Our Drainage and Wastewater Management Plan 2030-2055

Delivering for customers, communities and the environment

Performance Indicator Methodology – Treatment Works Compliance (Dry Weather Flow)

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 **Treatment Works Compliance (Dry Weather Flow) 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 **Treatment Works Compliance (Dry Weather Flow) Performance Indicator**, as part of our DWMP for the 2030-2055 planning period. The base year is 2030 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[1] and subsequent clarifications by the Environment Agency (EA)[2]. To understand the general approach to our DWMP please also refer to our Strategic Context document on our website[3].

1.5. Assessment of the base year and future risks for each of our Performance Indicators is an important 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)[$]
- Treatment works compliance (numeric)[$]
- Treatment works compliance (descriptive at numeric sites)[$]
- **Treatment works compliance (Dry Weather Flow (DWF))**
- Treatment works compliance (Flow to Full Treatment (FFT))

[1] Guidelines for Statutory Drainage and Wastewater Management Plans (DWMPs) - GOV.UK
[2] EA letters to water companies with feedback on performance indicators (02/10/2025), (23/03/2026) and reporting thresholds (17/10/2025).
[3] DWMP28 | Drainage and wastewater | Thames Water

- 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[1,2]. 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[1].

Key definitions

1.7. **Treatment works compliance (dry weather flow) Performance Indicator:** The DWMP guidance provides the following definition:

Table 1. Extract from Table 2 of the Government DWMP guidelines[1]

Category	Metric	Details
Water environment	Treatment works compliance: dry weather flow	Annual number of wastewater treatment works predicted to fail to meet discharge permit conditions for dry weather flow.

1.8. **Dry Weather Flow (DWF):** This is the average daily flow to a Sewage Treatment Works (STW) during a period not influenced by rainfall or snowmelt. The constituent parts of dry weather flow can be easily understood through the formula:

$$DWF = PG + I + E$$

where P is population, G is water consumption, I is infiltration and E is trade flow. A proportion (95%) of water consumption (G) is assumed to return to sewer and contribute to DWF.

1.9. Dry weather flow is measured with flow meters certified through the Environment Agency's Monitoring Certification Scheme (MCERTS[4]) at all STWs with a dry weather flow volume

greater than 50 m^3/day and with numeric effluent quality parameters. Where flow metering data is available, DWF can be estimated from a statistical analysis of daily flow readings over a year. The non-parametric 10-percentile or Q90 is used by the Environment Agency to assess compliance with DWF permit conditions. The Q90 is calculated by taking the total daily volumes (TDV) for each day of the year and placing these flow numbers in ascending order. Q90 is the flow on the day that is lower than 90% of total flows recorded, or the 37th lowest value (assuming 365 'good' data points). The use of Q90 is designed to provide greater allowance for year-on-year variability in the flow rates.

1.10. Part of a STW environmental permit defines the allowable DWF. When combined with other elements of the permit (the numeric standards for effluent concentration and the flow to full treatment setting) this defines the allowed dischargeable load into the receiving waterbody. Other 'descriptive' components of the permit are also applied.

1.11. The Environment Agency (EA) sets limits on the quality and quantity of treated effluent from our wastewater treatment works to ensure discharges from them do not cause an unacceptable environmental impact, and that they have sufficient capacity. DWF is one of these limits.

1.12. If the permitted DWF rate of a STW is exceeded, it may impact the water quality downstream. This could result in the watercourse not meeting requirements to achieve a planned for quality level / status. The permitted DWF will be exceeded if there are unplanned increases in either population, water consumption, infiltration or trade flows. The daily TDV (Total Daily Volume) is reported annually to the Environment Agency who calculate performance against Q80 (20-percentile or 73rd lowest TDV using the method described above) and Q90.

1.13. A STW will typically breach its DWF conditions where its Q90 exceeds the permit limit at least three times in a five-year period. However, where a STW's Q80 exceeds its permit limit, or where its Q90 exceeds the permit limit fewer than three times in five years, this may indicate that the STW is not designed, operated and / or maintained to ensure sufficient performance and is at risk of breaching its Q90 permit condition.

1.14. While changes in weather from year to year mean that it may not be possible for a STW to achieve Q80 compliance in each and every year, any exceedance should be investigated to consider whether failure may indicate the existence of longer-term problems.

1.15. A minority of STWs do not have a DWF permit condition but instead a 'max flow' condition that sets a maximum discharge of wastewater per day. A Q80 or Q90 approach is not appropriate for these permits, as any exceedance equals permit failure. Over time, Max Flow permits are being replaced by DWF permits.

1.16. Although compliance with Environmental Permitting Regulations (EPR) is based on Q90, the UWWTR (Urban Wastewater Treatment Regulations) requires consideration of Q80. Our methodology for this Performance Indicator will assess whether the average predicted Q80 DWF is compliant with the existing permit limit.

1.17. The current 5-year average (2020-2024) Q80 is used as the base position on which to forecast into the future. This aligns with Ofwat's interpretation[5] of the UWWTR that "STWs with DWF environmental permit conditions are expected to be able to treat the Q80 flow and companies are expected to monitor whether a site is achieving this metric and to take action to investigate and remedy if it is not. While changes in weather from year to year means that it may not be possible for a STW to achieve the Q80 metric in each and every year, a prudent company should investigate any STW that fail to achieve Q80 to ensure that it understands why this is the case and to consider whether the failure may indicate the existence of longer-term problems that the company needs to address".

[5] https://www.ofwat.gov.uk/consultation/notice-of-ofwats-proposal-to-issue-an-enforcement-order-and-impose-a-financial-penalty-on-thames-water/#Outcome

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 guidelines.

Assumptions

2.2. This Performance Indicator only applies to STW with DWF permits (323 sites out of a total 352).

2.3. Population (P), water consumption (G), infiltration (I) and trade flows (E) are all variables that may change by the base year (2030) and for each of the assessed future periods (2035, 2045 and 2055).

2.4. We assume that the current DWF permit (or known revisions up to 2030) will apply for all assessed future periods.

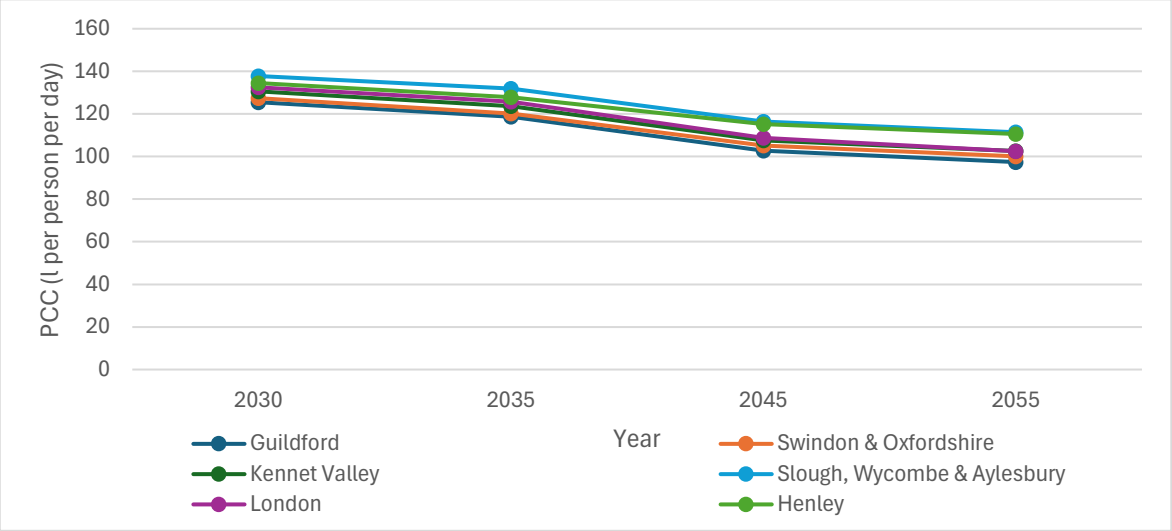
2.5. Population (P) is taken from forecasts supplied by specialists Edge Analytics for the likely population in each wastewater treatment catchment.

2.6. Infiltration is calculated as the difference between DWF (measured), and the sum of PG and E. Infiltration calculated for the base year is assumed to increase 0.5% per year due to the deterioration of sewer asset health and/or urban creep. This is a standard planning assumption inferred from observed data over multiple years and is part of our design standards. This method is supported by the Environment Agency. Over 25 years infiltration is hence assumed to increase by a total of 12.5%. Where network interventions are currently (in the period 2025 to 2030) planned which may reduce infiltration we will monitor performance to assess whether the rate of infiltration should be reduced for these catchments.

2.7. Water consumption (G) is assumed to change in line with the projections made in Water Resource Management Plans (WRMPs)[6] for the water supply zone covering each wastewater catchment. Not all of the water supply zones in the Thames Water area, have wastewater services provided and operated by Thames Water. All water companies have obligations to reduce water consumption significantly (from around 150 litres/head/day to around 110 litres/head/day) over the next 25 years. Thames Water customers' average water consumption as forecast in its WRMP, declines from 133 litres/head/day in 2030 to 126 in 2035, 110 in 2045 and 103 in 2055 as illustrated in Figure 1.

[6] https://www.gov.uk/government/publications/water-resources-planning-guideline

Figure 1. Forecast reductions in Thames Water customers' water consumption



Source: Thames Water WRMP24 Data Table – Dry Year Annual Average PCC[7]

2.8. Trade effluent flows are any liquid waste that is discharged into our sewers from a business, industrial or trade process, excluding domestic sewage and surface water. Annual trade effluent flow for a particular STW catchment is based on the last three years of trade effluent billing records. This is adjusted if we are aware of planned changes to trade effluent flow. Daily trade effluent flow (E) is calculated as annual trade effluent flow divided by 303 working days.

Alignment with Government DWMP guidelines

2.9. Our assessment methods, risk thresholds and our approach to reporting performance aligns with Government DWMP guidance and is consistent with the recently published revision to the Environment Agency's Environmental Performance Assessment (EPA) guidelines[8].

[7] https://www.thameswater.co.uk/media-library/2efhsngs/data-tables.xlsx
[8] 2. Definitions of the live EPA metrics - GOV.UK

3. Data sources

3.1. This section includes a brief description of the key datasets required to generate forecasts and report on this Performance Indicator. We also outline the process of assuring the accuracy of these sources used to calculate the Performance Indicator.

Table 2. Data sources and assurance

Dataset	Source	Assurance
DWF permit level	Thames Water Permit Database. The permit level is described for each STW.	Subject to second line assurance within Thames Water[9]
Population served by our wastewater treatment works	The current and forecast future population equivalent is described for each STW and input to our SOLAR (Strategic Overview of Long-term Assets and Resources) system. SOLAR includes the following sources of population/Population Equivalent (PE) data: • Existing residential population – Ordnance Survey address points multiplied by the average household size as reported in the 2021 census. • Future housing development – provided by Edge Analytics • Hidden and transient population e.g. short-term residents, irregular migrants – Provided by Edge Analytics • Cess[10] PE – taken from annual return • Trade Effluent PE – taken from annual return	Subject to second line assurance within Thames Water
Calculated current and forecast future flows arriving at our wastewater treatment works	Thames SOLAR (Strategic Overview of Long-term Assets and Resources). The current and forecast future DWF is described for each STW, drawing on current and forecast levels of water consumption, infiltration and trade flow.	Subject to second line assurance within Thames Water
Per Capita Consumption (PCC)	PCC forecast scenarios taken from WRMP24 published data tables for all Water Companies within the Thames Water wastewater area.	Full WRMP assurance process

[9] Thames Water use the broad principles of the three-lines model; a model designed by the Chartered Institute of Internal Auditors. Second line assurance refers to "complimentary expertise, support, monitoring and challenge"
[10] wastewater that is collected in a sealed on-site storage structure (such as a cesspit or cesspool) and is periodically removed by tanker for treatment or disposal at a sewage treatment works.

4. Reporting thresholds and outputs

Reporting thresholds and planning horizons

4.1. The calculation for percentage compliance is based on the latest EA Environmental Performance Assessment (EPA)[11]:

> % compliance = (B-A) / B x 100
>
> Where; A is the number of STW failing the 3 in 5 year dry weather flow assessment – that is where the permitted limit is exceeded in the assessment year and 2 or more of the preceding 4 years, B is the number of STW with dry weather flow permit limits on the Environment Agency register during the calendar year and MCERTS monitoring/reporting requirements.

4.2. The EPA assessment is backwards looking (based on the number of failures in the preceding five years using the calculated Q90). This is to allow for year-on-year variability in catchment flow rates and uncertainty when measuring the daily volumes. To forecast UWWTR compliance the average Q80 flow (rather than Q90) for a five year period will be compared to the permit value as the DWF permit level should be set at this value[11].

4.3. There are no reporting thresholds within the EPA guidance as this is currently a shadow[12] metric. The thresholds used in the DWMP will mirror those used for Treatment works compliance (numeric) Performance Indicator.

4.4. The thresholds are used to summarise the forecast compliance with DWF permits across the whole of Thames Water. These are:

- Where fewer than 98% of STW meet this permit condition the overall situation is described as high risk.
- Where between 98 and 99% of STW meet this permit condition the overall situation is described as medium risk.
- Where greater than 99% of STW meet this permit condition the overall situation is described as low risk.

[11] 8. Forward look and future reporting - GOV.UK
[12] Show metrics are (not published) assessments and reporting before new or changed EPA metrics become live (published).

Reporting outputs

4.5. The main reporting outputs for this Performance Indicator will be Geographic Information System (GIS) layers for the Thames Water DWMP portal, showing the forecast treatment works compliance (UWWTR dry weather flow) risk level (high, medium, low) for the base year and the assessed future periods.

4.6. In addition, data tables will be produced that summarise performance for each STW in 2030, 2035, 2045 and 2055.

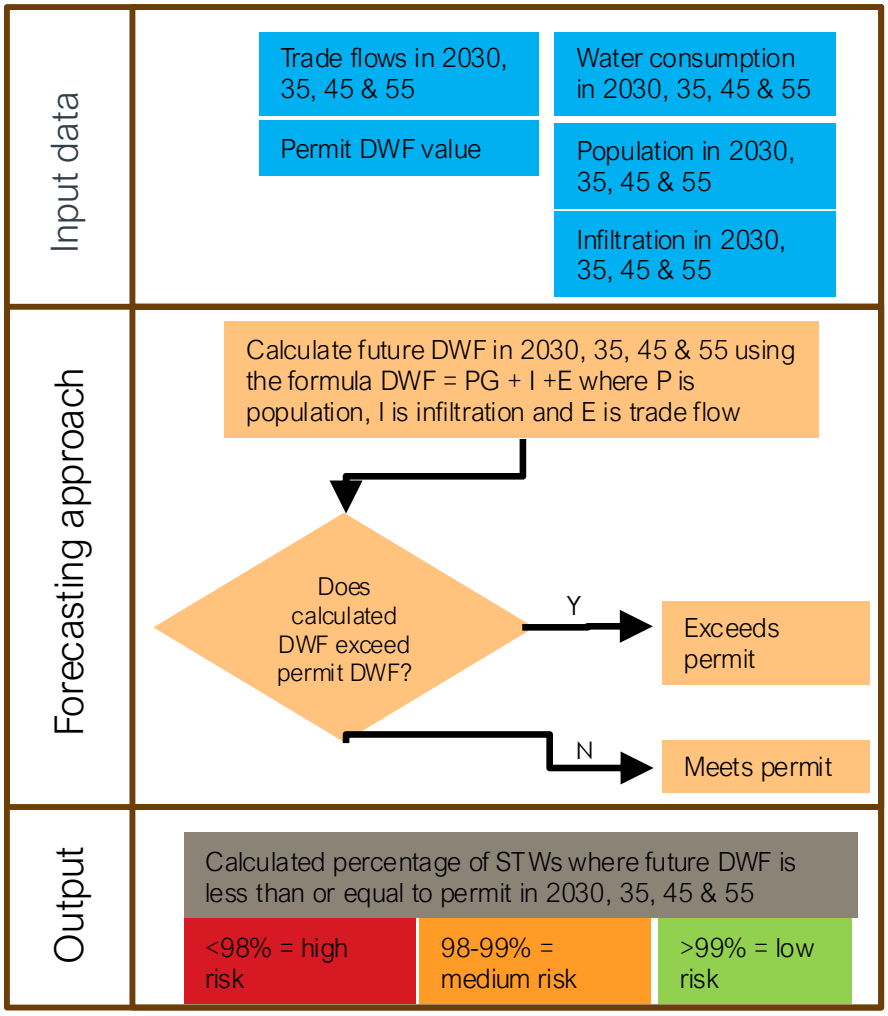
Assessing the value of performance

4.7. 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.

5. Performance Indicator Methodology

5.1. The following methodology will be applied to forecast base year and baseline DWF UWWTR compliance risk. The approach is illustrated in Figure 2.

Figure 2. Performance Indicator Methodology



Base year performance – 2030

5.2. DWF for 2030 is calculated by taking the average 2020 to 2025 measured Q80 DWF and applying changes to forecast values for P, G, I and E as described in Table 3.

5.3. This is compared to the permit value forecast in 2030, including any known permit changes during AMP8.

Table 3. How components of DWF are forecast for future planning periods

Variable	Forecasting method for future time periods
Population (P)	Thames SOLAR data generated from latest Edge Analytics demographic analysis
Water consumption (G)	Via WRMP forecasts specific to the relevant wastewater catchment
Infiltration (I)	Current measured infiltration flow rate inflated by 0.5% annually
Trade flows (E)	Current measured average flows amended only if there are known significant planned changes

Future baseline performance – 2035-2055

5.4. Future baseline DWF for each planning horizon will be evaluated as described for the base year (2030) and as described in Table 3. Data will be revised, where applicable, to account for future forecasts (for example, population growth) including incrementally increasing infiltration and by exception any known information about future trade flows (e.g. the opening or closing of a large employer). Water consumption is forecast to reduce so this will balance the effects of some population growth.

5.5. Where there is a range, due to uncertainty in the forecastable future input data for the Performance Indicator, then a scenario planning approach will be adopted here and throughout the DWMP. This is to inform our understanding of the sensitivity of our forecasts to uncertainty in input parameters; and ultimately support the development of an adaptive pathway to dealing with the risk.

5.6. For 2030, 2035 and 2045 a 'central' estimate for our input parameters is adopted as being the most likely future condition (Scenarios A and B in Table 4). For 2055 a more conservative estimate is made (scenario C) so that the 'worst case' outcome can be forecast.

Table 4. Scenario planning approach

Scenario	Description	Likely occurrence within	Low estimate	Central estimate (most plausible)	High estimate (conservative)
A	5-year medium – most plausible for short-term planning	Approximately 5 years (2030 Planning Year)	Not Applicable	✓	Not Applicable
B	Core scenario – high likelihood for long-term planning.	10 to 20 years (2035, 2045 Planning Year)	Not Applicable	✓	Not Applicable
C	25-year high – conservative for long-term planning	Greater than 25 years (2055 Planning Year)	Not Applicable	Not Applicable	✓

Assessment

5.7. Calculated future DWF is then compared to the current permit level for each future planning period at each STW. If the forecast DWF is greater than the current permit level, the STW is considered to be non-compliant with its permit for the purposes of this evaluation.

5.8. Current performance (for 2025) will also be reported, showing where there are investments underway to correct any non-compliance for 2030.

5.9. The percentage of all STWs passing/failing their permits at each planning period is then evaluated and reported.

Base and Asset Health

5.10. We will also consider the risk of poor and deteriorating asset health affecting DWF permit compliance. Thames Water is evaluating the asset health of all STW by calculating the annual likelihood of failure of key equipment types at STWs and using the change in this, along with the equipment / site criticality, to elicit a risk of non-compliance with permits at individual STWs. This will be reported at all three DWMP spatial scales (L3, L2 and L1)[1].

6. Next steps

6.1. We will develop and refine our asset health index and forecasting assessment for STWs.

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.

Thames Water