Our Drainage and Wastewater Management Plan 2030-2055

Delivering for customers, communities and the environment

Performance Indicator Methodology – Groundwater Infiltration (Dry Day Spills)

March 2026

Thames Water

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This methodology document is a working draft based on the requirements of the published DWMP guidance and informed by agreements made through the Water Industry Task and Finish Groups for each Performance Indicator (PI). As the DWMP stages for each PI progress, this methodology will be refined to reflect the practicalities of deployment and feedback from stakeholders. A final published methodology document will describe the detailed approach followed.

1. Introduction

1.1. This document provides a detailed description of the **'Groundwater infiltration' Performance Indicator** and its purpose and contribution to forming our Drainage and Wastewater Management Plan (DWMP).

Purpose of this document

1.2. The purpose of this document is to outline the methodology that will be used to establish the base year and future baseline forecasts for the **Groundwater Infiltration (Dry Day Spills (DDS)) Performance Indicator**, as part of our DWMP for the 2030-2055 planning period. The base year is 2030[1] and it is our best estimate of expected performance for this indicator at the end of the current investment period (2025-2030) and reflects the outcome of schemes and maintenance activities planned for this period. We then forecast what is expected to happen to the indicator at baseline points in the future if no change in investment is made. These future points are set in the short term (2035), the medium term (2045) and the long term (2055).

1.3. In addition, it sets out threshold values that will be used to summarise the level of risk and guide the development of options for the 2030-2055 planning period.

1.4. The requirements for Performance Indicators are set out in Government guidance for DWMPs[2] and subsequent clarifications by the Environment Agency (EA)[3]. To understand the general approach to our DWMP, please also refer to our Strategic Context document on our website[4].

1.5. Assessment of the base year and future risks for each of our Performance Indicators is a crucial step in the development of our DWMP. It informs our understanding of how the drainage and wastewater system is able to meet legal obligations and meet the needs of customers and the environment. The DWMP approach requires completion of a risk assessment for the following Performance Indicators for each future planning horizon at the wastewater catchment scale:

- Internal flooding
- External (curtilage) flooding
- Storm overflow performance (England)[$]
- Treatment works compliance (numeric)[$]

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[1] 2030 refers to Annual Return performance reported in 2030 (AR30), it should be noted that some data reported at AR30 is actually from the prior year, examples being pollution numbers and annual spill count which are based on 2029 calendar year performance.
[2] Guidelines for Statutory Drainage and Wastewater Management Plans (DWMPs) - GOV.UK
[3] EA letters to water companies with feedback on performance indicators (02/10/2025), (23/03/2026) and reporting thresholds (17/10/2025).
[4] DWMP28 | Drainage and wastewater | Thames Water

- Treatment works compliance (descriptive at numeric sites)[$]
- Treatment works compliance (Dry Weather Flow (DWF))
- Treatment works compliance (Flow to Full Treatment (FFT))
- Good Ecological and/or Chemical Status: Public sewerage
- Pollution incidents: serious[$]
- Pollution incidents: total
- Bathing water quality
- Shellfish water quality
- Surface water flooding (Shared responsibility)[β]
- Good Ecological and/or Chemical Status: Urban and transport (Shared responsibility)[β]
- Emergency overflow performance[$β]
- Treatment Works Compliance (descriptive)[β]
- Groundwater pollution[β]
- **Groundwater infiltration[β]**

1.6. Performance Indicators marked $ will use a nationally consistent suite of thresholds to describe the general level of risk[2],[3]. Performance Indicators marked β are considered more experimental in nature and are recognised as inherently difficult to forecast and will hence be trialled in DWMP28 as emerging Performance Indicators and then possibly refined for subsequent DWMPs[2].

Key definitions

1.7. **Groundwater Infiltration (DDS) Performance Indicator**: The Government DWMP guidelines[2] provide the following definition:

Table 1. Extract from Table 2 of Government DWMP guidance

Category	Metric	Details
Water environment	Groundwater Infiltration (DDS)	Annual number of discharges during 'dry weather' caused by increase in sewer flow from groundwater infiltration

1.8. The purpose of the Performance Indicator is to assess the base-year performance (2030 for DWMP28) of the risk of groundwater infiltration impact on storm overflows (Dry Day Spills) and provide a prediction of typical annual average future performance under a 'do nothing' scenario at each of the baseline planning horizons; 2035, 2045 and 2055.

1.9. Storm overflows are permitted to discharge because of 'rainfall or snowmelt'. Days on which spills occur are defined as 'dry' or 'wet' days. Currently regulatory guidance describes

a Dry Day Spill when a storm overflow operates on a 'dry day', defined as a day with no rainfall above 0.25 mm on that day and the preceding 24 hours[5].

1.10. A common cause of dry day or prolonged spills is the impact of groundwater infiltration; hence this metric looks to measure the risk posed by groundwater infiltration on triggering dry day spills.

1.11. The metric is to report the average annual dry day spill count at Level 1, Level 2 and Level 3 DWMP spatial scales for storm overflows on the sewer network and at treatment works (including combined sewer overflows and settled storm overflows).

1.12. This measure includes an assessment of available historical event duration monitoring (EDM) data and rainfall data to identify all dry day spills (using the EA guidance LIT74042 but counting all incidents including self-reported) related to increase in flow from groundwater infiltration.

[5] It should be noted at the time of drafting this Performance Indicator, LIT74042 is currently being reviewed by the Environment Agency for republication so this reference, which relates to the last publicised version is subject to change and may not be searchable.

2. Key assumptions

2.1. This section contains a description of the assumptions we will make in reporting the Performance Indicator and provides a commentary on alignment with the DWMP guidance.

Assumptions

2.2. The definition of a Dry Day Spill (DDS) is based upon the EA definition i.e. When a storm overflow operates on a 'dry day', defined as a day with no rainfall above 0.25 mm on that day and the preceding 24 hours, or longer than one day drain in large catchments where we can provide sufficient evidence regarding the spatial impact of rainfall and how this impacts on catchment drain down times.

2.3. In deriving the base year position in 2030, the measure assumes an average annual performance in the years preceding 2024 (calendar year) as a start point, which is then adjusted for interventions that impact the measure that are completed in AMP8.

2.4. Temporary discharges due to groundwater infiltration (e.g. infiltration reduction plan related temporary discharges under the Environment Agency (EA) Regulatory Position Statement (RPS) on Groundwater Surcharged Sewers[6]) are also included within this measure.

2.5. The measure excludes the following:

- Excludes dry day spills due to third party causes, e.g. river or land drainage flooding which may cause a similar slow flow response in the system
- Excludes dry day spills from Emergency only overflows (see Emergency Overflow Performance Indicator), except where impacted by groundwater infiltration.
- Excludes dry day spills due to other known non-groundwater reasons (e.g. equipment breakdown)

Alignment with Government DWMP guidance

2.6. Our assessment methods, risk thresholds, and our approach to reporting performance aligns with Government DWMP guidance and will be consistent with any forthcoming revisions to the Environment Agency's guidelines regarding DDS and position on temporary discharges from groundwater surcharged sewers.

[6] EA Regulatory position statement: Discharges from groundwater surcharged sewers: RPS 362 - GOV.UK

3. Data sources

3.1. This section includes a brief description of the key datasets required to generate and report on this Performance Indicator. We also outline the process of assuring the accuracy of these sources used to calculate the Performance Indicator. There is no related historic performance measure for the Performance Indicator, however there is significant overlap between this PI metric and the storm overflows performance PI metric.

Table 2. Data sources and assurance

Dataset	Source	Assurance
Dry Day Spill Data (EDM)	Each month the EDM data team review spill performance to determine, wet, dry day spills as well as root cause analysis. Groundwater derived dry day spills will be determined through this process.	Data validated monthly in preparation for EA data monthly data returns. Data contributes to regulatory Annual Return and hence is subject to assurances as part of that process.
Rainfall Data (RARa)	Met Office Rainfall Radar data	Data is subject to Met Office quality assurance
Storm Overflow Locations	Yearly EDM data returns submitted to the Environment Agency	This data is already subject to an EA data return and therefore subject to our annual return assurance and governance processes
Temporary Discharge Data under the EA's RPS for Groundwater Surcharged Sewers	Operations – who manage the deployment and switch on/off the temporary discharge units	Switch on and off dates, in accordance with the RPS, are notified to the EA as a formal requirement and monitored by the EA, hence serves as assurance of data.
Catchment area contributing to each overflow location	Measured area upstream of overflow, defining urban catchment extent, produced by Modelling team	This data forms the basis of permit setting for network eg calculation of Formula A Pass Forward Flow. For overflows at the Treatment Works, the areas are assured via our Annual Return Process.
Storm Harvester derived modelling data.	This is an emerging Performance Indicator; hence we wish to trial different techniques in tandem to the current industry agreed approach. One such approach is to use Machine Learning techniques such as applied by Storm Harvester in assimilating groundwater (level), rainfall and EDM data to develop mathematical trends in performance that can be extrapolated with synthetic rainfall.	Third party independently assured data from Storm Harvester.

4. Reporting thresholds and outputs

Reporting thresholds and planning horizons

4.1. DWMP guidance does not provide details or expectations of the standardised reporting thresholds for this emerging Performance Indicator for DWMP28. The thresholds for DWMP28 are proposed below and will be reviewed for DWMP33.

4.2. This measure reported in the draft data tables is the "annual number of discharges during 'dry weather' caused by increase in sewer flow from groundwater infiltration". Therefore, the requirement for the DWMP data tables is to report the annual total number of dry day spills, summed across all storm overflows and presented at Level 3, Level 2 and Level 1.

4.3. In addition to the data table requirements, we will normalise the measure to assist with scenario planning. To do this we will report the average annual spills on dry days divided by the number of storm overflow sites in the geographical reporting area.

4.4. In order to assist with prioritisation of areas to focus on addressing DDS, we will review all L2/3 areas in our region and rank them in order of impact e.g. number of normalised spills. The data will then be banded into trial quartiles with the following breakdown:

- 0/ Green – Low/No Risk – Bottom quartile
- 1/Amber – Moderate Risk – Upper lower and lower upper quartiles – sites to be addressed as second priority
- 2/Red – High Risk – Upper quartile – sites with greatest impact and most pressing urgency to address

4.5. In developing the above, we will take account of impact on receiving water course i.e. SSSI, Chalk streams, etc.

Reporting outputs

4.6. The main reporting outputs for this Performance Indicator will be a GIS layer for the Thames Water DWMP portal showing the forecast risk level (high, moderate, low risk) for each spatial scale, for the base year (2030) and the future baseline points (planning horizons of 2035, 2045 and 2055).

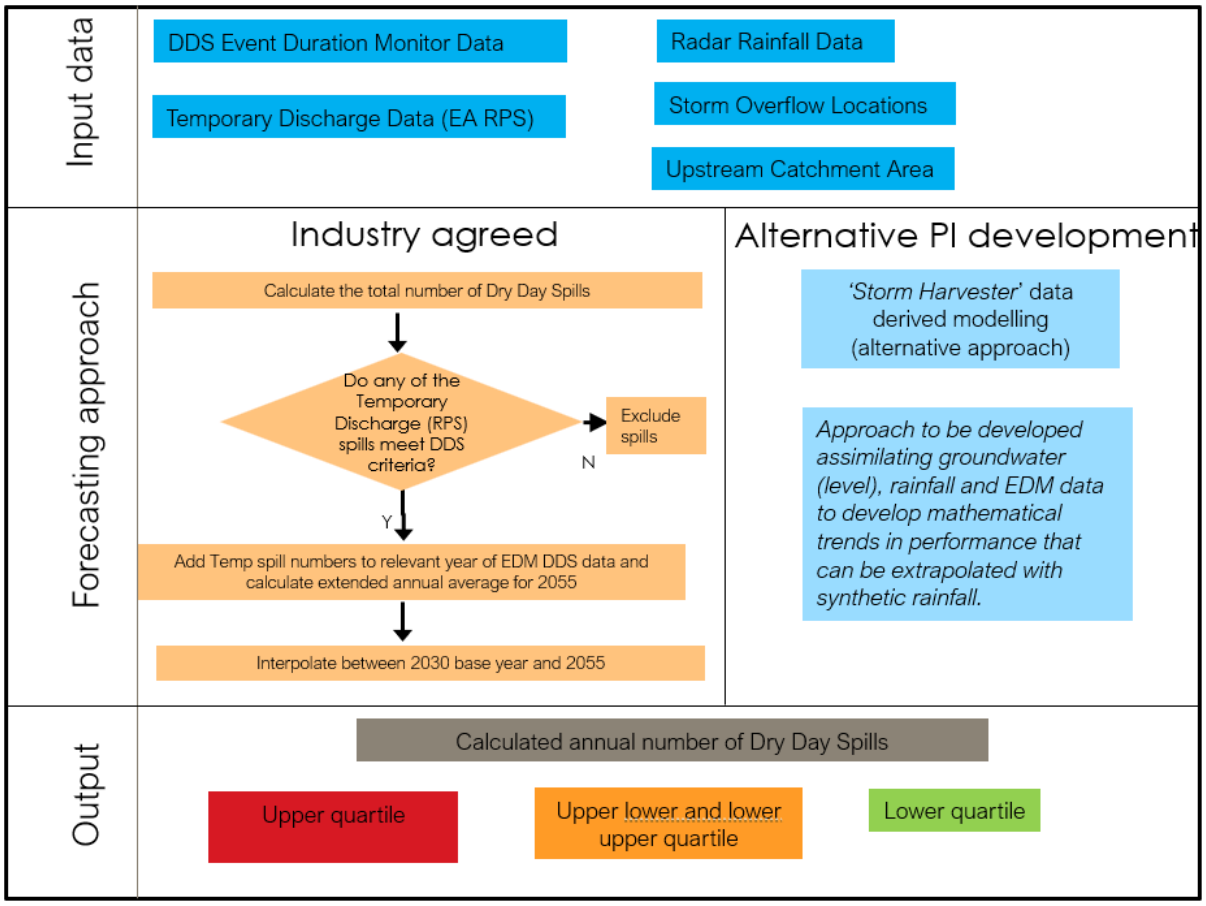
4.7. Spatial (mapping) Scales
- Level 1 (L1) Company level
- Level 2 (L2) River catchment or Local authority level
- Level 3 (L3) Sewerage catchment(s) level

4.8. In addition, data tables will be produced that summarise performance for each storm overflow location in 2030 (base year), each year for the following 10 years and totals for the periods of 2040-45, 2045-2050 and 2050-2055.

5. Performance Indicator methodology

5.1. The following methodology will be applied to the future baseline Groundwater Infiltration (Dry Day Spills) risk. The approach is illustrated in Figure 1.

Figure 1. Performance Indicator methodology



Base year performance – 2030

5.2. For this PI measure, the base year number of dry day spills for an overflow location is calculated using an average across:

a) All available EDM data, which is already processed internally against DDS criteria for purposes of reporting to the Environment Agency.
b) Temporary discharge data under the EA's RPS (switch on and off dates for temporary ATAC units).

Only dry day spills caused by groundwater infiltration are included in this measure.

5.3. To report the total number of DDS for this PI the temporary discharge data under the EA's RPS (2) has to be processed and added to the existing DDS reported data from EDMs (1).

5.4. In deriving the base position in 2030, the measure assumes no deterioration in performance from the average Annual Return data, which is based on data from the 2024 calendar year and considers any relevant investment undertaken in AMP8.

Processing the temporary discharge data under the RPS

5.5. The data is assessed against 15-minute Met Office Rainfall Radar (RARa) Data for the defined upstream catchment area bespoke to each temporary discharge location.

5.6. The upstream catchment is determined as 'dry' when the RARa data over the defined area is less than 0.25mm in both:
a) The period since midnight to the start of the storm discharge AND ALSO
b) Less than 0.25mm rain in the previous calendar day[7]

5.7. DDS for each storm overflow are counted in days and include any duration of DDS or multiple durations on the same day.

5.8. The number of DDS at temporary discharge locations under the RPS is then added to the EDM DDS data and the total is reported in the DWMP data tables summed across all storm overflows and presented at Level 3, Level 2 and Level 1.

5.9. Where accepted evidence has been presented to the Environmental regulator in support of prolonged drain down times encompassing Dry Day Spills then the data will be adjusted to account for these developments.

5.10. In addition to the data table requirements, normalisation of the data is also undertaken to facilitate scenario planning. The DDS count is averaged for each geospatial reporting area as follows:

$$Average\ annual\ number\ of\ DDS = \frac{Sum\ of\ all\ dry\ \text{day}\ spills\ in\ spatial\ area}{Number\ of\ overflows\ in\ spatial\ area}$$

Future baseline performance – 2030-2055

5.11. Climate change insights suggest that we will be subject to wetter winters in the future. There is limited research into the likely change in frequency of seasonally high groundwater tables

[7] The upstream catchment is defined as 'wet (not dry)' if the RARa data shows greater than 0.25mm since midnight before the discharge starts. If the rainfall threshold of 0.25mm is met during a storm discharge we classify only the duration of the discharge before this threshold was met as DDS, and the discharge duration after the threshold was met is not included as a DDS.
If the rainfall threshold of 0.25mm is met during a storm discharge we classify only the duration of the discharge before this threshold was met as DDS, and the discharge duration after the threshold was met is not included as a DDS.

interacting with the sewer network due to climate change. This Performance Indicator is a trial measure considered more experimental in nature and is recognised as inherently difficult to forecast.

5.12. Given this uncertainty, the future baseline groundwater infiltration DDS risk will be established for 2055 using the methodology below and linearly interpolated between 2030 and 2055.

5.13. The Task and Finish group for this PI agreed to use a weighted average of EDM data, to uplift the frequency of wet years, by assuming that the performance in the wet winters of 2023 and 2024 will be more frequent in the future due to climate change impacts. To do this, the annual average for 2055 uses an extended dataset by assuming that the 2023 and 2024 performance reoccur in the subsequent 2 years (i.e. average DDS counts for each storm overflow using DDS counts from 2020, 2021, 2022, 2023, 2024, 2023 and 2024). This conceptual model approach also allows for asset health deterioration under a 'do nothing' scenario.

Figure 2. EDM DDS Data applied to calculated average for base year and weighted average for 2055

			Wet Winter	Wet Winter	
	2021	2022	2023	2024	2025
Base Year performance	✓	✓	✓	✓	✓
2055 Performance	✓	✓	✓✓	✓✓	✓

5.14. It is noted that the calculated DDS from Temporary discharge locations under the RPS will also be added to these yearly datasets.

Assessment

5.15. Using the methods outlined above, the percentage is then converted into the relevant threshold for reporting purposes at each spatial scale.

Assessing the value of performance

5.16. Alongside publication of this Performance Indicator methodology, there is a requirement to value performance outcomes using our Value Framework. This step will be completed during the Options Development and Appraisal (ODA) stage, once the framework has been fully defined and agreed following consultation with stakeholders.

6. Next steps

6.1. We will review future EA guidance and reflect any changes to the reporting in our methodologies.

6.2. This measure is an emerging PI. To demonstrate our commitment to the ongoing development of this measure we will develop an alternative data driven model approach to this PI alongside the industry agreed approach set out in the methodology above. We will share our approach and any learnings with the wider industry.

6.3. To increase confidence in forecasting, further research into establishing the likely change in frequency of seasonally high groundwater tables interacting with the sewer network due to climate change and sustainability reductions to groundwater abstractions is recommended from an industry perspective.

We welcome your views on this technical methodology. Please share them with us by emailing DWMP@thameswater.co.uk.

Our Drainage and Wastewater Management Plan 2030–2055 will include a number of technical methodologies, like this one. They will all provide detailed information on specific topics featured in our draft Plan such as climate change and sustainable approaches to drainage. You will be able to access all of the technical methodologies on our DWMP webpage.

For more DWMP28 information please visit our DWMP webpage and portals on our website.

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