

DWMP 28



Our Drainage and Wastewater Management Plan 2030-2055

Delivering for customers, communities and the environment

Performance Indicator Methodology – Groundwater Pollution

March 2026





Table of contents

1. Introduction	3
2. Key assumptions	6
3. Data sources	8
4. Reporting thresholds and outputs.....	10
5. Performance Indicator methodology.....	11
6. Next steps.....	15

List of tables

Table 1. Extract from Table 2 of Defra guidance	4
Table 2. Data sources and assurance	8
Table 3: Useful economic life expectancies for rising mains from our internal asset health improvement user guide	14
Table 4 . Scenario planning approach	14

List of figures

Figure 1. Performance Indicator methodology	11
---	----

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 Pollution 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 Pollution 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 DWMPs¹ 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 website³.

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 can 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)[§]

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](#)



- 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^{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 DWMPs¹.

Key definitions

- 1.7. Sewers can leak wastewater if they are in poor condition (this is known as sewer exfiltration). This potentially could lead to contamination of groundwater sources used for water supply. This indicator aims to understand and quantify this risk.
- 1.8. **Groundwater Pollution Performance Indicator.** The Government DWMP guidelines¹ provide the following definition:

Table 1. Extract from Table 2 of Defra guidance

Category	Metric	Details
Water environment	Groundwater Pollution	Length (km) of sewer within Source Protection Zone (SPZ) 1 (and SPZ 2 also in Groundwater Safeguard Zones (SGZ's)) where there are likely risks to groundwater from sewer exfiltration.

1.9. The purpose of the Performance Indicator is to assess the base-year performance (e.g. 2030 for DWMP28) of the risk of exfiltration from public sewers to groundwater pollution and provide an indication of future performance under a 'do nothing' scenario.

1.10. This Performance Indicator reports the length (km) of public sewers that are in high-risk zones and have the potential to be vulnerable to experience exfiltration that meet the following two criteria. It should be noted that whilst the focus of this PI is on publicly



maintained sewers, private sewers and drains are equally susceptible to exfiltration and hence may also contribute to groundwater pollution.

a) Public foul and/or combined sewers in high-risk zones:

- Source Protection Zone (SPZ) 1⁴ or
- Source Protection Zone (SPZ) 2⁵ that are also within Groundwater Safeguard Zones (SGZ's)⁶.

b) Public foul and/or combined sewers that are potentially 'vulnerable to exfiltration':

- Sewer runs (manhole to manhole) that are 'Structural Condition Grade (SCG) 4 or 5' as defined by the WRc Sewer Rehabilitation Manual⁷
- Sewers with localised defects in manholes or connections, not categorised as 4 or 5 SCG.
- Sewers known to have a defect (hole) or significant displaced joints, not categorised as 4 or 5 SCG.

1.11. The following sewers are to be **included** in the reported lengths:

- Foul and combined,
- Public sewers and S105a public sewers (both mapped and an allowance for unmapped),
- Foul and combined rising mains.

1.12. The following sewers are to be **excluded** in the reported lengths:

- Non-water company assets e.g. NAVs, private sewers, and drains
- Surface water sewers/culverted watercourses in water company responsibility.

⁴ Zone 1: (Inner Protection Zone) - This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table

⁵ This zone is defined by the 400-day travel time from a point below the water table

⁶ Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water). They are identified where the protected area has been assigned as being "at risk" of failing the drinking water protection objectives of the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017.

⁷ <https://srm.wrcplc.co.uk/home.aspx>

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

- This metric is for sewer exfiltration. It excludes point source discharges (e.g. from storm overflows, Sewage Treatment Works final effluent, flooding, etc.).
- An allowance for unmapped public sewers and S105a sewers will be estimated and included in the metric, using assumptions based on Thames Water's mapped/unmapped ratio of all sewers and surveys carried out historically.
- An allowance of un-surveyed sewers should also be made based upon findings from surveyed areas.
- Grade 4 and 5 sewers are sometimes caused by third party impact (e.g. damage cause to our assets, while 3rd parties excavating/working on their assets nearby). The future performance forecasts, of asset life, assume that this is factored into deterioration rates.
- Not all sewers have the same propensity to exfiltrate. The frequency of surcharge in the sewer can influence this risk due to intermittent pressurised conditions within the pipe as can the level of groundwater around and above the pipe. Modelling data on surcharging sewers and groundwater levels will be used to determine this risk and sewers weighted accordingly.
- Rising mains and inverted siphons, subject to extended periods of surcharge will be classified as being at greater risk of exfiltration. We take account of factors such as age, material and location when assessing potential exfiltration risk.

2.2. Current research is noted below:

- "Exfiltration from sewers – Is it a serious problem?", D. J. Blackwood¹, D. J. Gilmour, J. B. Ellis, D. M. Revitt and A. Staines, August 2005⁸
- "Harmonised assessment of nutrient pollution from urban systems including losses from sewer exfiltration: a case study in Germany", Nguyen, H.H., Venohr, M. *Environ Sci Pollut Res* 28, 63878–63893 (2021)⁹
- "Modelling of sewer exfiltration to groundwater in urban wastewater systems: a critical review", Nguyen, H.H., Venohr, M Aaron Peche A. *Journal of Hydrology*, Volume 596, 2021¹⁰

⁸ www.researchgate.net/publication/228507978_Exfiltration_from_Sewers_Is_it_a_Serious_Problem

⁹ <https://doi.org/10.1007/s11356-021-12440-9>

¹⁰ [Modelling of sewer exfiltration to groundwater in urban wastewater systems: A critical review - ScienceDirect](#)



Alignment with Government DWMP guidelines

- 2.3. Our assessment methods, risk thresholds and our approach to reporting performance aligns with Government DWMP guidance. This metric is emerging and therefore more experimental in nature. We have worked with industry practitioners on a viable approach that is based on piloting to build the evidence base for future DWMPs.

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 populate the Performance Indicator.

Table 2. Data sources and assurance

Dataset	Source	Assurance
Safeguard zones	<p>This Environment Agency dataset provides a national shapefile of all Safeguard Zone areas and identifies which substances are causing the drinking water protected area to be 'at risk':</p> <p>Groundwater - https://www.data.gov.uk/dataset/7fe90245-d6e8-4d7c-a13a-65a87455f429/drinking-water-safeguard-zones-groundwater</p> <p>Surface Water (Last updated in 2022)- https://www.data.gov.uk/dataset/6ac22521-2e77-4dc8-ba90-6bb55d2ea3b8/drinking-water-safeguard-zones-surface-water</p>	Environment Agency published datasets therefore no additional assurance required
Source Protection zones (England)	<p>Environment Agency dataset - The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction. Zones around location sites are defined by groundwater travel time to an abstraction: https://www.data.gov.uk/dataset/09889a48-0439-4bbe-8f2a-87bba26fbbf5/source-protection-zones-merged1</p>	Environment Agency published datasets therefore no additional assurance required
Thames Water Sewer GIS records	Technical Information – corporate GIS database sewer layer (where data is available)	Updates to this system check for completeness of data and basic connectivity with an automated QA/QC process to identify errors/mismatches with our data model.
Sewer condition data for base year (2030)	We will collate sewer condition data from various datasets held by Thames Water where possible, where this is not possible, we will use industry level data.	CCTV from our framework contractors is conducted in accordance with industry standards and specifications- MSCC5



		(Manual of Sewer Condition Classification edition 5, published by the Water Research Centre)
Annual return sewer length data	APR Table 7C L21 and L22. This data will be used to add an allowance for S105a unmapped sewers into the total length of sewer used for calculating the reporting percentage. The ratio of 'mapped' to 'unmapped' sewers will be calculated using L21 and L22, and added to the mapped total length of sewers in the high-risk zones.	This data is subject to external assurance as part of Thames Water's annual reporting processes
Sewer surcharge data	Hydraulic modelling of sewers within high-risk zones that surcharge in a 1 in 1 year return period storm.	Hydraulic modelling processes are ISO9001 accredited
Modelled groundwater level risks	JBA Groundwater Flood Risk Map – national scale dataset, this has then been applied to understand risk to our underground assets as part of our Groundwater Impacted System Management Plans (GISMPs)	Owned and assured by JBA Consulting
Future sewer condition	Deterioration Data/Approach for Base year (2030) and baseline approach to planning horizons (2035, 2045 and 2055)– based upon Thames Water fixed asset class accounting rules.	Accounting rules used in Annual Performance Report governance processes



4. Reporting thresholds and outputs

Reporting thresholds and planning horizons

- 4.1. DWMP guidance does not provide details or expectations of industry standardised reporting thresholds for this emerging Performance Indicator for DWMP28. Thresholds for DWMP28 are developed by individual companies on a trial basis and will be revisited for DWMP33.
- 4.2. This measure is reported as a percentage length of sewers classified as "vulnerable to risk of exfiltration" within the Source Protection Zone (SPZ) 1 or Source Protection Zone (SPZ) 2 that are also within Groundwater Safeguard Zones (SGZs)¹¹ at each DWMP reporting level. DWMP28 trial reporting thresholds for this Performance Indicator are proposed as follows:
 - 0/Green – Low Risk – <2%
 - 1/Amber – Moderate Risk – 2 - 20%
 - 2/Red – High Risk – >20%
- 4.3. Percentages relate to proportion of sewers, by length, that are vulnerable to exfiltration in the qualifying zones.

Reporting outputs

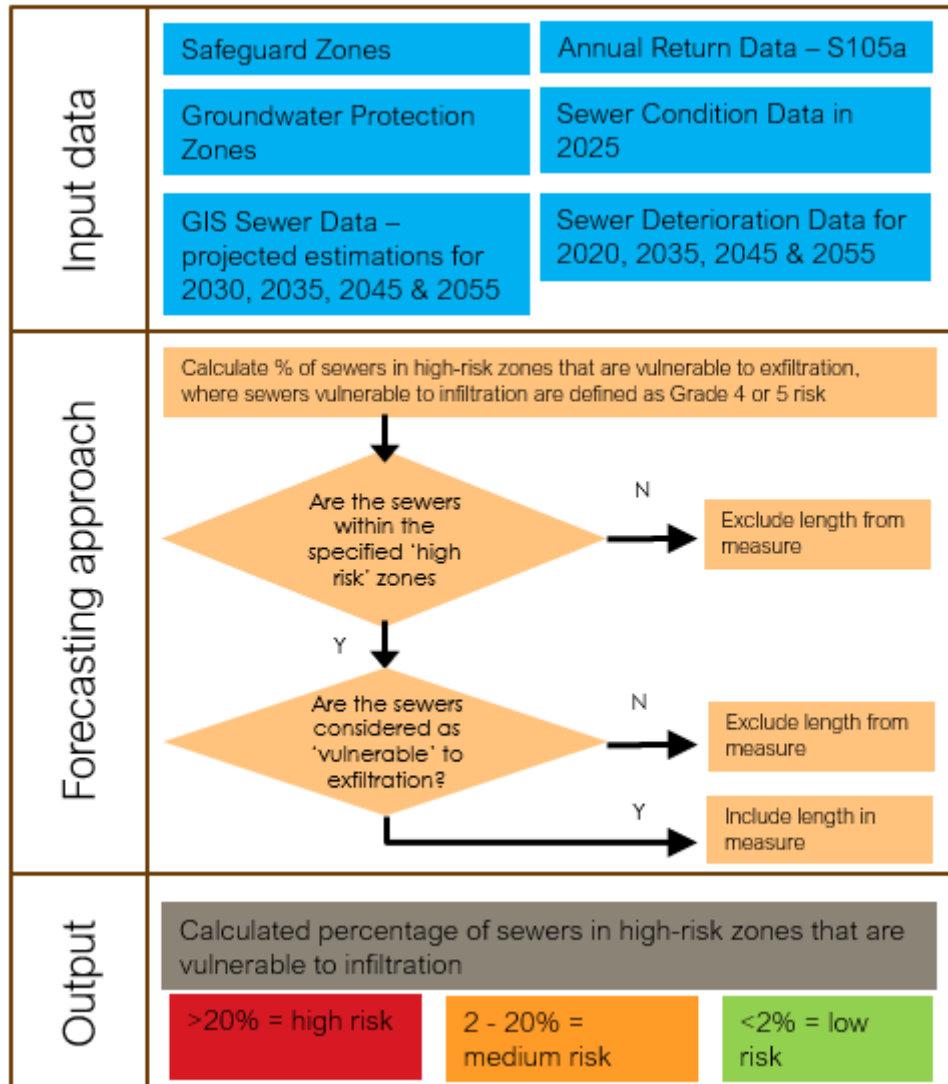
- 4.4. The main reporting outputs for this Performance Indicator will be GIS layers for the Thames Water DWMP portal showing the risk level (high, moderate, low) for each DWMP reporting level, for the base year (2030) and the baseline performance for the planning horizons 2035, 2045 and 2055.
- 4.5. Spatial (mapping) Scales
 - Level 1 (L1) Company level
 - Level 2 (L2) River catchment or Local authority level
 - Level 3 (L3) Sewerage catchment(s) level
 - Level 4 local level (London catchments only) – sub Sewerage Treatment Catchment area scale, utilised in London only owing to size of area served

¹¹ Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water). They are identified where the protected area has been assigned as being "at risk" of failing the drinking water protection objectives of the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017.

5. Performance Indicator methodology

5.1. The following methodology will be applied to base year and baseline performance Groundwater Pollution risk. The approach is illustrated in Figure 1.

Figure 1. Performance Indicator methodology



Base year performance – 2030

5.2. The Base year is the first year that is assessed for performance and level of risk at the start of the DWMP 25-year planning period. For example, for DWMP28 it is 2030.

5.3. Using SPZ/SGZ Environment Agency data sources outlined in Table 2 and overlaying our current GIS sewer layer we determine the mapped extent of **public sewers in the 'high risk' zones** and then make an allowance of unmapped sewers (including an allowance for legacy and S105a sewers):



- The allowance for unmapped S105 sewers is taken from annual return reporting ratios (mapped Vs unmapped) from the data outlined in Table 2.
- 5.4. For sewers intersecting the high-risk zone boundary, only the length of sewer within the zone will be included in the measure.
- 5.5. In order to uplift the measure to 2030 from 2025 data we need to account for new sewers that may be built and therefore contribute to the total length of sewers in the zones. In order to estimate this, we will consult annual return data (Table 7C line 21) back to 2020 and use this to forecast the rate of new sewers created across the Thames region as a whole and apply this to the base year of 2030.
- 5.6. We then assess the length of sewers within the high-risk zones that have the potential to be vulnerable to exfiltrate, the total length will be a combination of:
- The total of the full length of sewer identified as Grade 4 and 5 structural condition grades
 - The total of the full length of sewers known to have a defect (hole) or significant displaced joints. This applies to sewers not classed as SCG 4 or 5.
 - Not all public sewers within the high-risk zones will have had a survey, in the absence of survey data we will make an allowance for 'un-surveyed public sewers' based upon findings from the surveyed lengths (i.e. % of grade 4 and 5 sewers) and considering factors such as geology and age of sewer. Where possible Thames Water data will be used, where this is not possible, we will use industry level data.
 - The rate of surcharge of sewers based upon hydraulic modelling outputs for the sewers in the high-risk zones for a 1 in 1 year return period storm is to be used to weight the scoring of sewers at risk (weighting and how this is applied is to be agreed as the emerging PI develops through risk assessment stage).
 - The head of groundwater above the sewers based upon JBA groundwater risk model data is to be used to weight the scoring of sewers at risk (weighting and how this is applied is to be agreed as the emerging PI develops through risk assessment stage).
- 5.7. For DWMP28 it is unlikely that survey programmes will include sufficient coverage of sewers within the high-risk zones. In the event of this we will infer condition from available survey trends using Thames Water data where available or industry level data. For Price Review 2029 (PR29) we will include for a programme of CCTV of sewers in high-risk zones.
- 5.8. We then calculate the percentage length (km) of public sewers by dividing those that have the potential to be vulnerable to exfiltration in the high-risk zones, by the total length of sewers in the high-risk zones:



$$\frac{\text{Length of sewers (km) in high-risk zones vulnerable to exfiltration}^{12} \times 100}{\text{Total length of sewers in high-risk zone}^{13}}$$

Future baseline performance – 2035-2055

- 5.9. Future baseline performance is derived as per the methodology for the base year but with a further allowance for growth and an allowance for deterioration.
- 5.10. In order to estimate growth, we will consult annual return data (Table 7C line 21) back to 2020 and use this to forecast the rate of new sewers created across the Thames region per AMP, and apply this to the baseline years of 2035, 2045 and 2055.
- 5.11. In order to estimate the level of deterioration in 2035, 2045 and 2055 we apply the asset life stipulated in Thames Water's Fixed Asset Class Accounting Rules. This sets out that public foul and surface water sewers have an economic life of 150 years and therefore based on a 25-year DWMP planning period we would expect the number of Grade 4 or 5 sewers to increase by one sixth (25/150), a linear relationship is then applied between 2030 and 2055. Sewers are long life assets and therefore this approach is deemed appropriate for this emerging measure as we collect more data over time. Where other specific factors such as pipe material are identified (e.g. pitch fibre sewers) an adjusted asset life will be applied.
- 5.12. For rising mains, asset life is applied based upon material, asset insights on this asset will apply an asset life based upon the following Useful Economic Life (UEL) expectancies:

¹² This includes an allowance for 'unsurveyed sewers' based upon the proportions identified in the surveyed findings.

¹³ This includes an allowance for S105a unmapped sewers.

Table 3: Useful economic life expectancies for rising mains from our internal asset health improvement user guide

Material	Start of Time Period Used	End of Time Period Used	Average built date	Life Expectancy
AK – Alkathene	1980	2009	2007	100
HDPE – High Density Polyethylene	1990	2050	2007	100
HPPE – High Performance Polyethylene	1990	2050	2007	100
MDPE – Medium Density Polyethylene	1980	2009	2007	100
PE – Polyethylene	1980	2050	2007	100
PEBD – Medium Density Polyethylene	1980	2009	2007	100
AC – Asbestos Cement	1930	1980	1960	70
CI – Cast Iron	1840	1975	1920	100
CO – Concrete	1950	2050	1980	100
CSB – Concrete Segments	1950	2050	1980	100
DI – Ductile Iron	1960	2050	1985	60
GRP – Glass Reinforcement Plastic	1970	2009	1999	70
I – Iron	1840	1980	1940	100
PF – Pitch Fibre	1950	1975	1980	60
PL – Plastic	1960	1986	1980	60
PP – Polypropylene	1960	2050	1980	100
RPM – Reinforced Plastic Matrix	1960	1995	1980	100
SI – Spun Iron	1940	1975	1950	100
ST – Steel	1920	2050	1980	100
UPVC – Unplasticized Polyvinylchloride	1960	1986	1970	60
UPVCB – Unplasticized Polyvinylchloride Class B	1968	1986	1970	60
UPVCC – Unplasticized Polyvinylchloride Class C	1968	1986	1970	60
UPVCD – Unplasticized Polyvinylchloride Class D	1968	1986	1970	60
UPVCE – Unplasticized Polyvinylchloride Class E	1968	1986	1970	60
X – Other	1840	2050		100
Z – Unknown	1840	2050		100

5.13. 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 . Scenario planning approach). 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

5.14. 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

5.15. 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 develop and refine our Asset Health condition forecasting assessment for sewer condition. We will ensure that we are aligned to the 'enhancing asset health' Ofwat workstream to ensure there is consistency in the approach for this Performance Indicator.
- 6.2. For Price Review 2029 (PR29) we will include for a programme of CCTV of sewers in high-risk zones.
- 6.3. Where relevant, we will use data collected from AMP8 WINEP studies to inform our observations of risk in these areas.
- 6.4. We will support the industry Task and Finish Groups, who endeavour to lobby for further research into establishing the risk associated with vulnerability to exfiltration and the consequence posed to groundwater sources from exfiltration.



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.

