the previous two hydrological years.

Table 9 – Works Undertaken in the 2023/2024 Hydrological Year, 2022/23 Hydrological Year & in the 2021/22 Hydrological Year

Investigation/ remediation type	Number/ length undertaken 21/22	Number/ length undertaken 22/23	Number/ length undertaken 23/24
CCTV survey	447 metres	1.253 kilometres	500 metres
Look and lift survey	N/A	10 surveys	8 surveys
Sewer lining	N/A	850 metres lining*	360 metres completed, further 1.3 kilometres planned*
Patch lining	N/A	N/A	N/A
Manhole sealing	N/A	20 manholes sealed*	15 manholes sealed, further 16 manhole sealings planned*
Manhole sealing plates	N/A	N/A	N/A
Manhole covers and frames replaced	N/A	N/A	N/A

**Rollovers from previous hydrological years*

Tankering was required in the catchment during the 2024/24 Hydrological Year. A total of 410 days of flow management was undertaken across eight locations: The Spring Inn, Gravel Pit Cottages SPS, The Miles House Therapeutic School, Macs Café (Padworth), French Horn (Sonning eye) SPS, Arrowhead (Theale) SPS, Muswell Close (Theale) and Lambfields (Theale) SPS.

An upgrade is planned for Reading STW. This will improve its ability to treat the volumes of incoming sewage, reducing the need for untreated discharges to the environment. The scheme, which is still in the design phase, is due to be completed in 2027.

It is expected that the catchment will meet all government targets for storm overflows by 2040 – 2045.

Summary

The EDM data for 2023, is indicative of a wider relationship between rainfall, elevated groundwater levels and spill frequency in the Reading catchment. However, operational issues also influenced spill frequencies observed in the catchment. This hydrological year (October 2023 – September 2024), indicator site data suggests groundwater levels in the Reading catchment have reached much higher levels than those observed in the previous hydrological year. The EDM data for 2024 will be analysed once available to further understand the relationship between groundwater levels and spills in the Reading catchment.

Lift and look and CCTV surveys will be undertaken in remaining wet winter periods if conditions allow and subject to funding and available capacity. The aim of this is to find further priority locations for remediation and investigating/justifying the need for future larger scale lining as part of our Price Review (PR) process if required.

Addendum - Annual Update 2025

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Winterbourne	80
Woolhampton	83

Kennet and Trib River basin summary

The Thames Water region covers the length of the River Thames from its source down to Tilbury including all its tributaries. The sewer network has overflows that discharge along the River Thames and its associated tributaries. The role of storm overflows in the network is to protect against property flooding from the sewerage system. Storm overflows, which may be augmented with settlement tanks, are employed to optimise the split between wastewater treatment and the management of rainfall. Storm separation is typically designed in accordance with regulatory guidance.

Aligned with our Drainage and Wastewater Management Plan (DWMP) approach, the Thames Water region has been split into River Basins, each contains a varying number of localised sewer networks. Taking this approach allows alignment to the different drivers in each river basin and provides and efficient way to investigate, tackle performance and protect the environment. This report covers the performance of the sewer networks within the Kennet and Trib River Basin which are heavily influenced by groundwater infiltration into the network.

The Kennet and Trib River covers the upper reaches of the River Thames including its associated tributaries and streams. The river basin contains 12 heavily groundwater impacted Thames Water localised sewer systems that interact with various rivers and streams forming the tributaries to the River Thames. Each localised sewer system may contain storm overflows located at sewage treatment works (STW) and/or in the network; or are "treat all" sites for which there is no overflow. Figure 1 shows the relationship between the sewer systems and the associated rivers and streams. Figure 2 shows the location of each localised sewer system within the Kennet and Trib River Basin with an insert showing the location of the Kennet and Trib River Basin in relation to the Thames Water Region.

Sewer System	Associated River / Stream	Relationship to the River Thames
Burghfield STW	River Kennet	Direct tributary of the River Thames
East Shefford STW	River Lambourn	Indirect tributary of the River Thames via River Kennet
Froxfield STW	River Dun	Indirect tributary of the River Thames via River Kennet
Fyfield STW	River Roding	Indirect tributary of the River Thames via Barking Creek
Kingsclere STW	Kingsclere Brook, River Enborne	Kingsclere indirect tributary of the River Thames via River Enborne then River Kennet. River Enborne indirect tributary of the River Thames via River Kennet.
Marlborough STW	River Kennet	Direct tributary of the River Thames
Ramsbury STW	River Kennet	Direct tributary of the River Thames
Reading STW	River Kennet, Holy Brook, River Thames	River Kennet direct tributary of the River Thames. Holy Brook indirect tributary of the River Thames via River Kennet. River Thames.
Silchester STW	Silchester Brook	Indirect tributary of the River Thames via River Loddon
Wash Water STW	River Enborne	Indirect tributary of the River Thames via River Kennet
Winterbourne STW	Winterbourne Stream	Indirect tributary of the River Thames via River Lambourn then River Kennet
Woolhampton STW	River Kennet	Direct tributary of the River Thames.

Figure 1: Relationship of the Sewer Systems to Associated Rivers

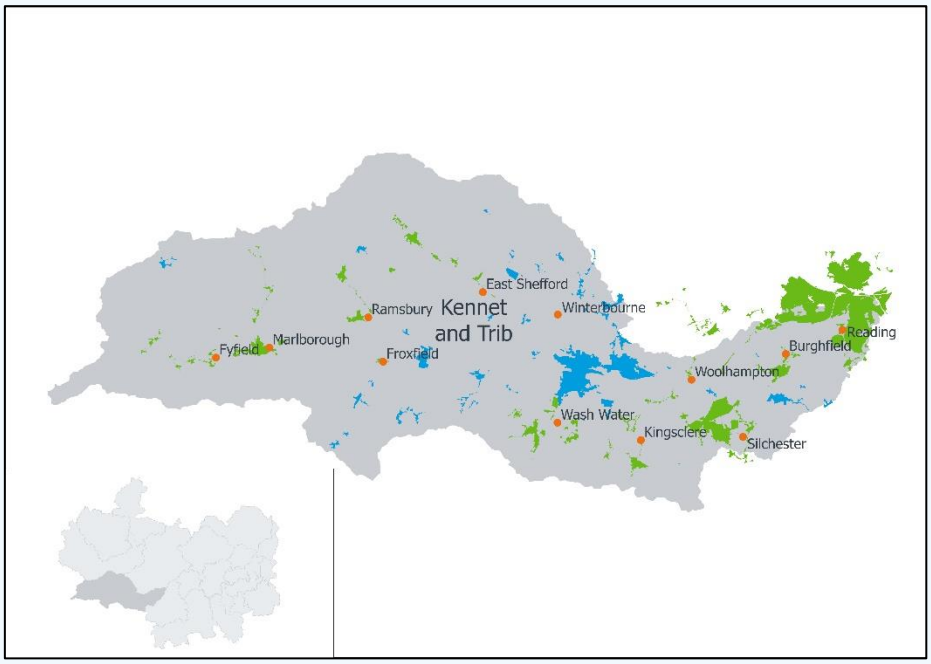


Figure 2: Location of Sewer Systems Within the Kennet and Trib River Basin

Burghfield

Burghfield is located in West Berkshire, approximately 4 miles south-west of Reading.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Burghfield sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 5 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation with decreased number and duration of spills at the CSOs shown in Figure 5. However, the river levels remain consistent as shown in Figure 2, and 3.

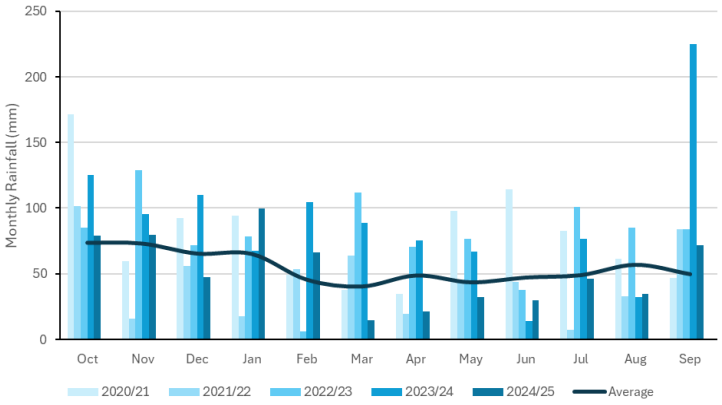


Figure 1: Monthly Rainfall Data

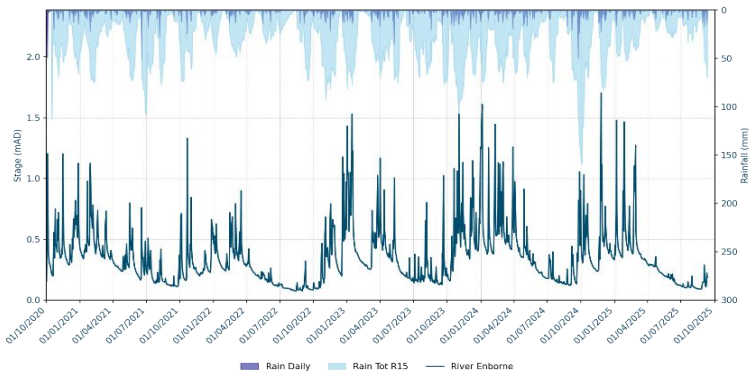


Figure 2: River Level data for River Enborne, Brimpton

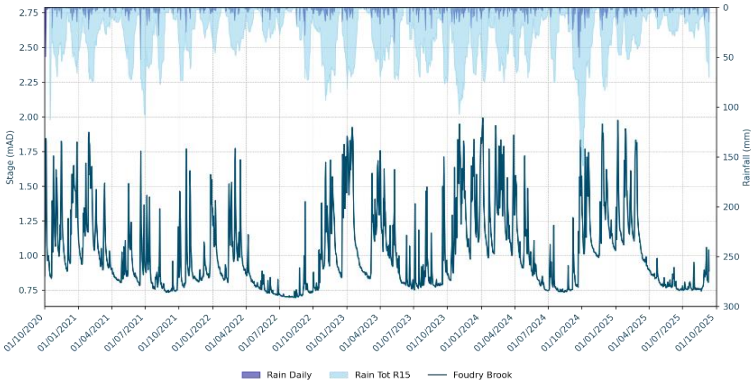
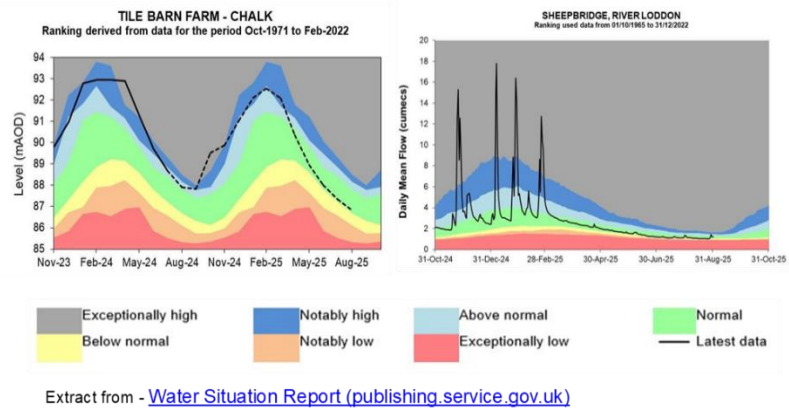


Figure 3: River Level data for Foudry Brook, Beech Hill



Extract from - Water Situation Report (publishing.service.gov.uk)

Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 5.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Burghfield STW	132	2861	96	1639

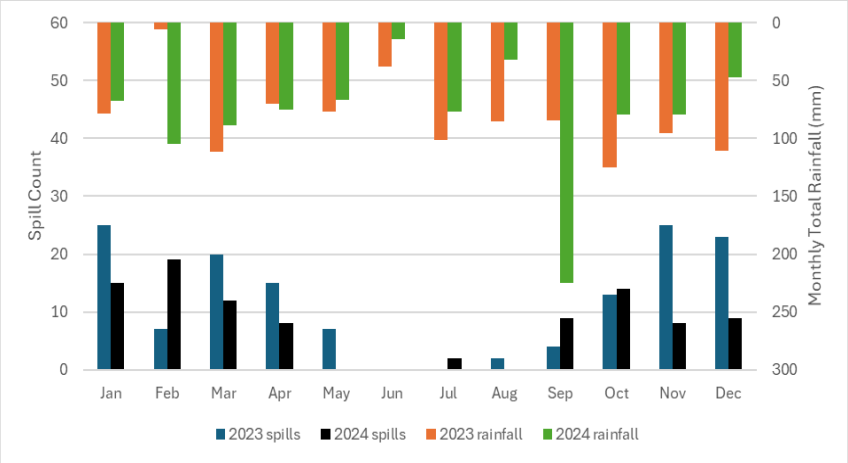


Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Burghfield STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	170m	-	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/2024 shows a similar pattern being followed compared to previous years, including the average rainfall in 2023 staying fairly consistent compared to 2024 (see Figure 5). The lower number of annual spills could be a result of the rainfall and river levels staying consistent. Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

East Shefford

East Shefford is located in Berkshire, approximately 9 miles south of Newbury and 16 miles north of Reading.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the East Shefford sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 6 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation to decreased groundwater and river levels shown in Figure 2 and Figure 3. However, an increased number and duration of spills at the CSOs are observed in 2025 compared to 2024 as shown in Figure 5.

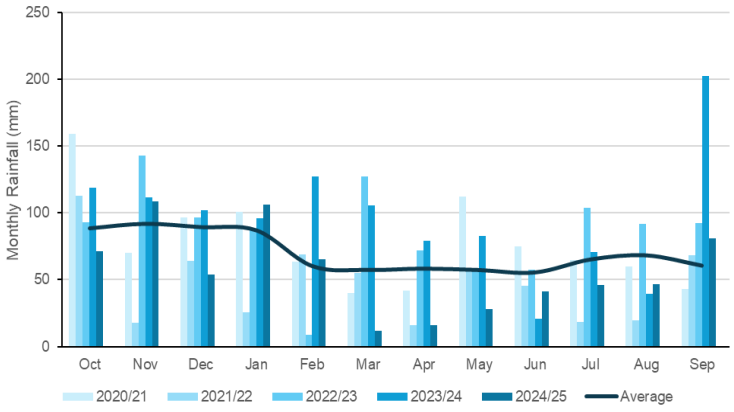


Figure 1: Monthly rainfall data 2020/21 to 2024/25

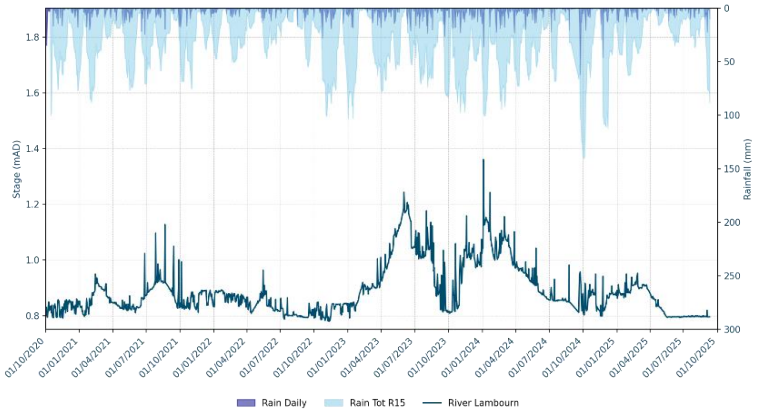


Figure 2: River Level data for River Lambourn at Lambourn

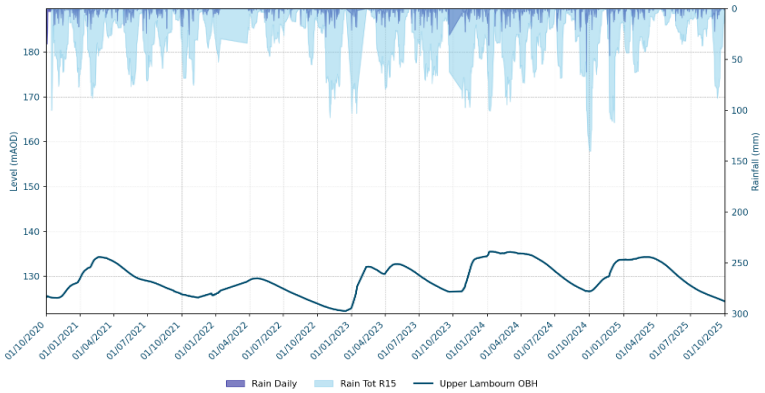
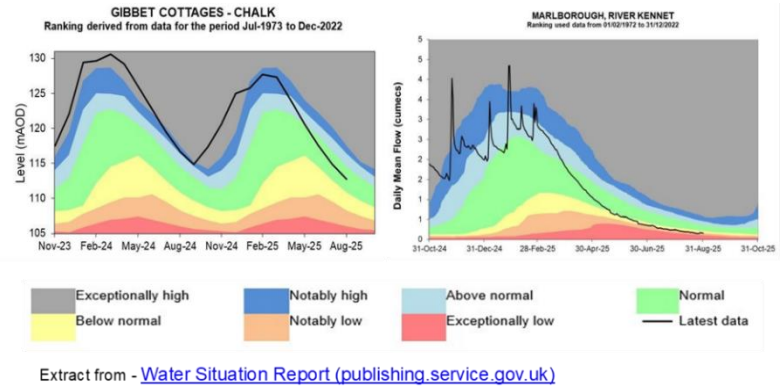


Figure 3: River Level data for Upper Lambourn OBH



Extract from - Water Situation Report (publishing.service.gov.uk)

Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 5 and 6.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
East Shefford STW	1	2.5	35	541
East Garston SPS	4	51.8	0	0

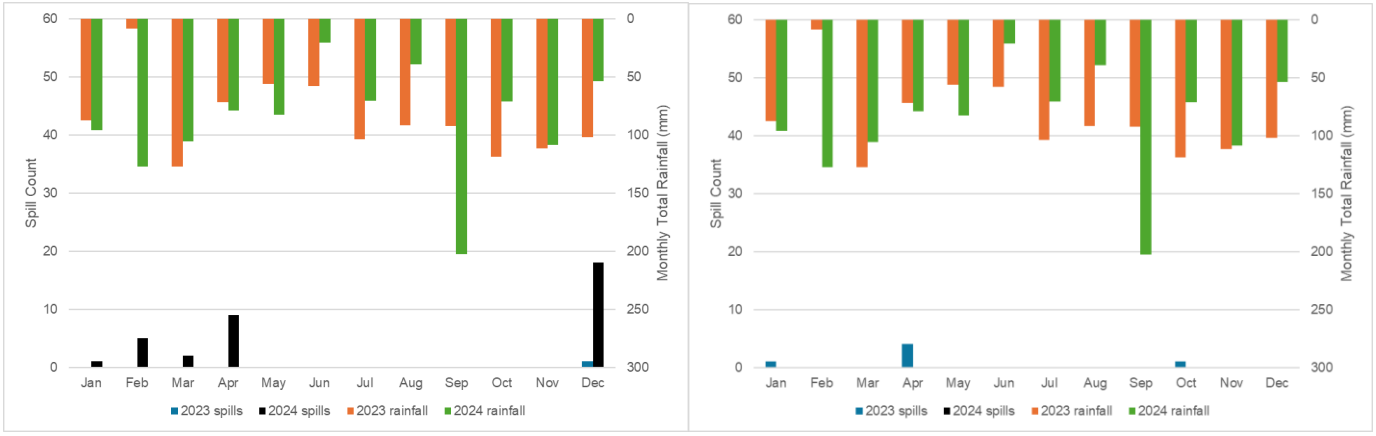


Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – East Shefford STW / Figure 6: Monthly rainfall data versus monthly spill count for 2023 and 2024 – East Garston SPS

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024 /25
CCTV surveys	-	595m	277m	800m	1,800m
Look and lift surveys	-	-	7	30	-
Sewer lining	144m	340m	916m	-	1,600m
Patch lining	-	-	1	-	-
Manhole sealing / plates / covers and frames replaced	1	30	2	-	39
ATAC unit deployment	1	-	-	2	2
Treatment Works / Pumping Station Upgrades	-	-	-	-	-

Summary

A review of river level data over 2023/24 has increased compared to previous years. For East Shefford STW the number and duration of spills have increased in 2024 compared to 2023. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 8). During months January to April 2024, river levels were at the highest for the year (see Figure 5B) which could have led to groundwater ingress leading to the high number of spills during this period. Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

In the reporting year, we have undertaken CCTV survey of our sewers network, covering some 1,800 metres. These CCTV surveys help us monitor the condition of sewer network as well as identifying potential defects that could allow groundwater infiltration. In conjunction with the CCTV, we have completed 1,600 metres of sewer lining, 21 manholes sealing, 9 manhole sealing plates, and 9 manhole covers and frames replaces, to prevent potential infiltration. ATAC units were deployed in the catchment during periods of high flows to partially treat flows being discharged to the watercourse. The ATAC at East Garston was deployed on site but not turned on.

Furthermore, our operational teams have also worked with local stakeholders to improve overland drainage in the area which may be contributing to infiltration into the foul system through manholes.

Froxfield

Froxfield is located in Wiltshire, approximately 7.5 miles east of Marlborough.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Froxfield sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 3 illustrate the relationship between rainfall and river levels. The decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; represents a correlation to decreased average river levels shown in Figure 2 and Figure 3.

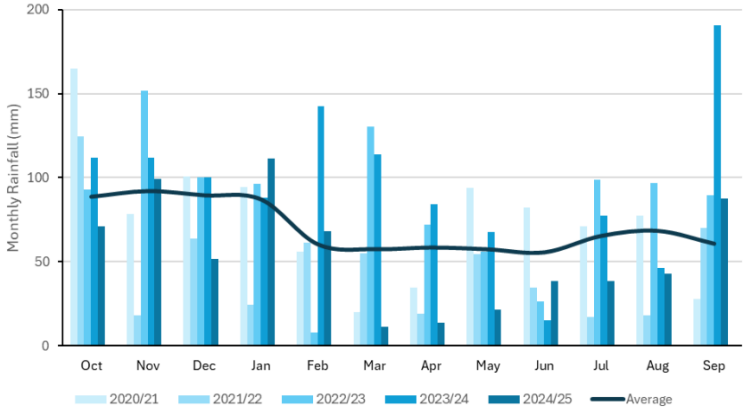


Figure 1: Monthly rainfall data 2020/21 to 2024/25

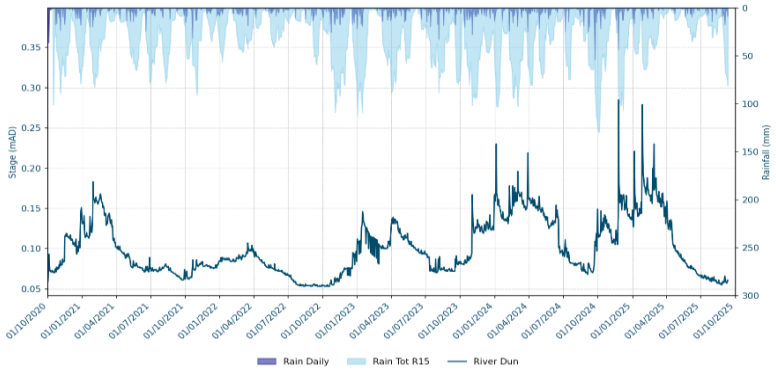


Figure 2: River Level data for River Dun, Hungerford

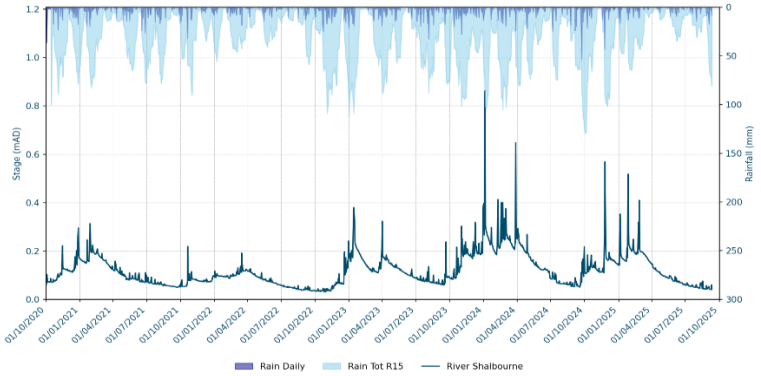


Figure 3: River Level data for River Shalbourne, Hungerford Shalbourne

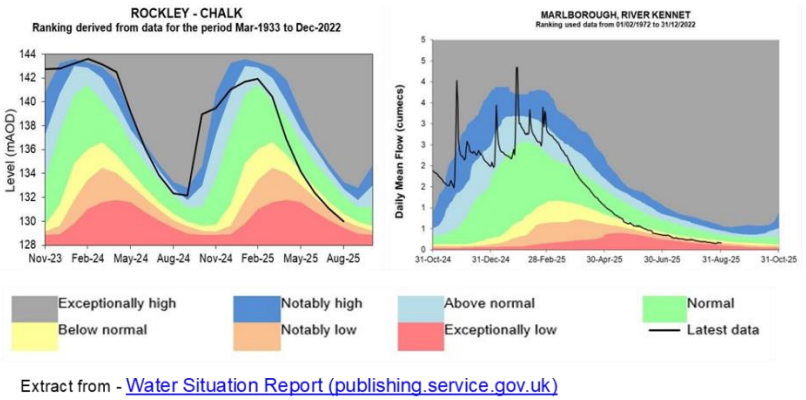


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Figure 4: Ground Water situation Report

Froxfield STW is a 'treat all' site and does not have a storm permit. Therefore, there are no overflow sites with Event Duration Monitor (EDM's) fitted.

Table 1 below represents the intervention works utilised to address infiltration in the sewer and upgrade capacity at treatment works or pumping stations. Please note that this table does not capture works carried out in previous years or long term planned works as these do not have a bearing on the current performance.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	-	1,650m
Look and lift surveys	-	-	-	3	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/24 has increased compared to previous years. Froxfield STW is a 'treat all' site and does not have a storm permit. Therefore, there are no overflow sites with Event Duration Monitor (EDM's) fitted. Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

In the reporting year, we have undertaken CCTV survey of our sewers network, covering some 1,650 metres. These CCTV surveys help us monitor the condition of sewer network as well as identifying potential defects that could allow groundwater infiltration.

Fyfield

Fyfield is located on the River Kennet in Wiltshire, approximately 2km east of Marlborough.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Fyfield sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 5 illustrate the relationship between rainfall and spills at CSOs. Viewing Figure 1, there has been a reduction in rainfall from 2023/24 into 2024/25, representing a correlation to decreased river levels displayed in Figures 2 and 3. Figure 5 also demonstrates how there were no spills in 2025.

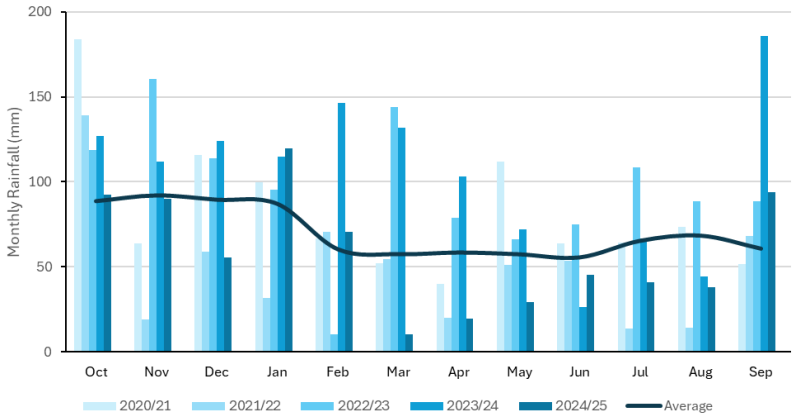

Figure 1: Monthly rainfall data 2020/21 to 2024/25

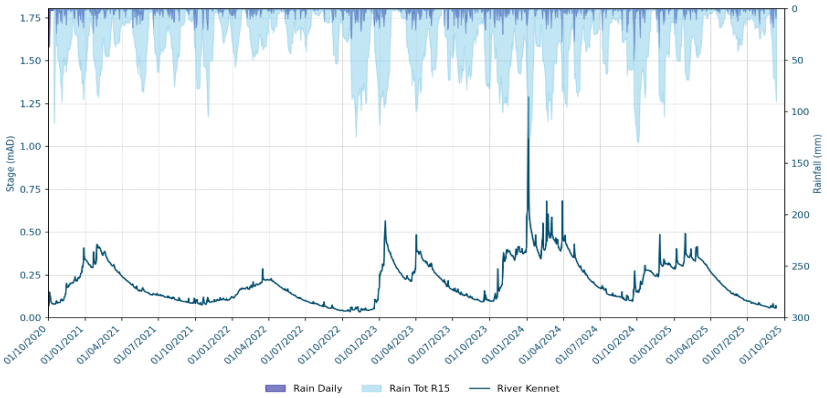

Figure 2: River Level data for River Kennet, Marlborough

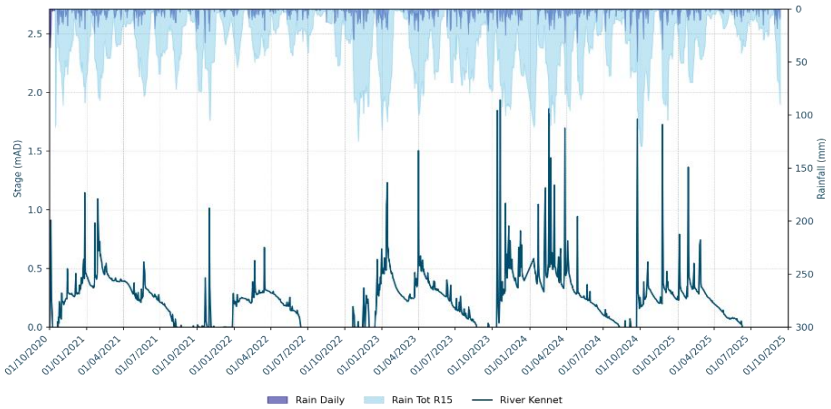

Figure 3: River Level data for River kennet, Winterborne Monkton

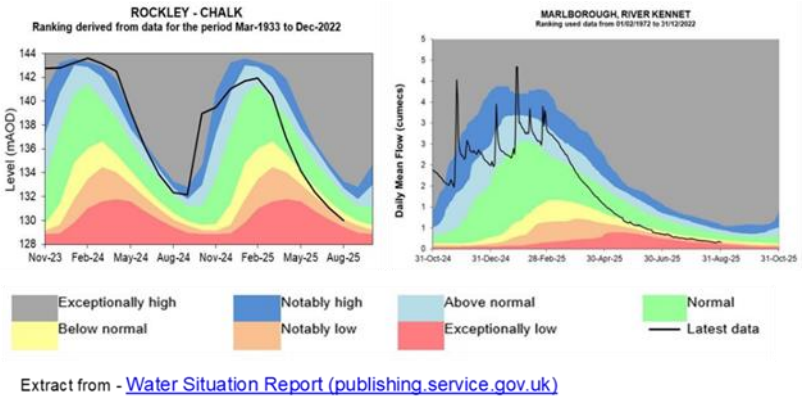

Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 5.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Fyfield STW	15	238.5	44	993.45

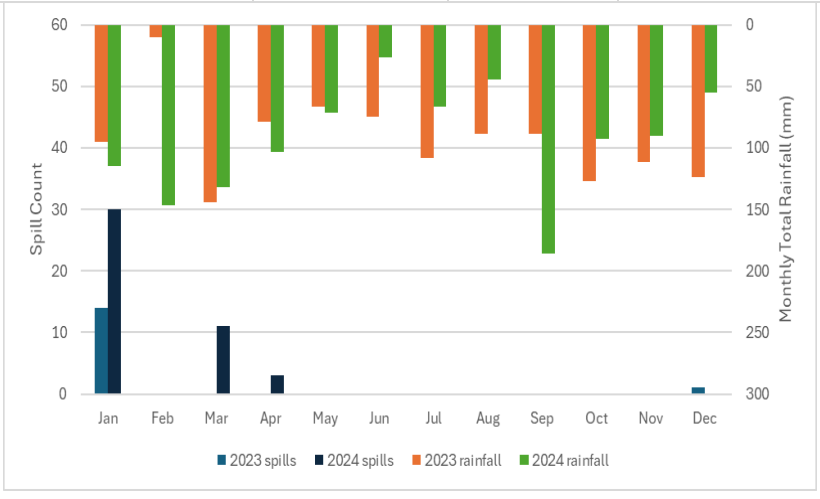

Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Fyfield STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	370m	-	-
Look and lift surveys	-	-	4	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/24 has increased compared to previous years. The number and duration of spills have increased in 2024 compared to 2023. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 5). Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published. Thames Water delivered wastewater treatment enhancement scheme in 2023 which has increased treatment capacity, providing a higher quality of treated effluent discharging into the river.

Thames Water is currently undertaking a scheme, due to complete in 2026, to reduce ground water infiltration into the sewer network. These works include GISMP strategic sealing of 123 manholes and replacing 32 standard manhole covers and frames with “Low Leak” covers and frames in locations where surface water has a potential to accumulate. The scheme also includes sealing an estimated 7,025m of sewers, in locations considered to be at high risk of ground water infiltration, using “Leak Tight” Cured in Place Pipe Lining.

Kingsclere

Kingsclere is located in West Berkshire, approximately 6 miles south-east of Newbury.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Kingsclere sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 5 illustrate the relationship between rainfall and spills at CSOs. Figure 1 displays the reduction in rainfall from 2023/24 to 2024/25.shows a correlation with decreased number and duration of spills at the CSOs shown in Figure 5. However, the river levels remain consistent as shown in Figures 2 and 3.

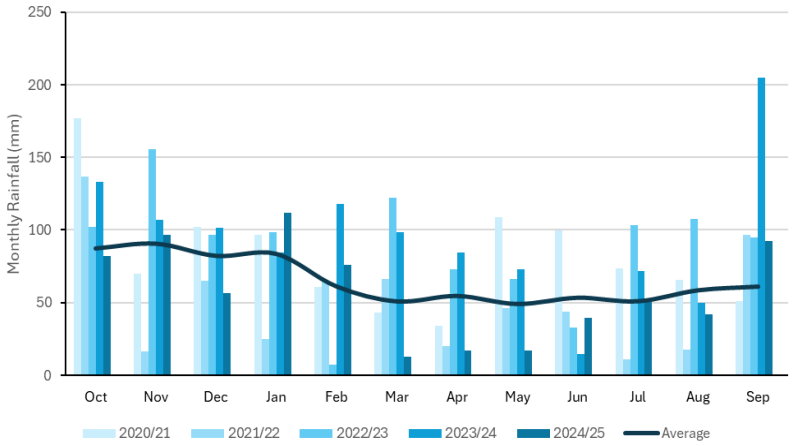

Figure 1: Monthly rainfall data 2020/21 to 2024/25

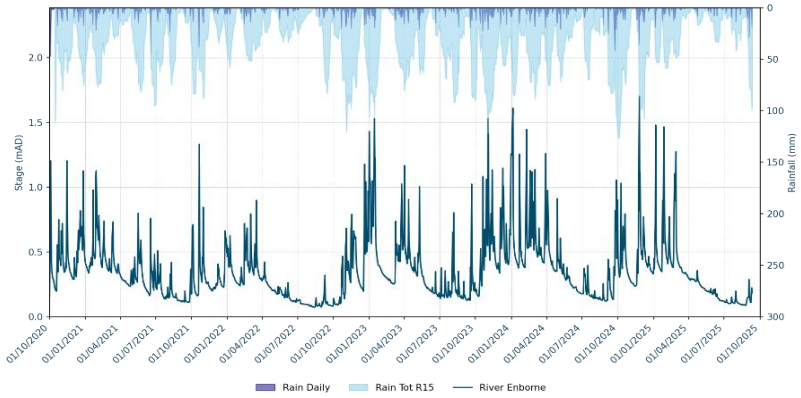

Figure 2: River Level data for River Enborne, Brimpton

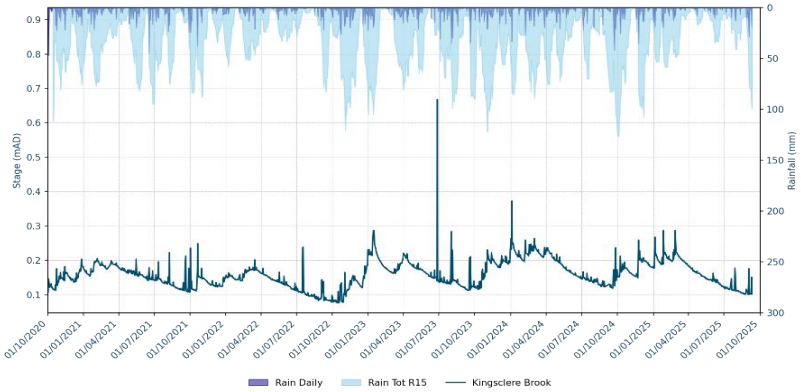

Figure 3: River Level data for Kingsclere Brook, Kingsclere

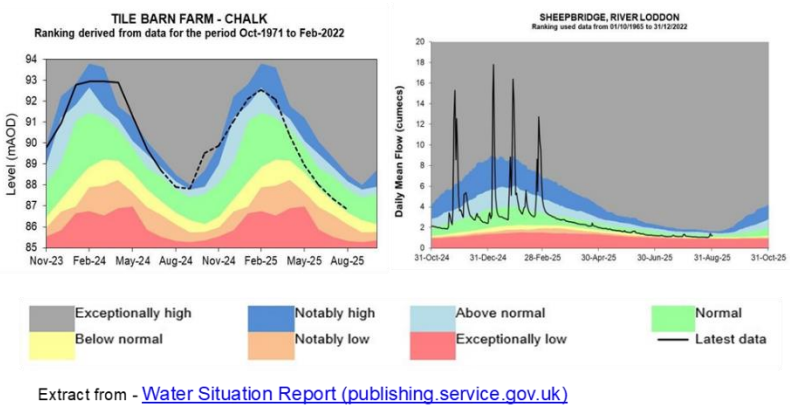

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Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 5.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Kingsclere STW	134	2562.25	119	2271

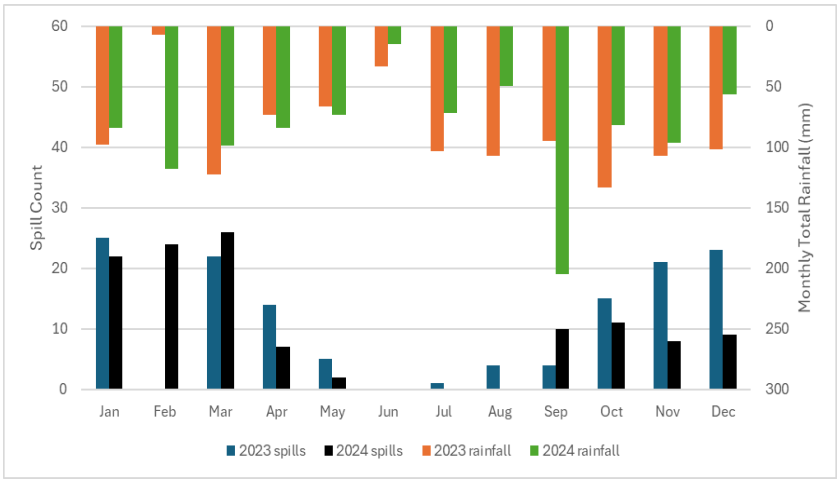


Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Kingsclere STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	1,727m	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
Tankering undertaken	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-
Treatment Works / Pumping Station Upgrades	-	-	-	-	-

Summary

A review of river level data over 2023/2024 shows a similar pattern being followed compared to previous years, including the average rainfall in 2023 staying fairly consistent compared to 2024 (see Figure 5). The lower number of annual spills could be a result of the rainfall and river levels staying consistent. Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

Marlborough

Marlborough is located on the River Kennet in Wiltshire, approximately 10 miles South of Swindon.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Marlborough sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 8 illustrate the relationship between rainfall and spills at CSOs. Figure 1 displays the decrease in rainfall from 2023/24 into 2024/25, this correlating to decreased groundwater and river levels shown in Figures 2-5, and the decreased number and duration of spills at the CSOs is shown in Figure 7 and Figure 8.

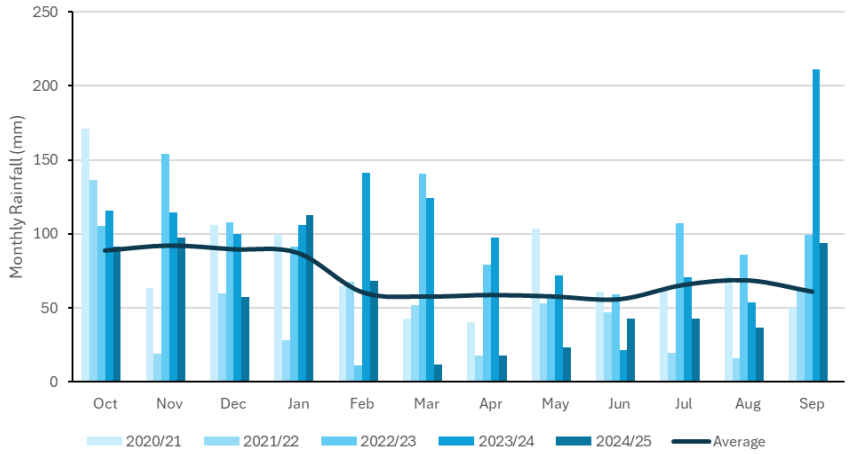


Figure 1: Monthly rainfall data 2020/21 to 2024/25

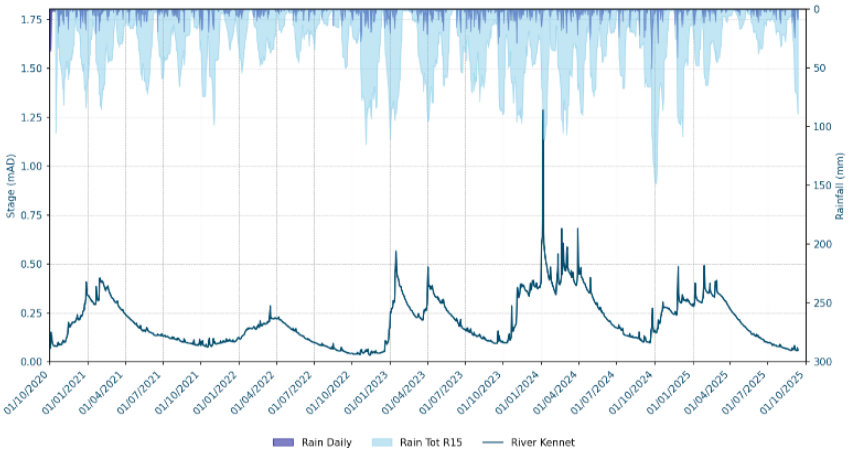


Figure 2: River Level data for River Kennet at Marlborough

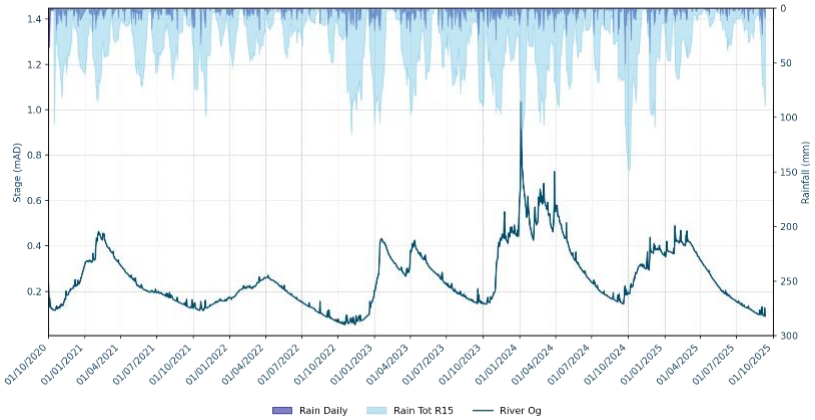
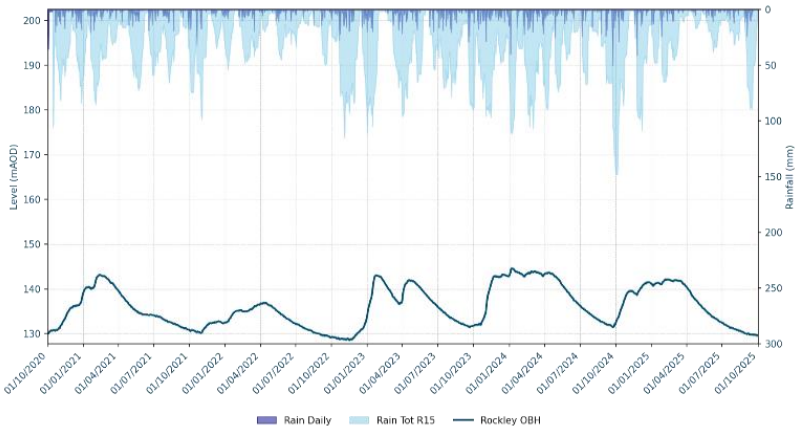


Figure 3: River Level data for River Og at Poulton Farm



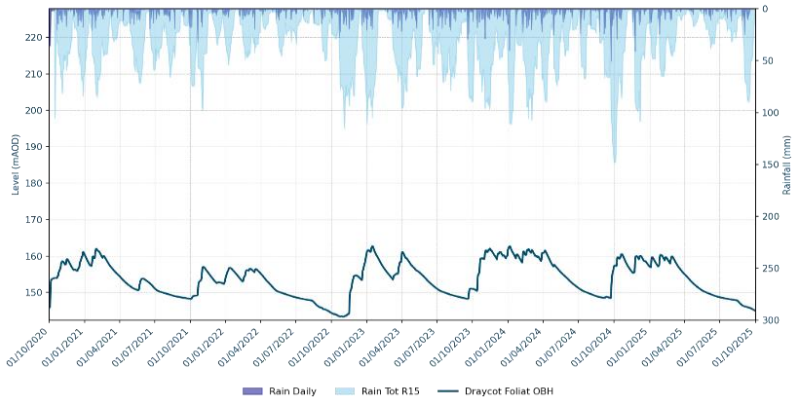


Figure 4: River Level data for Rockley OBH / Figure 5: River Level data for Draycot Foliat OBH

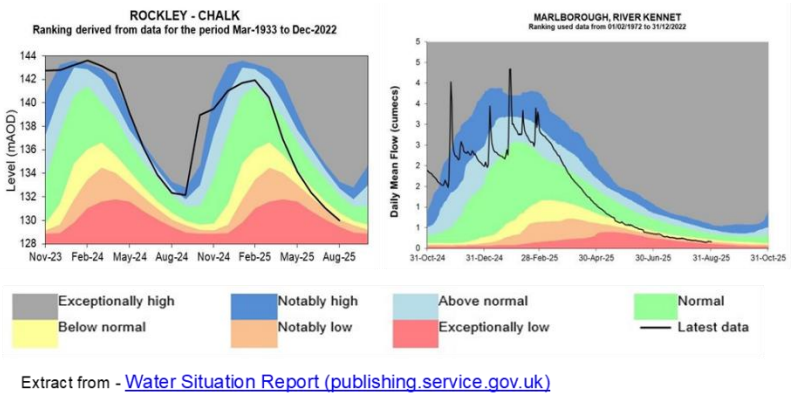


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Figure 6: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figures 7 and 8.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Marlborough STW	172	2383.25	172	2786
London Road SPS	2	1.5	11	59.45

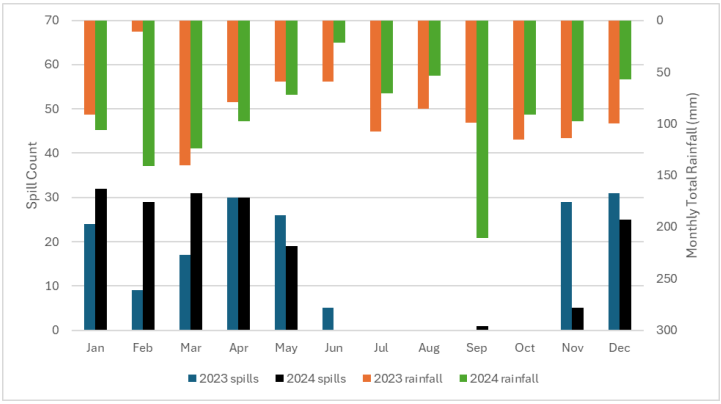

Figure 7: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Marlborough STW

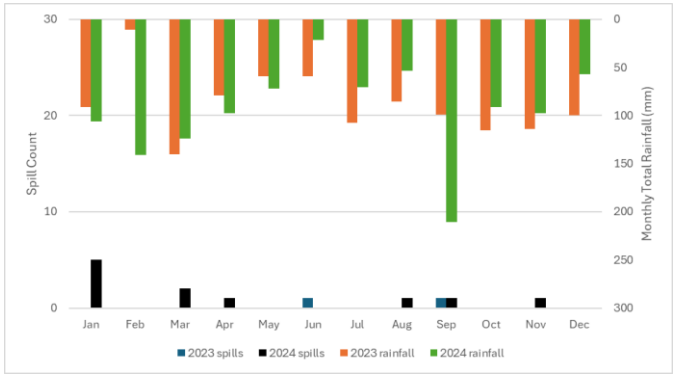

Figure 8: Monthly rainfall data versus monthly spill count for 2023 and 2024 – London Road SPS

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	380m	-	3,700m
Look and lift surveys	-	-	2	6	-
Sewer lining	30m	50m	-	-	-
Patch lining	-	-	2	-	-
Manhole sealing / plates / covers and frames replaced	1	2	6	-	-
ATAC unit deployment	-	-	-	1	1

Summary

A review of river level data over 2023/24 has increased compared to previous years. The number and duration of spills have increased in 2024 compared to 2023 for “London Road SPS”, whereas number of spills have remained the same for “Marlborough STW”, but spill duration has increased. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 7 & 8). Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

In the reporting year, we have undertaken CCTV survey of our sewers network, covering some 3,700 metres in the area upstream of the ATAC, the Ogbournes down to Bay Bridges. The CCTV has been reviewed, and there were no major gushers found. The footage has highlighted an area of interest where a number of private connections cross the river kennet before discharging in the sewer. Operations are currently liaising with the customers about gaining access to review these private lines this winter.

Furthermore, ATAC units were utilized in this catchment during periods of high flows to partially treat flows being discharged to the watercourse. The ATAC unit at Bay Bridges was switched on between 25/11/2024 – 01/05/2025. Further details for the ATAC units are available in the standalone groundwater plan for this system.

Ramsbury

Ramsbury is located in the Kennet Valley, Wiltshire.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Ramsbury sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 6 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation with decreased number and duration of spills at the CSOs in Figure 5. However, the Groundwater and river levels remain consistent as shown in Figure 2 to Figure 4.

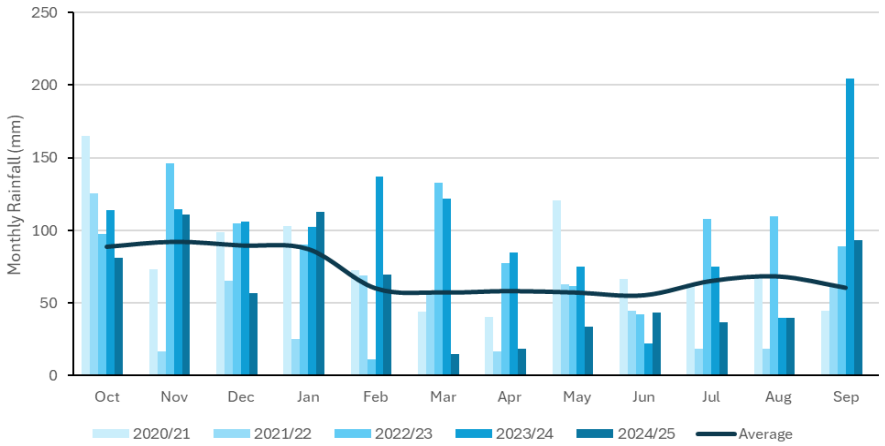

Figure 1: Monthly rainfall data 2020/21 to 2024/25

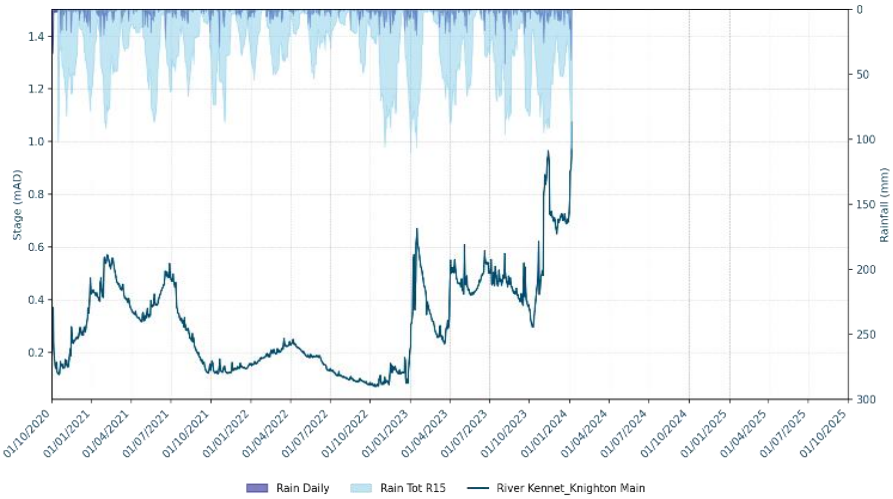

Figure 2: River Level data for Kennet, Knighton Main

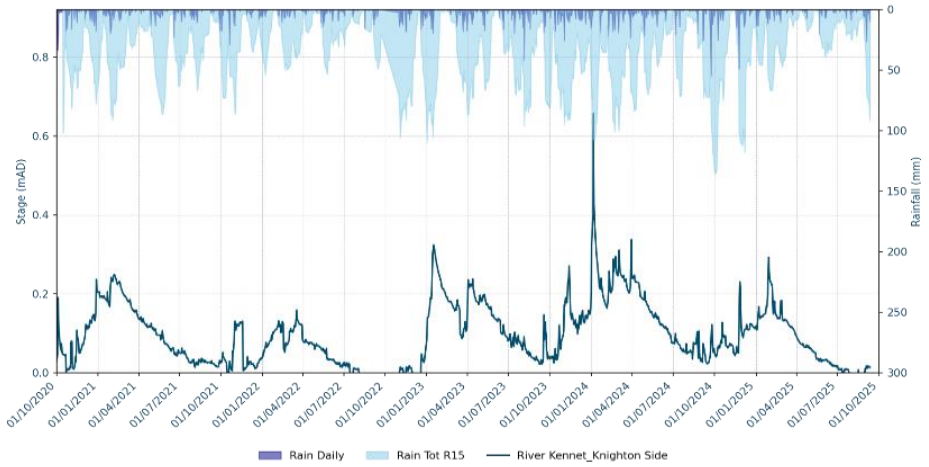

Figure 3: River Level data for Kennet, Knighton Side

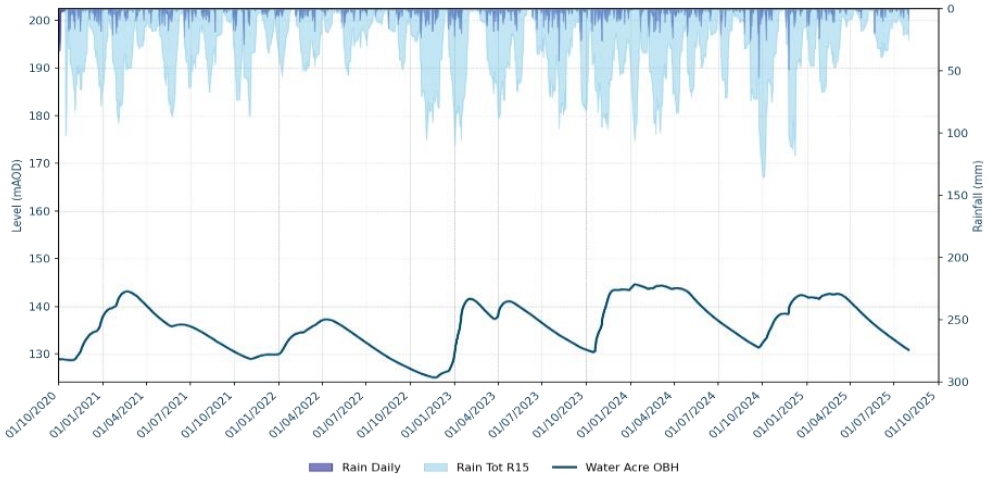

Figure 4: River Level data for Water Acre OBH

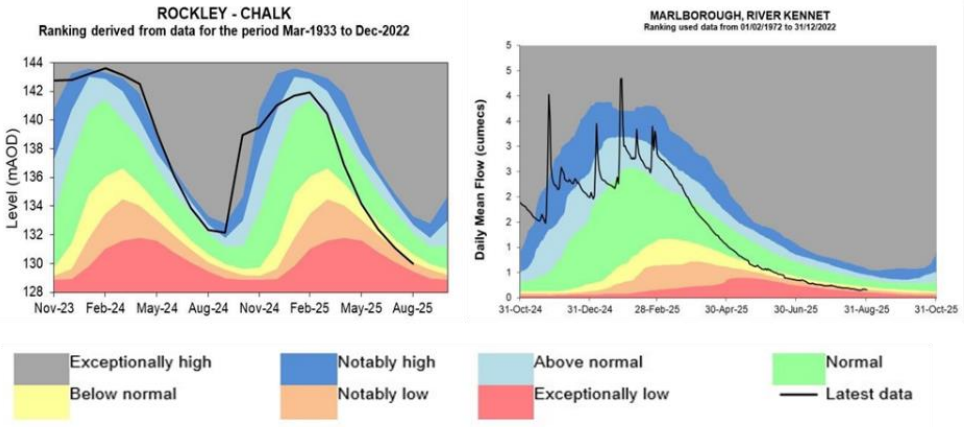

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Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 6.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Ramsbury STW	0	0	23	90.45

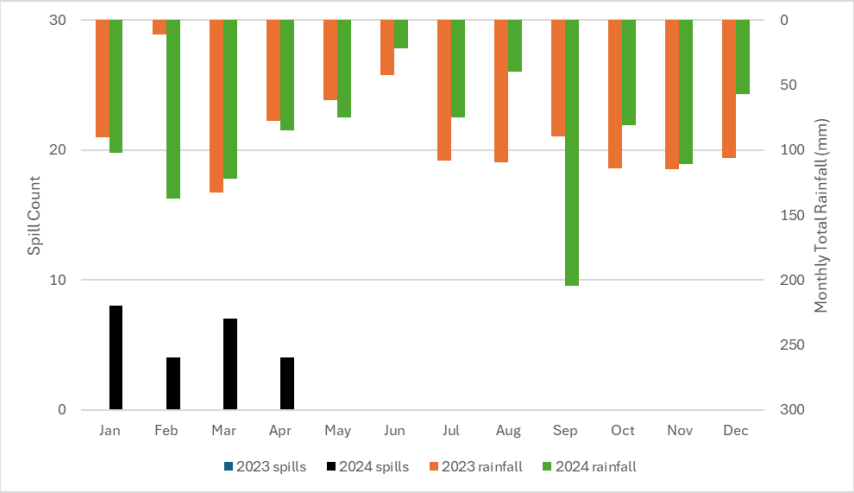


Figure 6: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Ramsbury STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	1,665m	3,500m	1,318m
Look and lift surveys	-	-	5	12	-
Sewer lining	-	60m	-	-	-
Patch lining	1	-	-	-	-
Manhole sealing / plates / covers and frames replaced	2	2	-	-	-
ATAC unit deployment	1	-	-	1	1

Summary

A review of river level data over 2023/24 has increased compared to previous years. The number and duration of spills have increased in 2024 compared to 2023. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 6). Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

This year we have completed 1.318km of CCTV in Lottage Road and The Square, there were no major gushers found.

Furthermore, a temporary bio-filter (ATAC) unit was utilized in this catchment during periods of high flows to partially treat flows being discharged to the watercourse. The ATAC unit at Aldbourne was switched on between 14/01/2025 – 10/04/2025. Further details for the ATAC units are available in the standalone groundwater plan for this system.

Reading

Reading is located in in Berkshire, approximately 15 miles east of Newbury.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Reading sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 6 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation with decreased number and duration of spills at the CSOs shown in Figure 6. However, the Groundwater and river levels remain consistent as shown in Figure 2 to Figure 4.

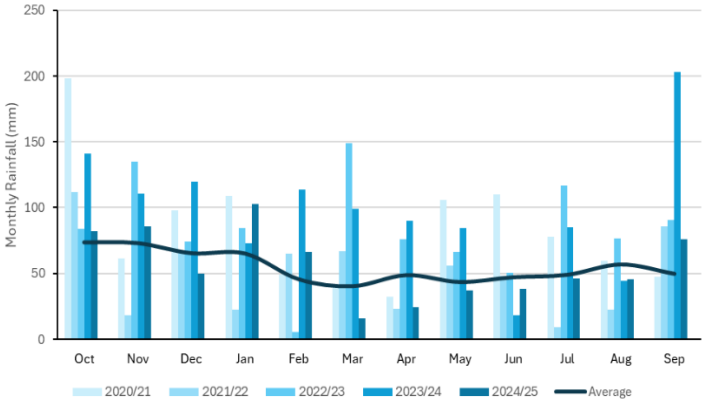
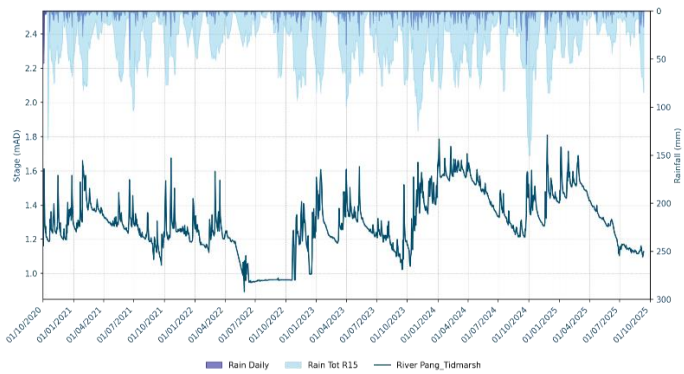


Figure 1: Monthly rainfall data 2020/21 to 2024/25



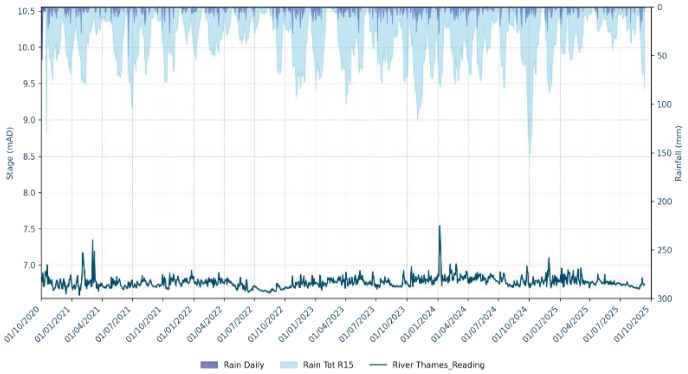


Figure 2: River Level data for River Pang, Tidmarsh/ Figure 3: River Level data for River Thames, Reading

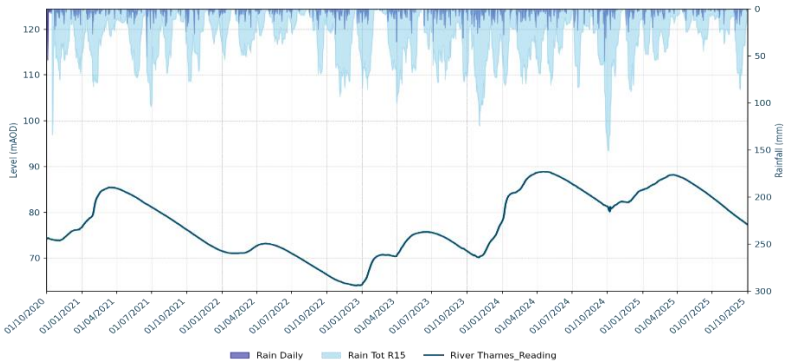


Figure 4: River Level data for Stonor Park OBH

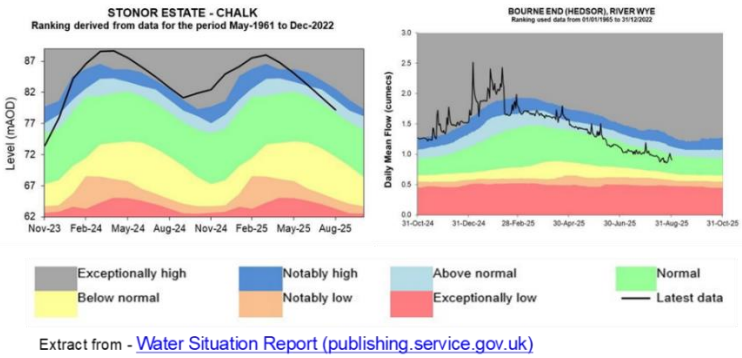


Figure 5: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 6.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Reading STW	24	289.75	47	654

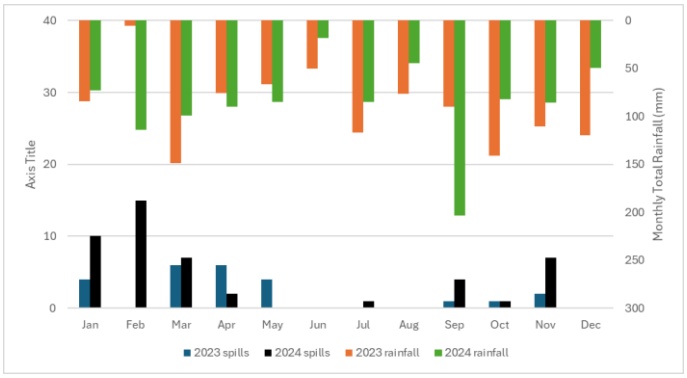


Figure 6: Monthly rainfall data versus monthly spill count for 2023 and 2025 – Reading STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	447m	1,253m	500m	1,500m
Look and lift surveys	-	-	10	8	-
Sewer lining	-	-	850m	360m	1,195
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	20	15	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/24 has increased compared to previous years. The number and duration of spills have increased in 2024 compared to 2023. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 6). Moreover, groundwater levels for 2024/2025 have stayed relatively similar to the groundwater levels of the previous year, but the effect of this will be analysed when 2025 spill data is published.

In the reporting year, we have undertaken CCTV survey of our sewers network, covering some 1,500 metres. These CCTV surveys help us monitor the condition of sewer network as well as identifying potential defects that could allow groundwater infiltration.

In conjunction with the CCTV, we have undertaken 1,100 metres of sewer lining was introduced at Gravel Pits and a further 95m at Aldermaston Wharf.

Silchester

Silchester is located in Hampshire, approximately 9 miles south-west of Reading.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Silchester sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 6 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation with decreased number and duration of spills at the CSOs as shown in Figure 5 and Figure 6. Figure 2 shows a decrease in river levels, while Figure 3 shows a similar trend. However, this observation should be interpreted carefully due to flatlining data, which may affect the reliability of the interpretation.

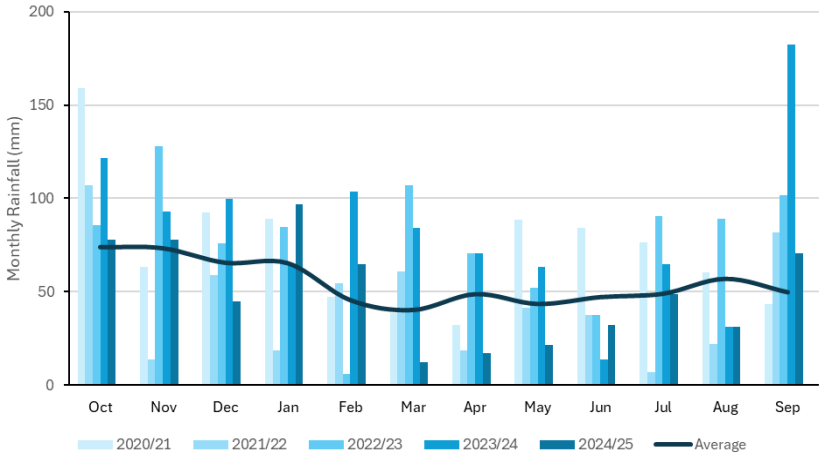


Figure 1: Monthly rainfall data 2020/21 to 2024/25

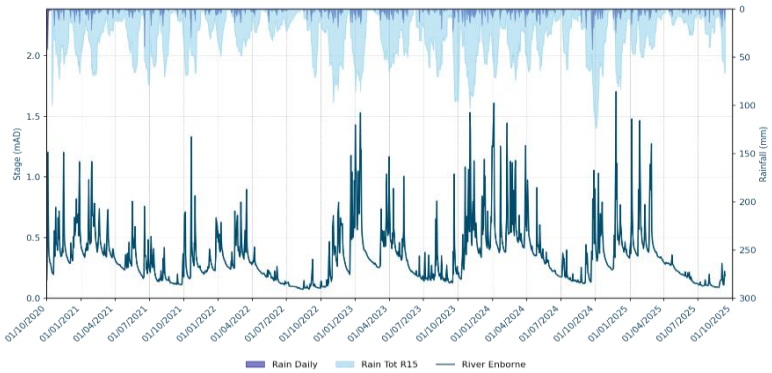


Figure 2: River Level data for River Enborne, Brimpton

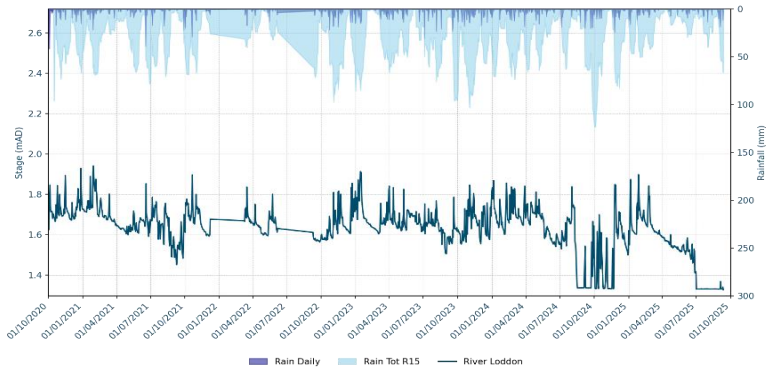


Figure 3: River Level data for River Loddon, Longbridge Mill

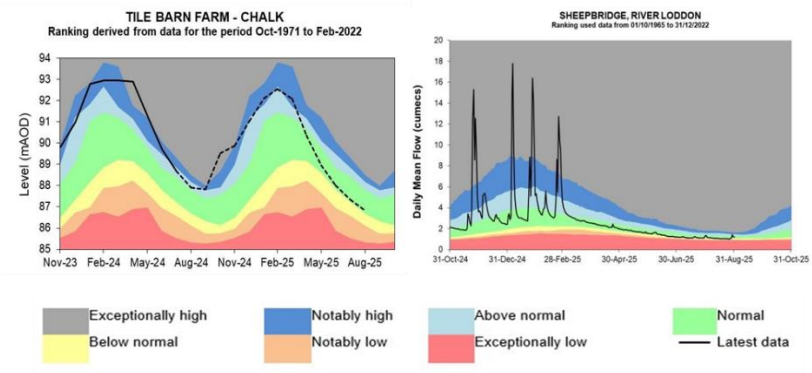


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Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figures 5,6and 7.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Silchester STW	112	2067	97	1685
Swains Road SPS	2	3.5	2	05.30
Opp St Stephens Hall SPS	60	62.77	72	180.30

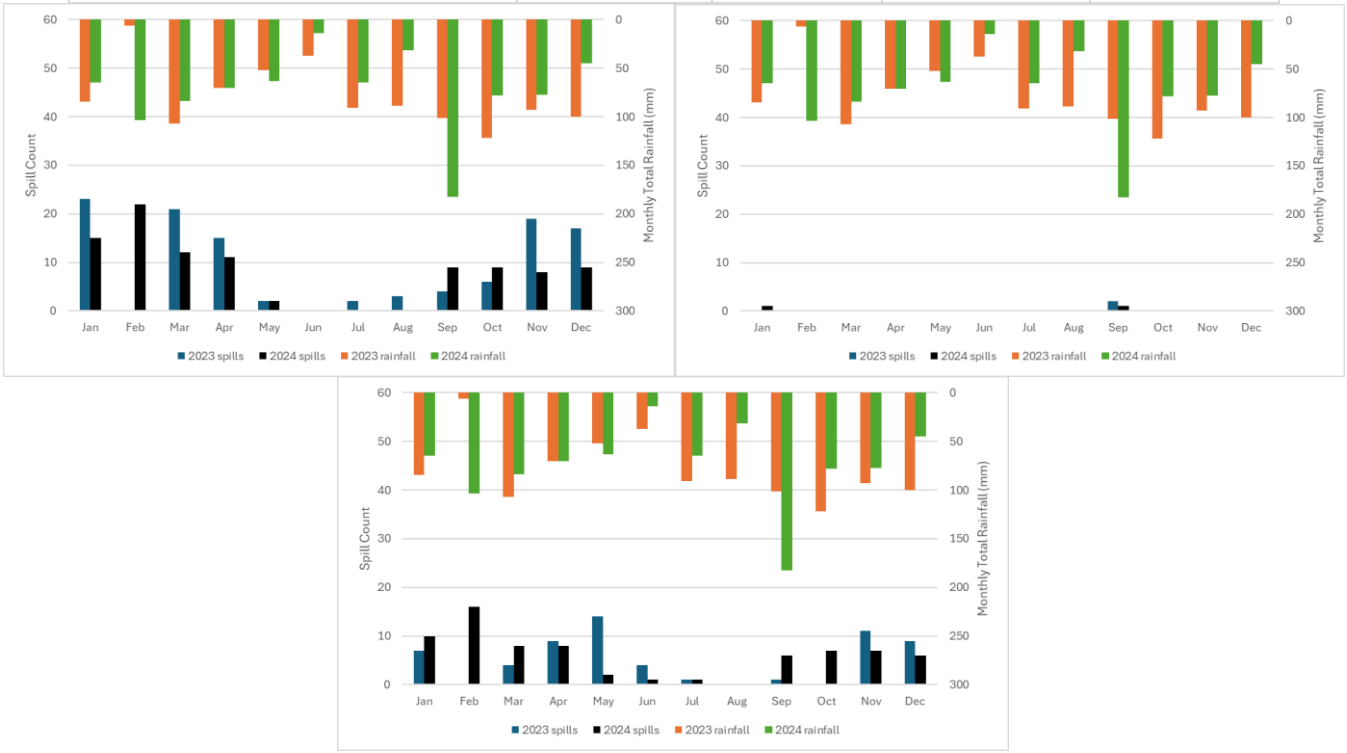

Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Silchester STW / Figure 6: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Swains Road SPS / Figure 7: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Opp St Stephens Hall SPS

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	4,740m	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/2024 shows a similar pattern being followed compared to previous years. The number and duration of spills have decreased for “Silchester STW” in 2024 compared to 2023, whereas the number of spills increased for “Opp St Stephens Hall SPS” and for “Swains Road SPS” the number of spills remained the same. The higher number of spills could be due to the increased rainfall in 2024 compared to 2023. The lower number of annual spills could be a result of the river levels staying consistent. Moreover, groundwater levels for 2024/2025 have stayed relatively similar to the groundwater levels of the previous year, but the effect of this will be analysed when 2025 spill data is published.

Wash Water

Wash Water is located in Berkshire, approximately 3 miles south-west of Newbury.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Wash Water sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 7 illustrate the relationship between rainfall and spills at CSOs. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; shows a correlation with decreased number and duration of spills at the CSOs shown in Figure 5 to Figure 7. However, the river levels remain consistent as shown in Figure 2 and Figure 3.

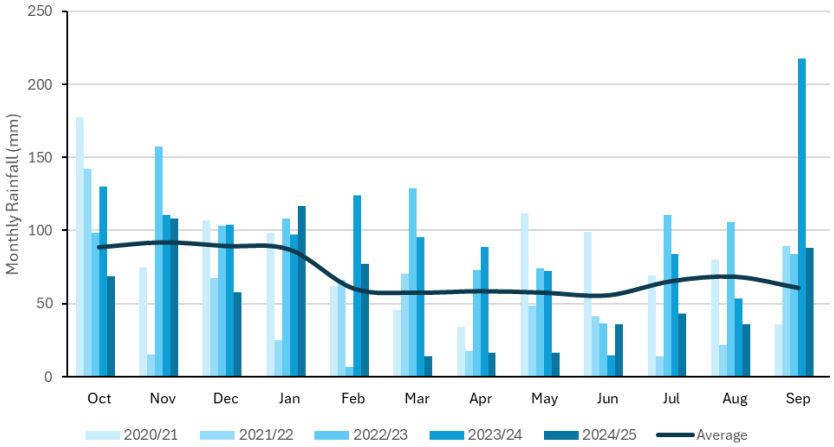

Figure 1: Monthly rainfall data 2020/21 to 2024/25

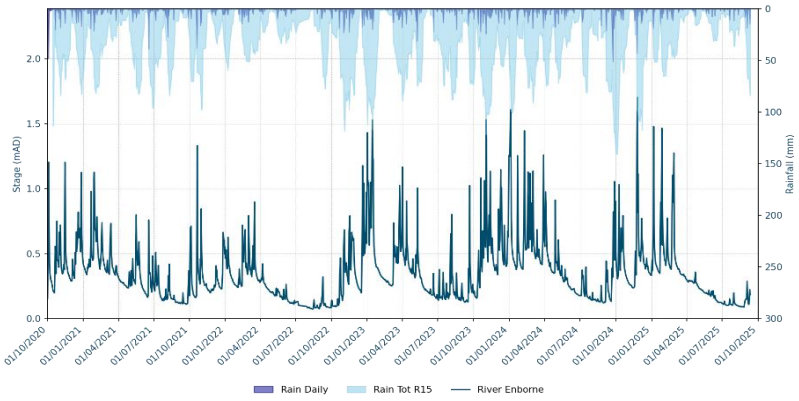

Figure 2: River Level data for River Enborne, Brimpton

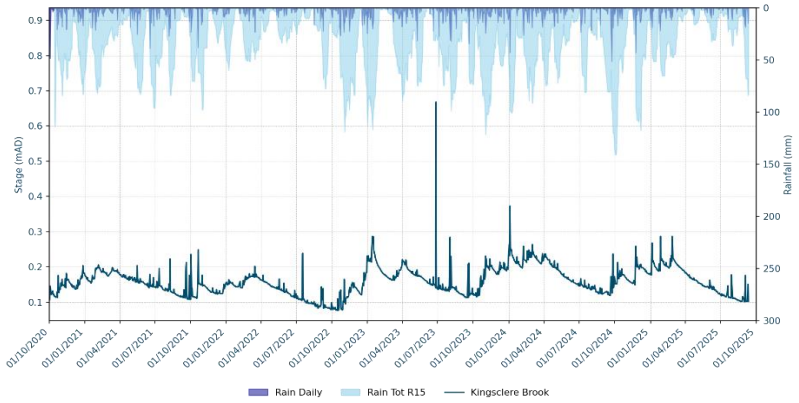

Figure 3: River Level data for Kingsclere Brook, Kingsclere

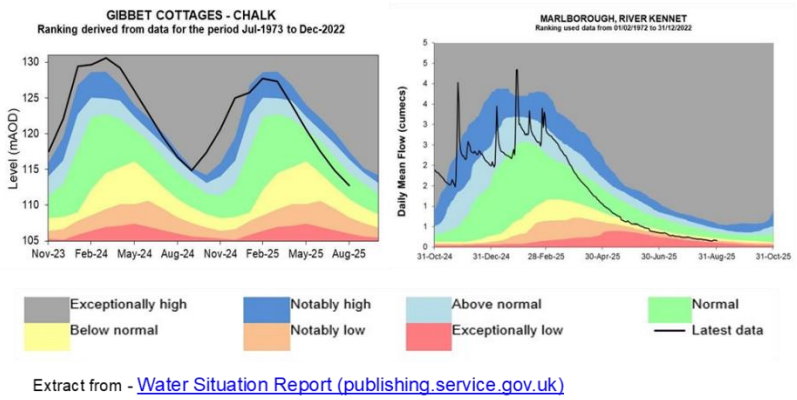

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Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figures 5 to 7.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Wash Water STW	111	1731.25	67	1049.45
Blind Mans Gate Highclere SPS	46	521	45	472.45
Knights Lane SPS	50	743.75	59	989.15

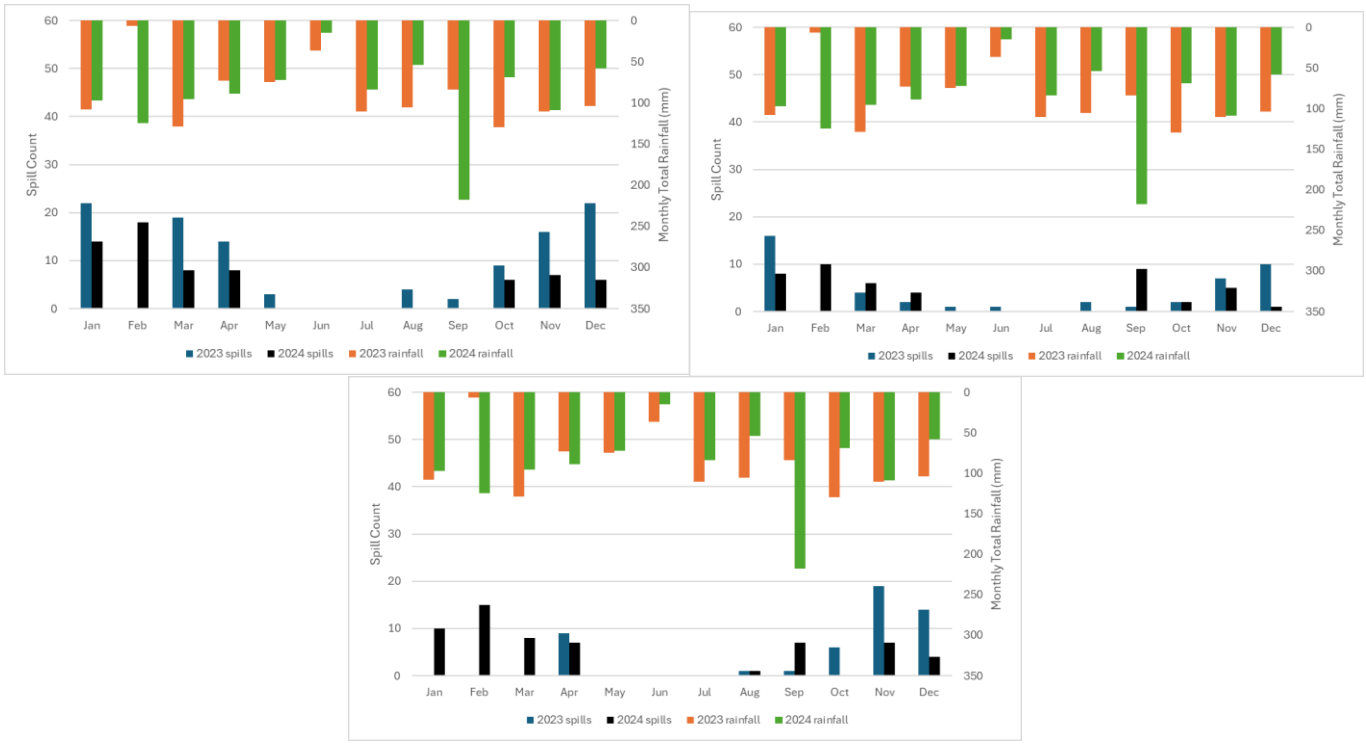

Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Wash Water STW / Figure 6: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Blind Mans Gate Highclere SPS / Figure 7: Monthly rainfall data versus monthly spill count for 2023 and 2024 – knights Lane SPS

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	1,256m	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/2024 shows a similar pattern being followed compared to previous years. The number and duration of spills have decreased for “Wash Water STW” and “Blind Mans Gate Highclere SPS” in 2024 compared to 2023, whereas the number of spills increased for “Kings Lane SPS”. The higher number of spills could be due to the increased rainfall in 2024 compared to 2023. The lower number of annual spills could be a result of the river levels staying consistent. Moreover, groundwater levels for 2024/2025 have stayed relatively similar to the groundwater levels of the previous year, but the effect of this will be analysed when 2025 spill data is published. Thames Water delivered wastewater treatment enhancement scheme in 2024 which has increased treatment capacity, reducing the likelihood of storm discharges.

Winterbourne

Winterbourne is located in South Gloucestershire, situated on the north fringe of Bristol.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Winterbourne sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 5 illustrate the relationship between rainfall and spills at CSOs. Figure 1 displays how rainfall has decreased in 2024/25 from 2023/24. While the Chapelwood OBH river level profile in Figure 2 remains similar to the previous year, observing Figure 3, Winterbourne Stream's level has decreased in 2025. Despite this, spills did not significantly decrease until May 2025 in Figure 5.

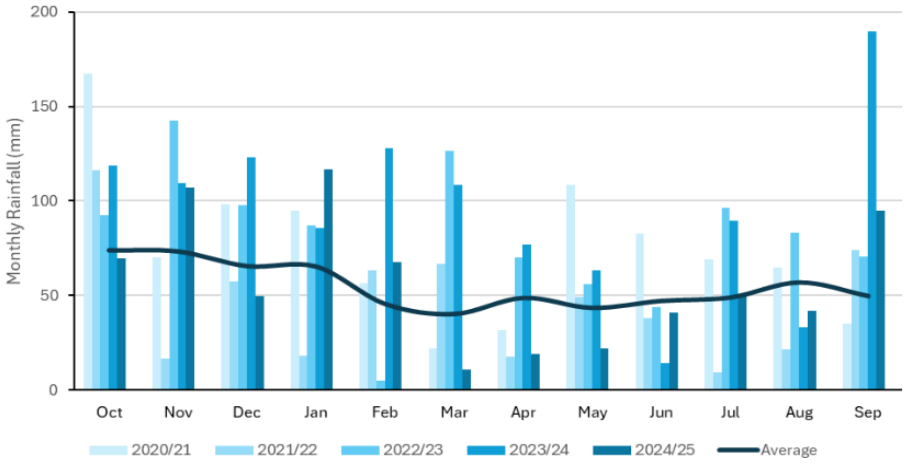

Figure 1: Monthly rainfall data 2020/21 to 2024/25

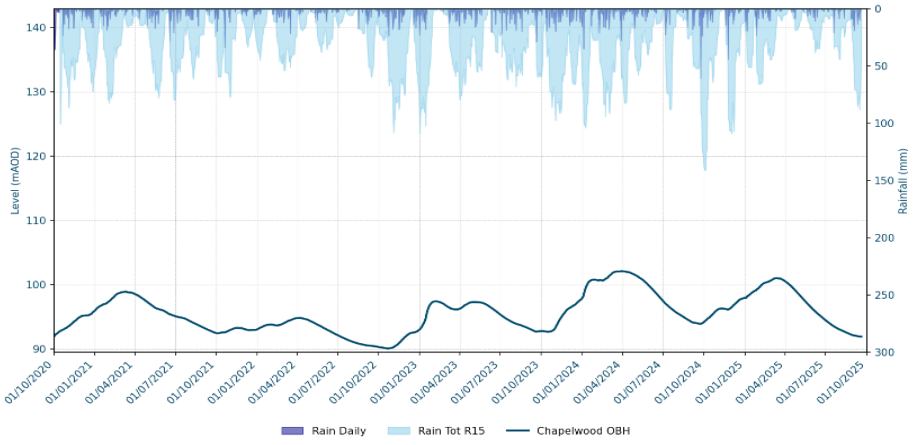

Figure 2: River Level data for Chapelwood OBH

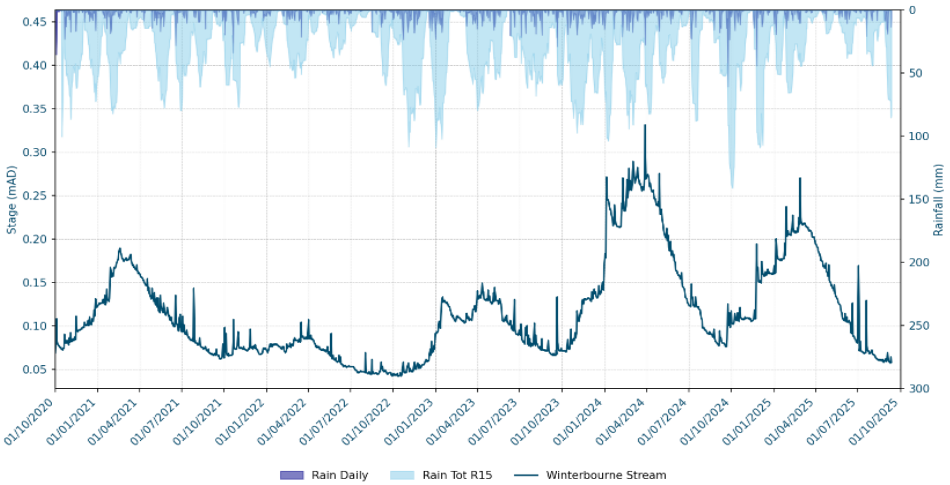

Figure 3: River Level data for Winterbourne Stream, Bagno

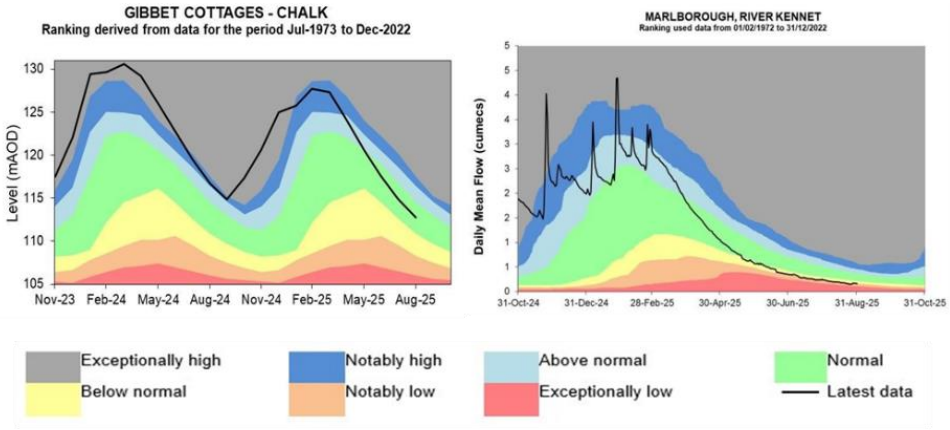

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Figure 4: Ground Water situation Report

Table 1 below details the last 2 years performance of overflows in the catchment. To assess EDM performance and its relation to groundwater infiltration, a review of the month-on-month spill performance in 2023 and 2024 against the monthly total rainfall values has been undertaken, as observed in Figure 5.

Event Duration Monitoring	2023		2024	
Overflow	Annual Spills	Duration (hours)	Annual Spills	Duration (hours)
Winterbourne STW	59	1287	219	5062

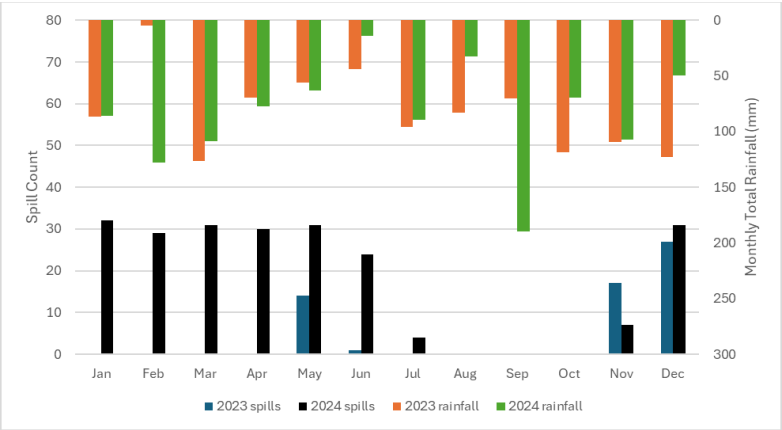


Figure 5: Monthly rainfall data versus monthly spill count for 2023 and 2024 – Winterbourne STW

Table 2 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	-	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	14	1	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/24 has increased compared to previous years. The number and duration of spills have increased in 2024 compared to 2023. The higher number of annual spills and river levels could be a result of the increased rainfall in 2024 (seen in Figure 5). Moreover, there is a slight drop in groundwater levels for 2024/2025 compared to the groundwater levels of the previous year, but the effect of this decrease will be analysed when 2025 spill data is published.

Woolhampton

Woolhampton is located in West Berkshire, approximately 6 miles east of Newbury.

This addendum provides an update on work undertaken in the hydrological year October 2024 to September 2025 for the Woolhampton sewerage system. The key points covered include:

- Hydrological conditions
- Performance of the sewerage system
- Mitigation / remedial measures progressed over the last year

Figures 1 to 3 illustrate the relationship between rainfall and river level. As can be seen the decrease in rainfall from 2023/24 into 2024/25, shown in Figure 1; whereas the river levels remain similar to the previous years as shown in Figure 2. Observing Figure 3, groundwater level has decreased in 2025.

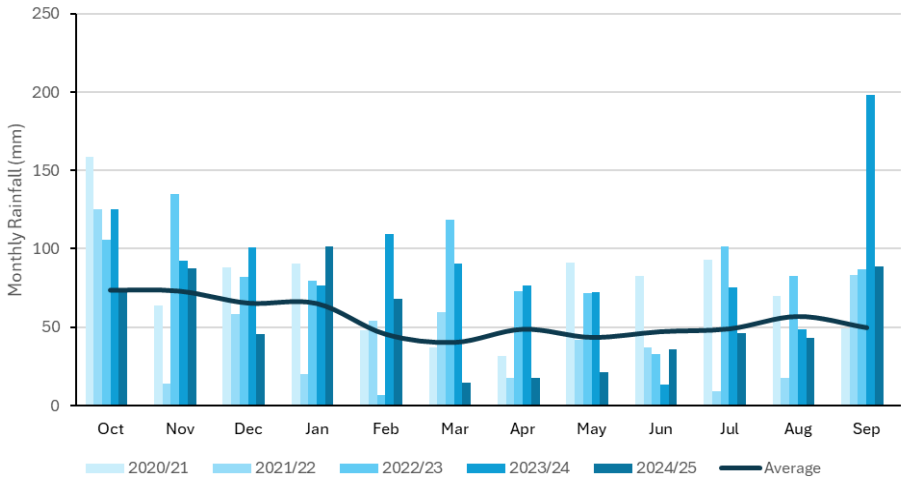


Figure 1: Monthly rainfall data 2020/21 to 2024/25

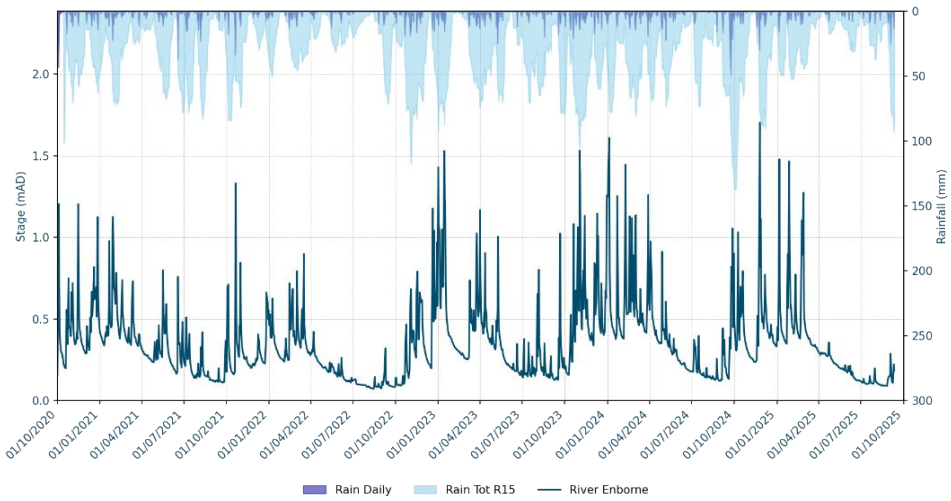
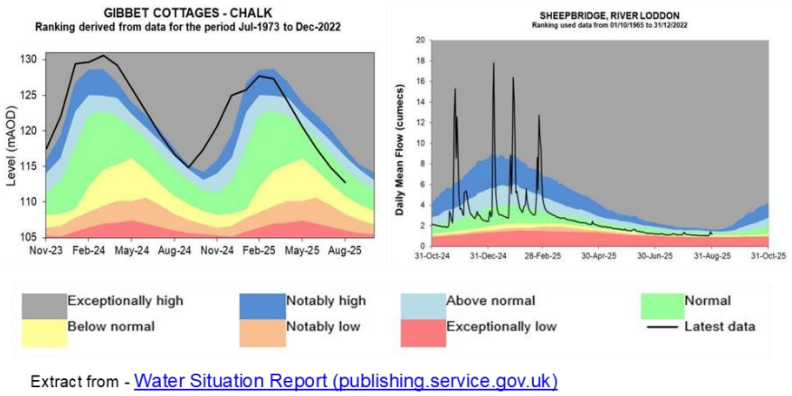


Figure 2: River Level data for River Enborne, Brimpton



Extract from - Water Situation Report (publishing.service.gov.uk)

Figure 3: Ground Water situation Report

Woolhampton STW is a 'treat all' site and there are no consented overflows located in the catchment. Therefore, overflow performance for the Woolhampton catchment has not been detailed.

Table 1 below outlines the remediation works undertaken to address infiltration in the catchment, and enhancements to treatment works and/or pumping stations. Please note that this table only refers to work completed in the previous year.

Investigation / remediation type	2020/21	2021/22	2022/23	2023/24	2024/25
CCTV surveys	-	-	-	-	-
Look and lift surveys	-	-	-	-	-
Sewer lining	-	-	-	-	-
Patch lining	-	-	-	-	-
Manhole sealing / plates / covers and frames replaced	-	-	-	-	-
ATAC unit deployment	-	-	-	-	-

Summary

A review of river level data over 2023/2024 shows a similar pattern being followed compared to previous years. As mentioned above, STW is a 'treat all' site and there are no consented overflows located in the catchment. Therefore, overflow performance for the Woolhampton catchment has not been detailed. Moreover, groundwater levels for 2024/2025 have stayed relatively similar to the groundwater levels of the previous year, but the effect of this will be analysed when 2025 spill data is published.