Catchment Strategic Plan

Part of our Drainage and Wastewater Management Plan (DWMP)

Co-creating resilient wastewater catchments

A long-term Strategic Plan for **Hertfordshire**

Thames Water

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Foreword

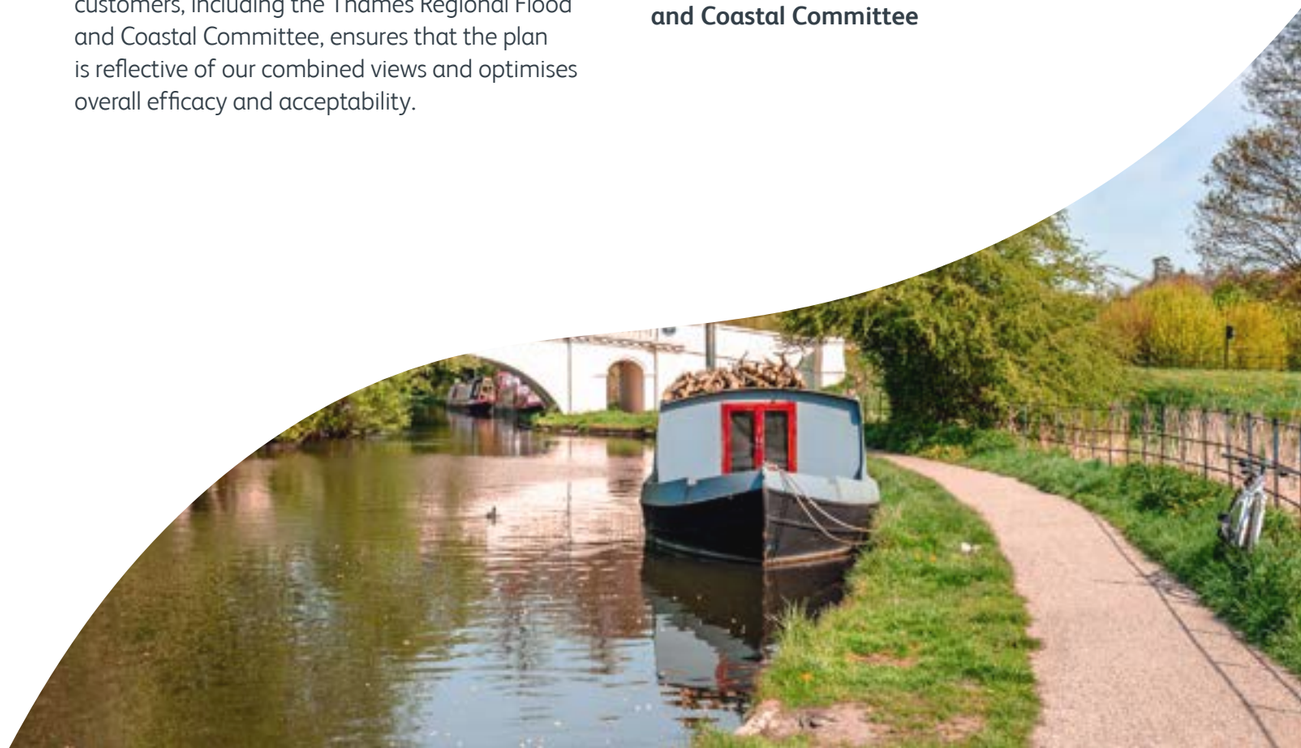
Thames Water has been making considerable progress to bring to fruition their drainage and wastewater management plan (DWMP). The DWMP vision is to co-create a 25-year plan for drainage and wastewater that benefits communities and the natural environment in London and the Thames Valley. We can all agree that planning to adapt to the growing critical pressures facing the water industry, such as climate change, a growing population and urbanisation, is of paramount importance and it has been very good to see that these challenges have been faced head on in the development of this plan.

Thames Water's commitment to achieve the DWMP vision through a collaborative process is one of the most important and admirable themes of this plan. Working alongside stakeholders and customers, including the Thames Regional Flood and Coastal Committee, ensures that the plan is reflective of our combined views and optimises overall efficacy and acceptability.

I have thoroughly enjoyed being part of this process and have been impressed by the extent of engagement that Thames Water has managed to undertake despite the challenging conditions of the coronavirus pandemic. As a result, I believe that the DWMP offers a significant step forward in planning for drainage and wastewater in our region.

Of course, the real changes will only happen once the plan is implemented on the ground, but the joined-up work and co-creation of the DWMP plan so far promises significant improvements for customers, communities and the natural environment across London and the Thames Valley. Continued focus on maintaining a tight relationship with all stakeholders is essential in moving forward to ensure Thames Water reaches their ambitious goals.

Professor Robert Van de Noort
Chair, Thames Regional Flood and Coastal Committee



Preface

Our DWMP progress and enhancements since our draft plan

We're proud of our first DWMP, and encouraged by the level of positive feedback we've received. By engaging and working collaboratively with around 2,000 of our customers and stakeholders, we've been able to deepen our shared understanding as well as develop new ways to approach drainage and wastewater management across our region.

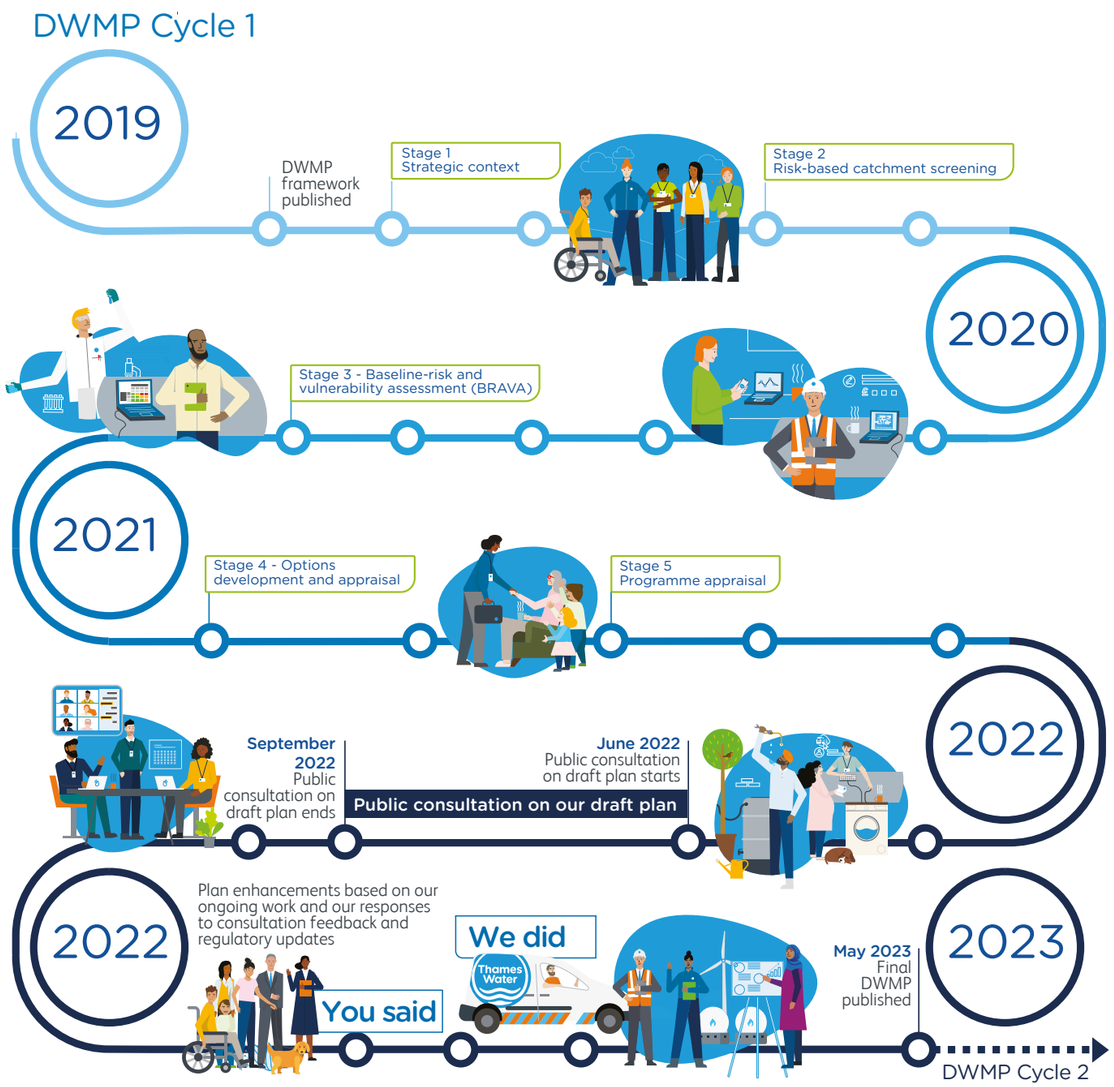
We'd like to say a big thank you to everyone who got involved and collaborated with us in the development of our shared plan. We're really happy it's having a positive impact already, and encouraged by the shared benefits we can deliver in the future as we continue to move forward together.

Our plan aligns with wider industry strategic plans and delivery programmes, such as the Water Industry National Environment Programme (WINEP) and the Long-Term Delivery Strategy (LTDS), and we'll make sure it continues to do so as we tackle current pressures and future challenges.

Over the past four years, we've developed, tested and enhanced our DWMP by engaging with customers and stakeholders and working with their valuable input and feedback to create a final plan we can all support. It's been almost a year since we first published our draft DWMP, and we've made some great progress since then. As customer and stakeholder requirements have evolved over time, our plan has evolved too.

We've enhanced our adaptive planning to increase the resilience of our final DWMP. We've also been testing its sensitivity against a range of alternative plans, risks and uncertainties to make sure our final plan is flexible to different potential futures. This approach will help us to make more proactive, adaptable and informed choices over time. It will also make sure that our interventions are set up for the future and can add the best value while providing ongoing opportunities for us to develop innovative solutions and ways of working.

The rest of this document summarises our final plan for this specific Catchment Strategic Plan (CSP) area, including the progress we've made from draft to final. We look forward to building on this progress and our collaborative approach as we implement our shared plan and evolve into DWMP Cycle 2.



Preface

What you told us about the draft DWMP for our region

We published our draft DWMP for public consultation in June 2022, and asked our customers and stakeholders for their feedback on it. We received around 1,400 responses from a wide range of local, regional and national stakeholder groups, including responses from every CSP area across our region.

We received lots of positive comments on the quality and ambition of our draft plan as well as useful ideas for making our final DWMP even stronger.

The consultation feedback had six main themes, as outlined below. We've listened carefully and responded wherever possible within our final plan*.

This valuable feedback has further enhanced our DWMP and will help our customers, communities and the natural environment in our region to thrive now and in the future.

You said

You supported

- Our preferred plan with the majority of our customers and stakeholders agreeing with this choice
- Our proposed solution types from nature-based solutions to using the latest technologies to increase capacity in our sewer system
- Our partnership-working approach with our 200+ local authorities, organisations, action groups, catchment partnerships and national stakeholders

You challenged

- Our targets – you wanted amendments or some new ones to be added
- Our programme – you wanted quicker delivery in certain areas and were concerned about such an ambitious SuDS plan
- The cost – you were worried about the impact on customer bills

You offered ideas for

- New or amended solutions that we could consider including in our preferred plan
- Maximising the benefits of our preferred plan's positive outcomes
- Enhancements to our stakeholder engagement approach and ongoing activities

You wanted more details on

- The resilience of our assets to flooding and power outage
- How our plan will be funded - by business-as-usual activities (base funding) or enhancement funds
- Adaptive planning scenarios to evidence how our plan could adapt to future influencing factors such as climate change

Feedback themes

Protecting the environment
Level of ambition and pace of delivery

Evidencing best value
Affordability and bill impact

Delivering the plan
Solutions and deliverability of the plan

Enhancing the plan
Technical clarifications and ease of navigation

Working together
Collaboration to achieve multiple benefits

Valuing your input
Stakeholder engagement

We did

We've used as much of your feedback as we could, together with the progress from our ongoing DWMP work and our responses to regulatory updates, to enhance our final plan including in the following ways:

- **More** ambitious storm overflow target delivery to help protect the environment
- **Increased** evidencing around best value and justification for our preferred plan
- **Increased** alignment of DWMP to other strategies and delivery plans
- **Increased** number of proposed solutions
- **Rewritten** and restructured parts of the documents to be clearer and more accessible
- **More** detailed content throughout, especially on strengthening partnership working and stakeholder engagement
- **Additional** future scenario testing
- **Increased** balancing of risk, ambition and deliverability
- **Earlier** planned implementations
- **New** dedicated technical appendices

* Some consultation feedback didn't require further action or wasn't relevant to the DWMP process. Other feedback was relevant to future DWMP planning cycles and will be used to inform this work.

This document focuses on the progress and updates we've made in our final DWMP for this specific CSP area.

Find out more about how we've addressed the wider consultation feedback in our You said, We did Technical appendix.

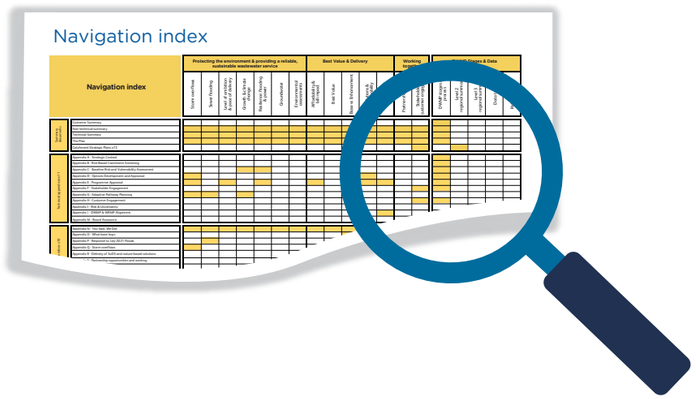
Preface

Navigating the final DWMP for our region

We've enhanced our final DWMP since we published it as a draft for public consultation in June 2022, and we want to make it easy for you to see what's changed.

You can spot all the places we've updated our draft plan with our 'progress signposts', which we've used across all our final DWMP documents. Here's where they'll be:

- Preface summaries - We've put a summary table in each document's preface, excluding Summary documents and the Catchment Strategic Plans (CSPs)
- Relevant chapters - We've placed the appropriate signposts next to each relevant chapter, including Summary documents and the CSPs

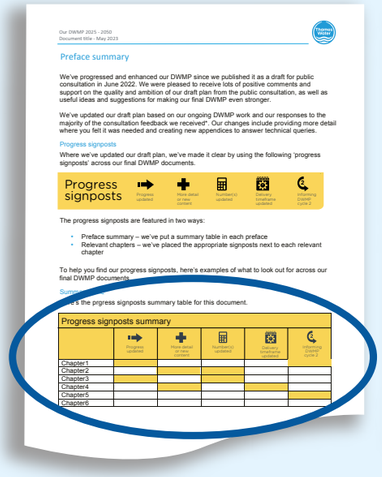


Progress signposts

- Progress updated
- More detail or new content
- Number(s) updated
- Delivery timeframe updated
- Informing DWMP cycle 2

To help you find our progress signposts, across our final DWMP documents, here are examples of what to look out for:

Preface summaries



Relevant chapters

If you need help navigating our final DWMP and locating key content, you can find a Navigation index at the back of this document.

Catchment strategic plan glossary

Term	Definition
1 in 30-year storm	A storm that has a 1 in 30 chance (3.33% probability) of being equalled or exceeded in any given year. This does not mean that a 30-year flood will happen regularly every 30 years, or only once in 30 years.
1 in 50-year storm	A storm that has a 1 in 50 chance (2% probability) of being equalled or exceeded in any given year. This does not mean that a 50-year flood will happen regularly every 50 years, or only once in 50 years.
Baseline Risk And Vulnerability Assessment (BRAVA)	Following Risk Based Catchment Screening (RBCS) detailed risk assessments on those catchments where we believed there was an adverse risk to performance over time, we modelled their performance for future epochs (2020, 2035 and 2050).
Combined Sewer	A combined sewer is a sewer designed to carry both wastewater and surface water from domestic and/or industrial sources to a treatment works in a single pipe.
Dry Weather Flow (DWF)	Dry Weather Flow (DWF) is the average daily flow to a Sewage Treatment Works (STW) during a period without rain.
EA Pollution Categories 1 to 3	Category 1 incidents have a serious, extensive or persistent impact on the environment, people or property. Category 2 incidents have a lesser, yet significant, impact. Category 3 incidents have a minor or minimal impact on the environment, people or property with only a limited or localised effect on water quality. Further guidance available here.
Event Duration Monitoring (EDM)	Event Duration Monitoring measures the frequency and duration of storm discharges to the environment from storm overflows.
Foul Sewer	A foul sewer is designed to carry domestic or commercial wastewater to a sewage works for treatment. Typically, it takes from sources including toilets, baths, showers, kitchen sinks, washing machines and dishwashers from residential and commercial premises.
Hydraulic Overload	When a sewer or system is unable to cope with a high flow.
L2 Area (Strategic Planning Area)	An aggregation of level 3 catchments (tactical planning units) into larger level 2 strategic planning areas. The level 2 strategic planning areas allow us to describe strategic drivers for change (relevant at the level 2 strategic planning area scale) as well as facilitating a more strategic level of planning above the detailed catchment assessments.

Term	Definition
L3 Catchment (Tactical Planning Unit)	Geographical area in which a wastewater network drains to a single sewage treatment works. Stakeholders may be specifically associated with this area. Includes for surface water sewerage that may exist which serves the wastewater geographical area but drains to a watercourse.
Lead Local Flood Authorities (LLFAs)	LLFAs are Risk Management Authorities as defined by the Flood and Water Management Act. They have statutory duties with respect to flood risk management, investigating flooding and the compilation of surface water management plans.
Risk Based Catchment Screening (RBCS)	A first pass screening exercise of catchment vulnerability against 17 different risk indicators to understand which catchments are low risk catchments and those that are likely to be at risk in the future if not supported by our long-term plan.
Sewage Treatment Works (STW)	A Sewage Treatment Works is a site where wastewater is received and treated to a standard legally agreed with the Environment Agency before it is released back into the environment.
Storm Overflow Discharges	Storm overflows are used to manage excess flows, which typically occur as a result of heavy rainfall. Excess flow that may otherwise have caused flooding is released through a designated outfall to a waterbody, land area or alternative drainage system.
Surface Water Sewer	A surface water sewer collects rainwater from domestic and commercial roofs, driveways, patios, etc to a local watercourse or suitable surface water drainage system.
Sustainable Drainage Systems (SuDS)	Drainage solutions for surface runoff that mimic natural drainage regimes and provide an alternative to a network of pipes and sewers.
Thames Regional Flood and Coastal Committee (TRFCC) Area	Thames Regional Flood and Coastal Committee (TRFCC) area was established by the Environment Agency under the Flood and Water Management Act 2010 that brings together members representing the Constituent Authority. Featured TRFCCs are listed here on our DWMP portal.

Introduction

Since 2019, we've been working with you, our stakeholders, to develop our first long-term strategy for wastewater and drainage issues within the Hertfordshire Thames Regional Flood and Coastal Committee (TRFCC) area.

We're developing a strategy for the next 25 years to meet future challenges such as climate change, population growth and urban creep which could impact the sewerage and drainage systems in our region. and drainage systems in our region.

We want to make sure we increase the resilience of our sewerage and drainage assets and network so that we can protect our customers, communities, and the environment from the impacts of these challenges.

This long-term strategic plan outlines our shared vision for the future and details how, through working together, we can improve and enhance our wastewater and surface water services in this TRFCC area to achieve the following ambitious goals:

In this document we'll explain:

- How we've worked in partnership to develop our strategic plan
- Our predictions of the future challenges we face in this region
- How this plan is expected to address these challenges and who else needs to be involved
- Our shared strategy for maintaining the safe and reliable delivery of wastewater and surface water services in the long-term

This TRFCC area covers 26 wastewater catchments, each with networks draining to a single treatment works site and, where present, surface water sewerage. In this document we summarise our long-term plan for this TRFCC area (L2) and also provide links to allow readers to drill down further into our catchment-level plans (L3). If you want to contact us or want to find out more about our DWMP and the set of documents it comprises, please click on the following links:
DWMP@thameswater.co.uk

Drainage and wastewater management plan

Our Goals

Stop internal and external property sewer flooding up to a 1 in 50-year storm event (2% probability in any given year) where possible

Eliminate harm from storm overflows - no more than an average of 10 discharges per annum by 2045 at overflow locations

Enhancing resilience at our sewage treatment works to ensure 100% permit compliance and protect river water quality

Our DWMP components

DWMP Framework

Our DWMP

The Plan

DWMP portal

Strategic Context

Technical Summary

Technical Appendices

Non-Technical Summary

Theme		How we will measure performance			
	Environment	**Sewage treatment works quality compliance** The ability of Sewage Treatment Works (STW) to treat and release treated sewage in line with the consented discharge permit quality conditions.	**Sewage treatment works DWF compliance** The ability of STWs to treat and discharge treated sewage in compliance with the flow discharge permit Dry Weather Flow (DWF) conditions.	**Risk of pollution incidents** The risk of polluting the environment through uncontrolled escape of sewage (classed as Category 1 to 3 by the Environment Agency) arising from either network or treatment sites.	**Storm overflow performance** The number of storm overflow discharges to the environment, both in the network and at the STWs.
	Property hydraulic sewer flooding	**Internal hydraulic sewer flooding risk in a 1 in 30-year storm** The risk of properties flooding internally as a result of hydraulic sewer overload.	**External hydraulic sewer flooding risk in a 1 in 30-year storm** The risk of sewer flooding to gardens and other land within the property curtilage as a result of hydraulic sewer overload.	**Risk of hydraulic sewer flooding in a 1 in 50-year storm (resilience sewer flooding)** The risk of residential properties experiencing sewer flooding as a result of hydraulic sewer overload based on a modelled assessment of the performance of our sewers in a storm that statistically occurs once every 50 years on average.	
	Asset health	**Sewer collapses** The risk of sewers collapsing or rising mains bursting that leads to a loss of / interruption to continued service.			

The Hertfordshire TRFCC area

This area encompasses the majority of Hertfordshire county, defined to the east by its border with Essex and the Rivers Stort and Lee. To the west, this TRFCC area is bounded by the border with Buckinghamshire. Key conurbations in this TRFCC area are Watford, St Albans, Hemel Hempstead and Stevenage. In addition to the Lea and Stort, other key rivers in this TRFCC area are the Beane and Colne.

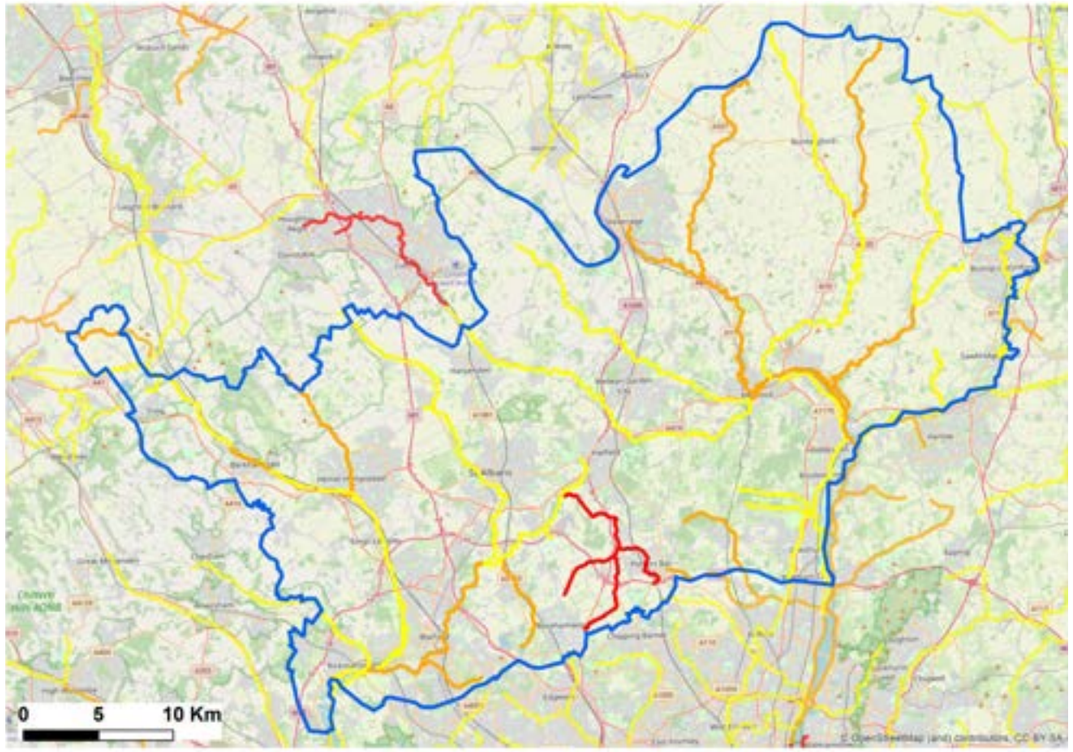
Our drainage and wastewater service needs to protect this unique area and support the growth ambitions of its communities.

Every day, our sewerage network in this TRFCC area manages the needs 1.1 million customers. Our sewerage network consists of:

- 26 STWs and their associated networks (2 non-Thames Water STWs)
- An area covering 1418 km^2
- 9,794 km of sewers
- 542 pumping stations

The region mostly has separate sewer systems that convey wastewater and surface water from homes and businesses. Rainfall runoff is often collected by surface water sewers, highway drainage, or privately owned assets and directly discharged to nearby watercourses.

The river water quality status in this region is generally moderate and poor as shown in the map below:



Creating resilient wastewater catchments

Our co-creators

Who our stakeholders are

It's not possible for all the benefits identified in the DWMPs to be developed by water companies alone. They are led by water companies but created collaboratively with other organisations and groups that, with Thames Water have a shared responsibility and/or interest in drainage, flooding and environmental protection. Active engagement with these stakeholders is vital for the consultation, planning and refinement of our DWMP.

Since 2019, we've been working with a wide variety of stakeholders from across this area to understand the local issues and opportunities so that we could create a long-term plan that provides the best outcome for everyone. In this area we've engaged and worked with stakeholders from the following organisations and groups:

Environment Agency, Department for Environment, Food and Rural Affairs (Defra), Water Services Regulation Authority (Ofwat), National Highways, Consumer Council for Water, Thames Water Customer Challenge Group (CCG), Thames21, Thames Rivers Trust, South East Rivers Trust, Hertfordshire County Council, Broxbourne Borough Council, Dacorum Borough Council, East Herts Council, Hertsmere Borough Council, North Hertfordshire District Council, St Albans City and District Council, Stevenage Borough Council, Three Rivers District Council, Watford Borough Council, Welwyn Hatfield Borough Council, The Colne Catchment Action Network (ColneCAN), Thame Catchment Partnership (CP), Lea CP and Lower Lea CP.

The stakeholder feedback we've received

To ensure our stakeholders' views have been considered and are a fundamental part of our final DWMP, we've carried out a variety of stakeholder engagement activities. From 2020 to 2022 much of the interaction was online due to coronavirus restrictions, but over the years they've included workshops, drop-in sessions, 1-2-1 calls, recorded webinar updates, newsletters, surveys, feedback forms as well as online discussions.

From our engagement throughout each of the DWMP framework stages we know our stakeholders want our strategic plan to deliver the following things in this region (see quotes on the right).

We've spoken to our stakeholders to identify their strategic management plans and policies that could interact with our DWMP. The strategic themes are displayed below and the following table records all of the plans and policies and how they align with the DWMP.

> "I think for a first cast it is a very good position statement. As is ever the case, the devil will be in the detail; but I look forward to the next stage in the consultation process and think TW thinking in this is in the right direction. My concerns are mostly around Ofwat and its ability to say, "Yes", which it has never been disposed to demonstrate."

> "Seems like a good strategic overview. I like that data and modelling is a first priority."

Partners' policies

Management Plan (Hyperlink)	Key aspects that align with the DWMP
Local Flood Risk Management Strategies	
Local Flood Risk Management Strategy for Hertfordshire	• The aim of the strategy is in relation to identifying and handling local flood risk from surface water, groundwater and ordinary watercourses, such as streams, ditches and small rivers.
Surface Water Management Plans	
East Hertfordshire District Surface Water Management Plan	• The aim of the strategy is in relation to identifying and handling local flood risk from surface water, groundwater and ordinary watercourses, such as streams, ditches and small rivers.
River Catchment Partnership Plans	
Lea Catchment Partnership	• The vision and aim of this plan ensures all watercourses flow year round with plentiful, quality water that supports its characteristic flora and fauna and to restore and maintain these ecosystems, both above and below ground, boosting the catchment's natural capital and value for people and wildlife.
Lower Lea Catchment Management Plan	• Education and monitoring • Water quality • Water quantity • Ecology and morphology
The Colne Catchment Action Network	• Control invasive non-native species • Involve people with their local waterbodies • Improve wildlife corridors • Improve water quality • Manage flow • Work together
River Thame Catchment Plan	• Provide a clear understanding of the challenges affecting the River Thame catchment, based on current evidence • Work out priorities for improvement – what needs doing and where, and to seek to deliver these improvements in a joined up and cost effective way

Management Plan (Hyperlink)	Key aspects that align with the DWMP
Local Plans	
South West Hertfordshire Joint Strategic Plan	• The plan sets out the shared vision to 2050 in the following areas: – climate change – strategic growth opportunities – strategic infrastructure delivery – economic opportunities – housing needs
Sustainability Plans/Climate Change Action Plans	
Sustainable Hertfordshire Strategy and Action Plan	• Delivery cleaner and greener environment • Healthy and fulfilling lives for our residents • Sustainable responsible growth • Make a public record of the targets that have been set • Tackle carbon emissions and climate change • Enhance biodiversity • Ensure resources are used effectively and efficiently
Environmental Sustainability Action Plan (East Herts)	• The wider aim is to achieve carbon neutrality for East Herts Council's own generated emissions by 2030 and do the utmost in achieving carbon neutrality by the same year for the wider district.
North Herts Council Climate Change Strategy	• The objectives of this strategy include: – achieve carbon neutrality for the council's own operations by 2030 – ensure all operations and services are resilient to the impacts of climate change – achieve a net zero carbon district by 2040 – become a district that is resilient to unavoidable impacts of climate change
Climate Change Strategy (Stevenage Borough Council)	• The vision for this strategy include: – understand the emissions – lead the way – advocate for real change – resident led approach – promote equality – monitor closely

Management Plan (Hyperlink)	Key aspects that align with the DWMP
Welwyn Hatfield Borough Council Climate Change Strategy Action Plan	• Reduce carbon emissions from our own estate and operations to net zero by 2030 • Comply with statutory obligations to mitigate and adapt to climate change • Work with, support, encourage and engage residents, communities, businesses and other partners in initiatives to reduce carbon emissions • Embed climate change mitigation and adaptation into plans, strategies and policies
Broxbourne Borough Council Sustainability Strategy and Action Plan	• Supporting action by businesses and residents
Hertsmere Climate Change and Sustainability Strategy	• Reduce energy consumption by improving efficiency of use • Reduce reliance on fossil fuels and reduce emissions by increasing renewable energy capacity • Reduce transport related emissions • Minimise waste and implement principles of circular economy • Build climate resilience, enhance biodiversity and offset unavoidable carbon emissions
St Albans City & District Council, Sustainability and Climate Crisis Strategy	• Governance and leadership • Energy use • Transport and air quality • Waste • Climate change adaptation and water
Dacorum Borough Council's, Climate and Ecological Emergency Strategy (Draft)	• Reach net zero emissions as an organisation by 2030 • Support the borough in reducing its emissions and reaching net zero as quickly as possible, by 2050 at the latest • Support the borough in improving biodiversity • Support the borough in creating more sustainable communities
Watford Borough Council Sustainability Strategy	• Reducing water consumption and tackling pollution • Lowering carbon by reducing our energy consumption • Delivering projects to improve biodiversity across the town

Management Plan (Hyperlink)	Key aspects that align with the DWMP
Chalk Stream Restoration Strategy	• Enhanced status for all chalk stream
AONB Management Plans	
Chilterns AONB Management Plan	• Describes how to ensure the Chilterns remains a healthy landscape with a viable rural economy to environmental problems such as climate change
Green/Blue Infrastructure Plans	
East Herts Green Infrastructure Plan Hertfordshire Strategic Green Infrastructure Plan St Albans District Green Infrastructure Plan Dacorum Borough Green Infrastructure Plan Three Rivers District Green Infrastructure Plan Watford Borough Green Spaces Strategy	These plans: • provide an overview of existing green infrastructure assets • set out an assessment of the ability of green infrastructure to provide multiple environmental and social and in some cases economic functions • consider opportunities for enhancement and creation of green infrastructure • outline a series of potential projects to deliver multiple functions and benefits • provide advice on taking green infrastructure proposals forward through spatial planning and practical delivery

Issues today

The initial risk-based screening in this TRFCC area, published in December 2019, found that 82% of catchments (99.7% of population served) were vulnerable to the risks of growth and climate change and warranted long-term planning.

The results from our hydraulic sewer flood risk modelling indicate that this TRFCC area is at risk of STW compliance failure and pollution, and at lower risk of hydraulic internal sewer flooding, storm overflow performance and sewer collapses.

Our experience suggests that flooding is many more times likely to occur as a result of blockages, rather than hydraulic overload as a result of storm flows. Therefore, we're focusing on sewer maintenance as a priority within our shared plan for this area.

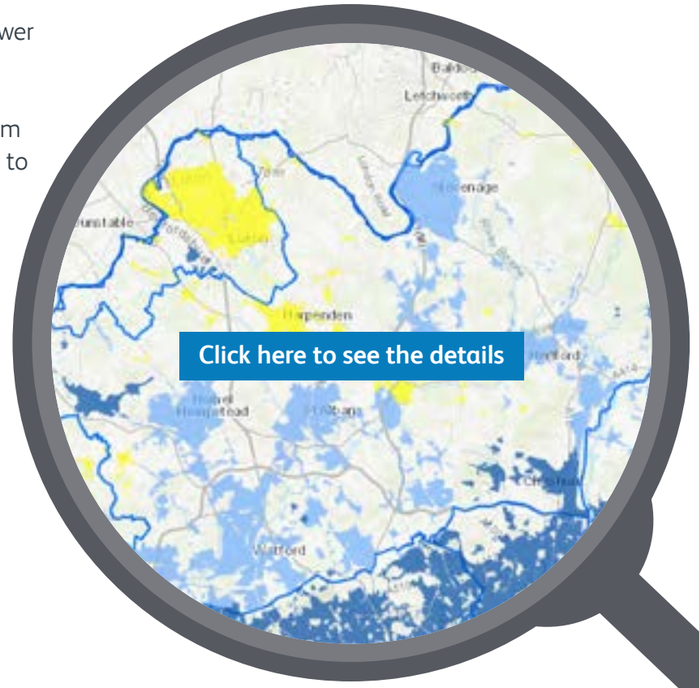
We will tackle the potential risk of hydraulic sewer flooding in accordance with our goals, where predicted flows entering the sewer exceed the capacity of the sewer, through taking a medium to long term plan which will afford us the time to implement solutions that are sustainable.

This will help us to improve the resilience of our systems, further protect our customers and communities and enhance our existing performance.

It's important to note that our sewer collapses in this area are low, and particularly low when compared nationally.

In addition to them being uncommon, sewer collapses do not materially affect our performance in relation to sewer flooding, pollution and storm discharges. However, as a company we're committed to maintaining and improving our sewers in this TRFCC area to address this risk.

The DWMP process is iterative and will be repeated every 5 years, next version due in 2028. This will capture any changes in demands for this TRFCC area and will look to incorporate future technologies and engineering solutions.



L3 Internal Sewer Flooding - Baseline (2020) Risk

0 - Not Significant (performance is at/below industry thresholds)

1 - Moderately Significant

2 - Very Significant

BRAVA link regarding classification

Our predictions for the future

We've modelled those sewerage catchments identified as vulnerable in the RBCS against future challenges, assessed targets and carried out discussions with local stakeholders and forecast that, if we do nothing and do not implement the DWMP, over the next 25 years there will be an increased risk of hydraulic sewer flooding and pollution from our sewerage systems in this TRFCC area. Our forecast performance metrics have been summarised in the accompanying bar charts. By 2050 we forecast that, across the region, over 2 % of properties will be at risk of hydraulic sewer flooding internally from the sewerage system for up to a 1 in 50-year storm, for example in areas such as Stevenage, Hemel Hempstead and St Albans.

In terms of protecting our rivers, if we don't act, our modelling predicts by 2050 that growth and climate change would impact on our storm overflow performance with 46 % of L3 catchments having an average storm discharge rate >10 storm discharges per annum per overflow, to rivers including the Upper Lee and Colne.

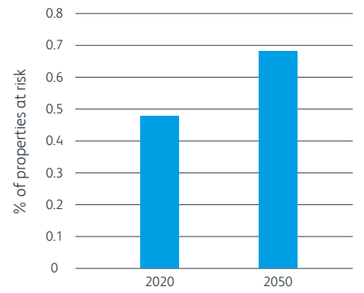
Therefore, there is an evident need for long-term planning and the implementation of the DWMP, to protect this TRFCC area and support its future growth. In addition, the permit compliance of our treatment works could be at risk for 8 catchments leading to a detriment in river water quality. If you are a DWMP practitioner, further details can be found on our Practitioner portal.

Practitioner portal (thameswater.co.uk)

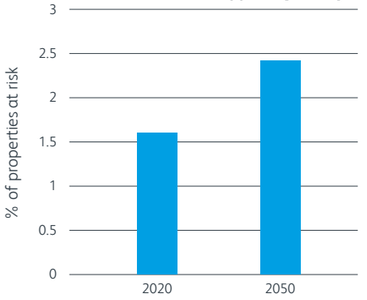
Creating resilient wastewater catchments

Change in risk if we do nothing and do not implement the DWMP

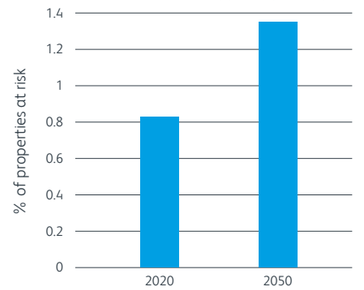
Internal hydraulic sewer flooding (1 in 30-yr storm) - i.e > 3.3% chance of happening each year



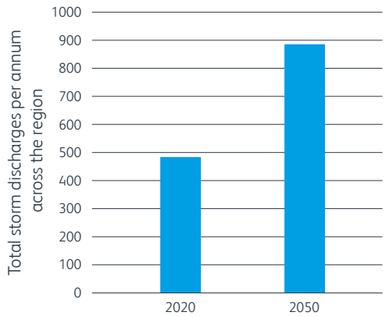
Hydraulic sewer flooding (1 in 50-yr storm) - i.e. > 2% chance of happening each year



External hydraulic sewer flooding (1 in 30-yr storm) - i.e > 3.3% chance of happening each year

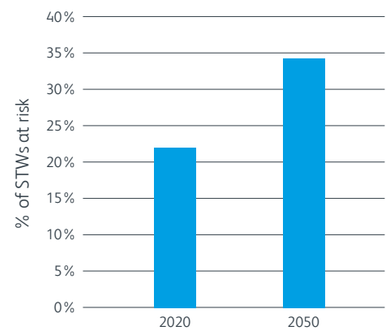


Annual storm overflow performance



2020 and 2050 modelled overflow data in DWMP catchments due to hydraulic incapacity

STWs at risk of water quality compliance failure



Sustainable solutions

We've combined our knowledge of the catchments with stakeholder feedback we've received to help us identify the solutions required to meet the future needs of this area.

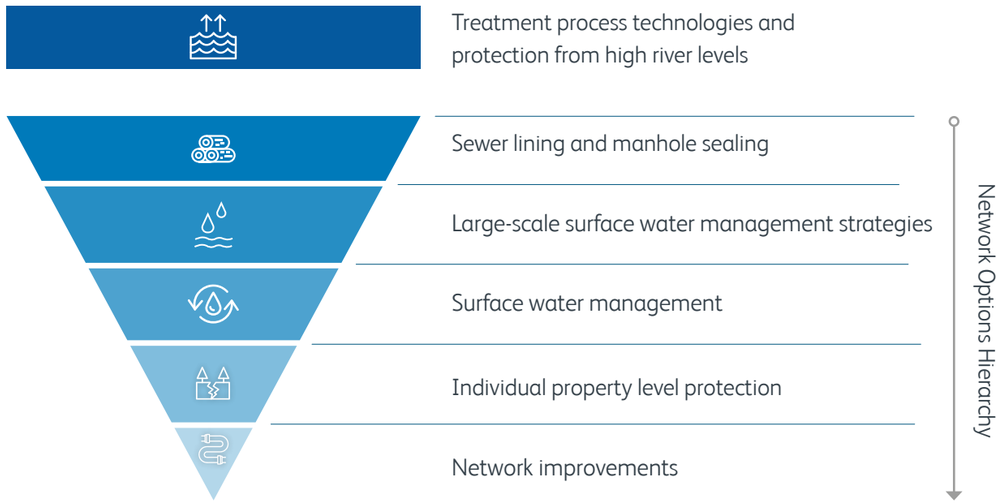
We've used a structured approach that started with over 40 generic solutions to ensure broad thinking. We identified and assessed the feasibility of a wide range of potential interventions and the extent in which they resolve the future needs.

Our approach has followed the same method that has been developed and implemented successfully over many years for our Water Resources Management Plans (WRMP).
Our stakeholders, like us, want this DWMP to work in balance with the natural environment and make the best use of available land.

The rural/urban mix in this region aligns to balancing grey/green engineering solutions with the need for traditional storage, predominantly in urban areas.

Our hierarchy of options follows this principle - it focuses first on maximising the efficient use of existing assets, then prioritising natural surface water management solutions over network improvements.

The common sustainable solution options we've identified for this area are outlined below. To view our spatial analysis of the potential solutions that have been reviewed, scoped out or selected visit our DWMP portal.



Solution options considered in optioneering

Sewer lining and manhole sealing

Undertaking a programme of sewer lining and manhole sealing, we will target as a priority the areas of high infiltration risk that leads to unwanted flows in our sewerage systems and that currently take up valuable capacity.

Large-scale surface water management strategies

Delivery of large-scale surface water management strategies in specific areas of development in this area to significantly reduce rainfall entering the separate foul sewer network.

Surface water management

Surface water separation and the installation of features to collect, store and/or infiltrate surface water from buildings and impermeable areas,such as driveways and car parks as part of enhancing our surface water sewerage system. This option also looks to reinforce the fundamental basis of our sewerage systems being separate by addressing property misconnections of surface water into the foul sewer network or foul to surface water.

Individual property level protection

Providing vulnerable homes with active and passive sewer flood protection measures such as flood proof doors, self-sealing bath/shower systems (non-return valves) and installation of household pumping stations.

Network improvements

Managing the impact of surface water on the sewerage system through the identification of network improvements to address deficiencies in the sewerage network capacity, specifically in areas with deliverability constraints and a high risk of sewer flooding now or in the future. This includes the construction of large attenuation sewers, new surface water and foul water sewers.

Treatment process technologies and protection from high river levels

Implementation of a range of different technologies identified to enhance the performance of the STW, through either retrofitting or new-build options. This will include the use of more intensive wastewater treatment processes which have the capacity to meet future demands and the construction of flood bunds to protect our assets from high river levels.

Partnership working – case studies

Working in partnership with our stakeholders is a fundamental component of our plan. It can provide significant potential to support delivery of mutually beneficial outcomes, address multiple drivers and deliver multiple benefits. In this section we present a few examples of partnership working opportunities in this region.

Chapel Lane, Long Marston

Chapel Lane has experienced sewer flooding following heavy rainfall and a power failure to the village impacting the local pumping station. Investigations discovered a drain of unknown ownership in poor condition that was unable to effectively drain surface water from the village. Subsequent investigations undertaken by both Hertfordshire County Council (HCC) and Thames Water led to a number of recommendations to mitigate the risk of flooding through a partnership approach involving (HCC), local highways authority, Environment Agency and Dacorum Borough Council. Recommendations included investigating alterations to improve the drainage system, maintenance and identifying a new discharge location into the Tring Bourne downstream of the village for the surface water sewer network.

Working in partnership with HCC and local landowners is essential to overcome the complexities in the maintenance works and ownership of the drain as well as riparian ownership for the channels and downstream ditches which pass through farm land to the point where the Tring Bourne discharges to the River Thame. This would help to reduce the flood risk to the community and mitigate for high periods of rainfall.

Opportunity	Partners
Bishops Stortford – Benhooks Avenue and Potter Street/ South Street	East Hertfordshire District Council, HCC and National Highways
Hatfield	HCC
Blackbirds STW Refurbishment	Affinity Water
Chapel Lane, Long Marston	HCC, East Dacorum Borough Council and National Highways
Rye House/ Hoddesdon	HCC, Borough of Broxbourne Council and National Highways

These opportunities have been identified following a detailed screening and prioritisation exercise with our partners. This approach is explained in the Appendix S Partnership Opportunities and Working report.

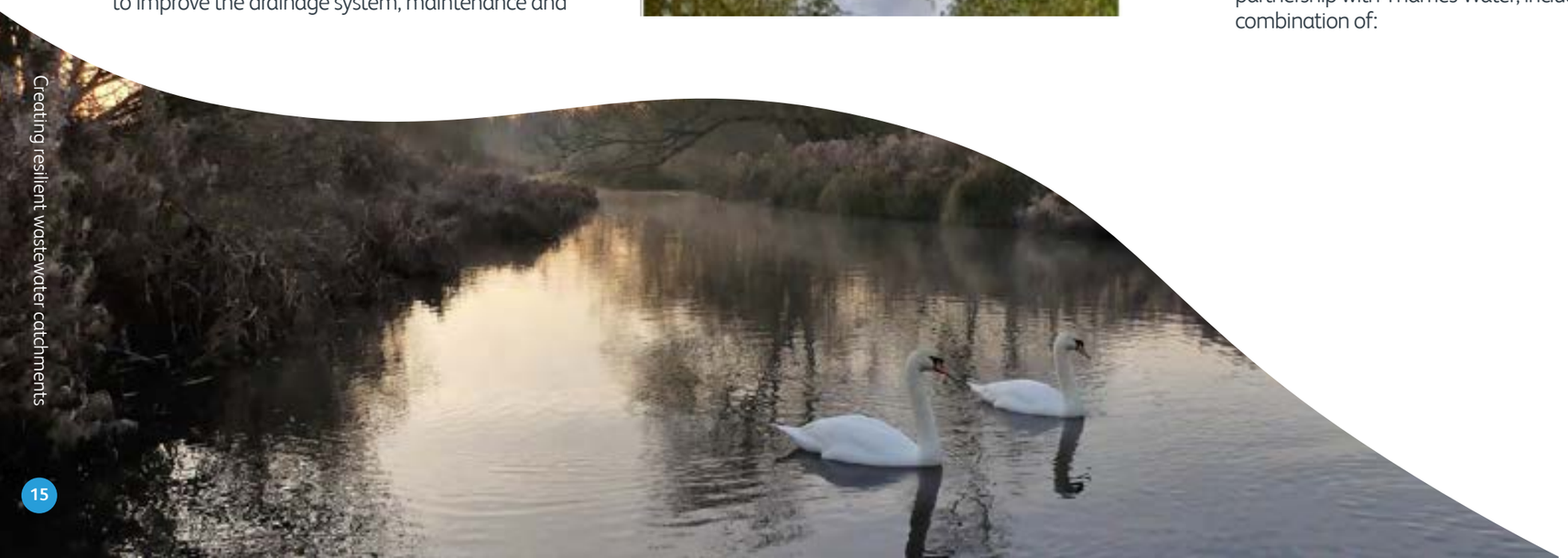
Travellers Lane, Hatfield

HCC led the statutory investigation into the flooding that identified the area by Travellers Lane as flooding on a number of occasions between 2013 and 2016.

A range of options were identified in the investigation which could be developed in partnership with Thames Water, including a combination of:

- surface water management, specifically a green corridor (wide shallow swale), in green space from the front of the road
- community focused property level protection measures
- detailed modelling to understand if additional drainage is required.

"We have been waiting many years to conduct a partnership project here and have funding available through Local Levy and FDGIA to support the project" - HCC



Our shared plan

Our shared long-term plan for the Hertfordshire TRFCC area has been formulated based on a balance of how deliverable and sustainable the proposed interventions are, and also how cost-efficiently they can deliver multiple benefits across our stakeholder groups.

The challenges this area has presented to us in delivering that balance have included:

- Population growth uncertainties
- Incomplete mapping of surface water systems e.g. sewer, highway or land drainage and the extent of our hydraulic surface water sewerage network model coverage
- Location of property level misconnections
- Pipe materials e.g. pitch fibre sewers impacting asset health
- Ownership and maintenance of SuDS

We propose an asset strategy that fundamentally addresses the inputs to our system i.e. unwanted flow removal in our foul or surface water sewers and bringing our sewerage systems back to their original intent of taking foul or surface water flows only. This will necessitate us ensuring our surface water sewers are fit for purpose.

By 2050 our foul sewerage systems in the Hertfordshire TRFCC area will no longer be reliant on storm overflows to manage the risk of flooding due to rainfall in storms with a greater than 2% probability of occurring in any one year. The catchments we serve with positive surface water systems will function as greenfield systems.

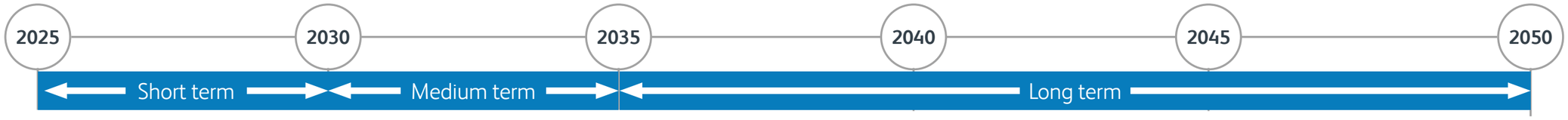
We will achieve this through an adaptive approach whereby we will aggressively target unwanted flows to create capacity in our foul only network incrementally at system level over the next 25 years. This will include sewer and manhole sealing to reduce groundwater infiltration and fluvial/pluvial inundation of flows, and disconnecting surface water misconnections from foul and combined sewers and redirecting it to surface water drainage.

Our approach is to address systems holistically, to provide wide-ranging benefit to the catchments we service in the most resilient and sustainable way for both foul and surface water systems.

We will work in partnership, where possible, to understand and evolve integrated surface water management systems, championing green infrastructure, where possible.

We will focus on our smaller catchments in the short to medium term to deliver the maximum benefit of reducing sewage escapes to the environment in the shortest possible time for our customers. Those assets linked to the most sensitive watercourses will be prioritised.

The diagram below outlines the sequencing of our proposed interventions for this area:



Restore

- **Reduced risk of flooding and pollution –** Enhancing our networks to resolve infiltration in the highest priority areas will reduce the risk of flooding and pollution
- **Sewer lining in areas at high risk of infiltration**
- **Sewer lining in medium risk catchments**

Enhance

- **Informed surface water plans –** Mapping and modelling surface water systems will increase confidence in our plans for surface water management solutions
- **Managing surface water drainage –** Reducing surface water misconnections to foul will ensure capacity is available for future growth
- **Reduced risk of flooding and pollution –** Implementing surface water management solutions will reduce the risk of flooding and pollution
- **Positive environmental and community impacts –** Creating a positive impact on environment and community wellbeing in key locations through partnership work

Maintain

- **Resilient and compliant STWs –** Providing enhanced sewage treatment capacity will ensure our works can manage the increases created by future growth in the area and are 100% compliant
- **Treatment capacity enhancements and/or protection from high river levels at 20 sites**

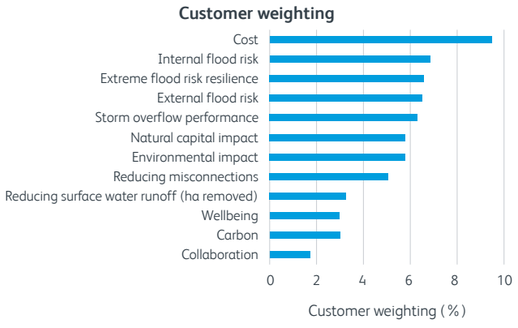
Developing our preferred plan for Hertfordshire

Defining a best value framework

A best value framework is one that considers broader criteria than just economic factors. Our DWMP will maximise outcomes for the communities it serves. Our criteria are based on the 12 planning objectives of the DWMP with additional criteria to capture broader environmental impact.

Defining what our customers and stakeholders value

We have used quantitative customer research to determine the relative priorities of the different criteria.



Agreeing scenarios with stakeholders

For our catchments outside London, over fifty possible alternative plans were identified to achieve various combinations of our planning objective targets. These were further refined and agreed through discussions with our regional stakeholders and the public consultation on our draft DWMP.

Alternative plans and outcomes
Maintain flooding resilience - delivers the statutory storm discharge reduction requirements and maintains property flooding at 2025 levels
Maximum community benefit - meets our DWMP sewer flooding objectives and delivers our storm discharge reduction plan for high priority sites by 2035 and all sites by 2045 whilst also creating the most benefit to communities and the environment
Resilient - constrained - meets our sewer flooding planning objectives and delivers our storm discharge reduction plan for high priority sites by 2035 and all sites by 2045. Delivers a feasible level of surface water management within the first 10 years of the plan
Accelerated / deliver sooner - accelerates investment to deliver our performance outcome targets sooner, including our storm discharge reduction at all sites by 2035, reflecting views expressed by stakeholders in the public consultation

To avoid customer bill volatility, we also explored alternative investment profiles that consider how quickly options are implemented. We also considered a better information plan that considers factors such as improvements in overflow and river monitoring data, and refinement in our hydraulic modelling to predict flood risk.

Scoring our options against our planning objectives

Scores have been generated for every option for each of our planning objectives and weighted based on our customer priorities. For example, DWMP with additional criteria to capture broader environmental impact.

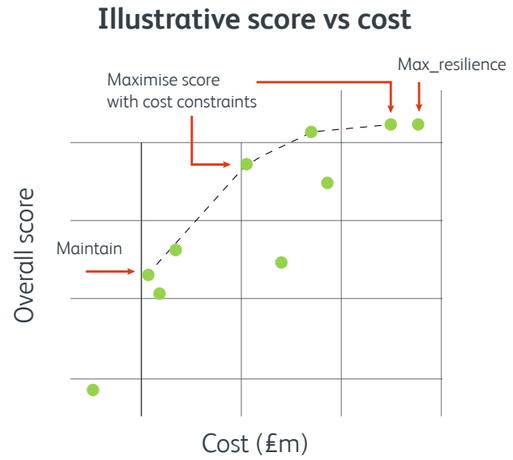
Natural capital (NC) impact
We used data from Natural England on the existing NC in the catchment and assessed whether the option would improve or reduce this baseline based on additional green space generated. Surface water management schemes scored highly whilst new sewers and tanks scored lower.

Wellbeing impact
We used data on environmental factors in the catchment that influence population and human health, including improved access to recreation and the environment, and assessed whether the option would improve or reduce this baseline.

Reducing misconnections
We assessed the area to be disconnected from our foul and connected into our surface water systems as part of our options.

Assessing different scenarios

We used a decision support tool to optimise our plan based on the 'value criteria'. We tested multiple alternative options to allow us to assess different scenarios and compare their outcomes.



Determining our preferred plan

Our preferred plan has been developed by considering a range of factors including:

- affordability
- deliverability
- performance outcomes
- strategic environmental appraisal
- stakeholder feedback

This has allowed us to develop an adaptive plan that recognises areas of risk and uncertainty, where improved understanding will be used to prioritise interventions at key decision points over those that can be deferred.
Our preferred plan balances our ambitions, our stakeholder and customer desires, our planning objectives and affordability.

Our preferred plan for Hertfordshire

We believe we will need to invest £1.1bn in Hertfordshire to achieve our long-term ambitious targets by 2050 to mitigate growth and climate change.

	£bn
Best cost estimate	1.1
Embodied carbon 156,803 tonnes	

Over the next 25 years this budget will be prioritised to invest in both surface water management and network improvements.

- £704m on managing the impact of surface water on the sewerage system including construction of new sewers, sewer upsizing and attenuation storage to provide additional capacity
- £201m on improvements to surface water management, with a particular focus on removing surface water from impacting on the networks
- £43m upgrading 20 STWs
- £160m on sewer lining
- £11m on individual property level protection

Storm overflow performance

Reduce the number of average annual storm discharges by 1,098. By 2050, none of the 39 storm discharge locations in this catchment will discharge more than ten times per annum on average

Property flooding

Protect 677 properties from internal sewer flooding up to a 1 in 30-year storm event

Protect 1,213 properties from external sewer flooding up to a 1 in 30-year storm event

Protect 2,521 properties from sewer flooding up to a 1 in 50-year storm event

If we don't invest, over 0.5 % of properties would be at risk in a storm up to 1 in 50-year in 2050. As a result of implementing our plan, this would reduce to less than zero

Treatment capacity enhancements and/or protection from high river levels at 20 sites

Upgrade 20 STWs by 2050

Asset improvements

Reline 125km of sewers

Reduce misconnections / Reduce surface water runoff

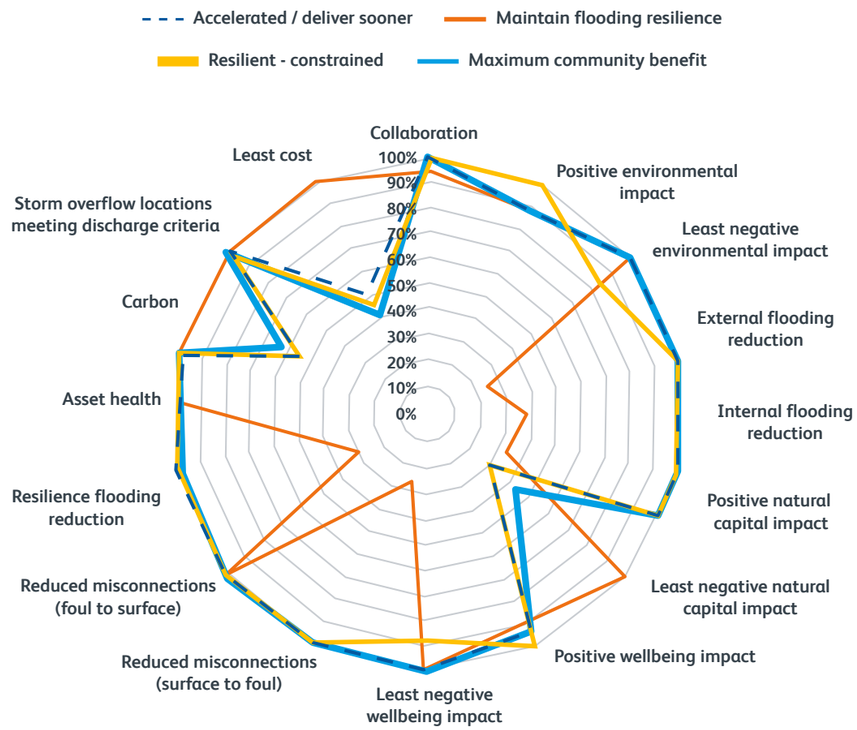
116 ha (equivalent to 7,800 properties) to be disconnected from our sewers and reconnected into a surface water sewer with attenuation or to a soakway

Carbon

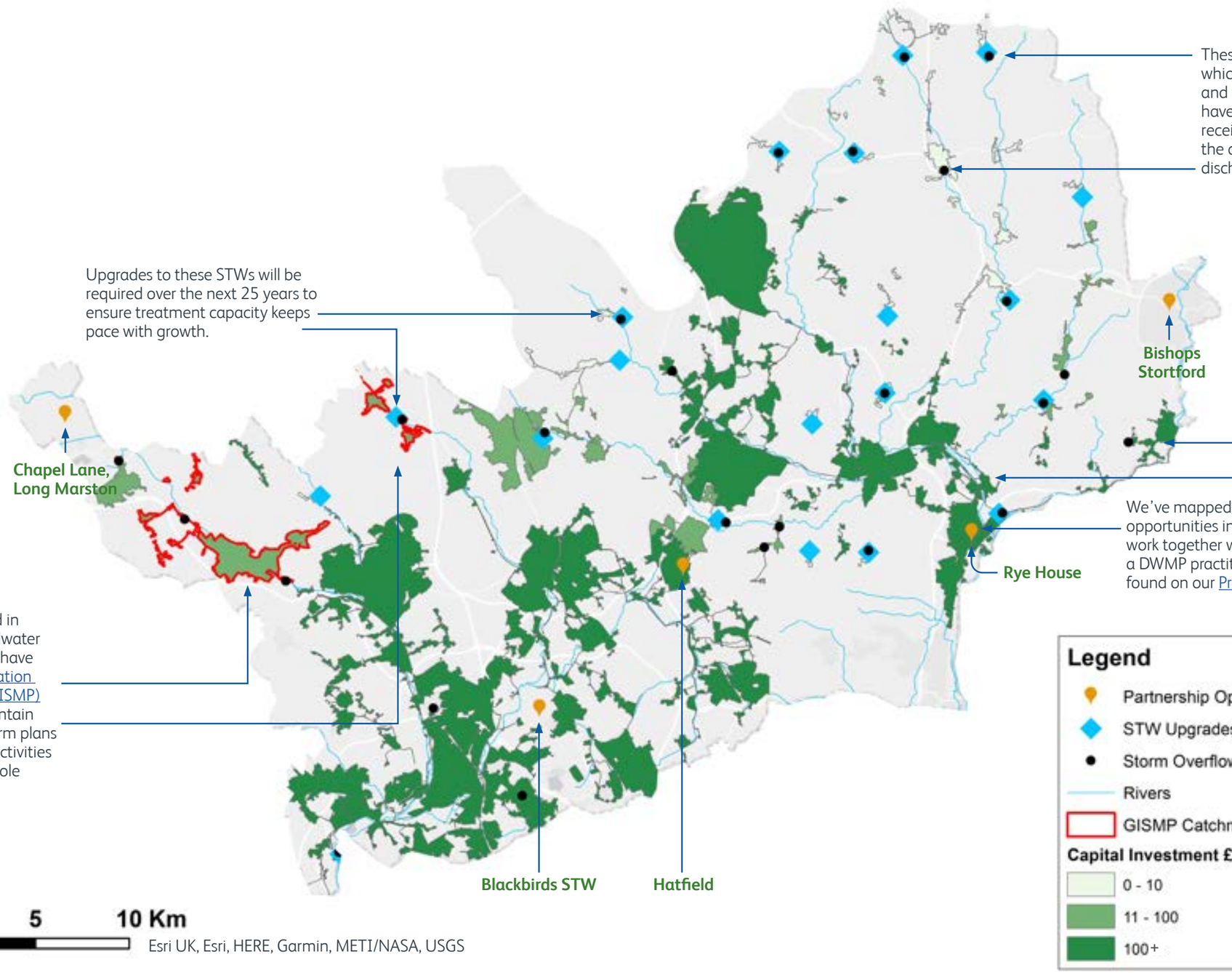
156,803 tonnes of carbon embodied in delivering the plan, with 148 tonnes of carbon sequestered in delivering the plan

Our preferred plan (resilient - constrained) has been optimised to offer the best value solution to reduce sewer flooding, protect the environment, and enhance natural capital as shown in the relative performance of our preferred plan figure.

Relative performance of our preferred plan



Our preferred 25 year plan for Hertfordshire



Next steps

Final version of the plan

We've progressed and enhanced our DWMP since we published it for public consultation in June 2022. We've updated our draft plan based on our ongoing DWMP work and our responses to regulatory updates and the majority of the feedback received during the 12-week consultation period.

Our preferred plan balances our ambitions, our stakeholder and customer desires, our planning objectives and affordability.

Further stakeholder input

This is our first DWMP and it will be the launch pad for future DWMP cycles that will occur every five years where growth, risks and system performance will be re-assessed and reviewed and the DWMP process repeated. We hope that we will receive a similar level of engagement and co-creation from our stakeholders in the next iteration as it has been a valuable contribution to this first iteration.

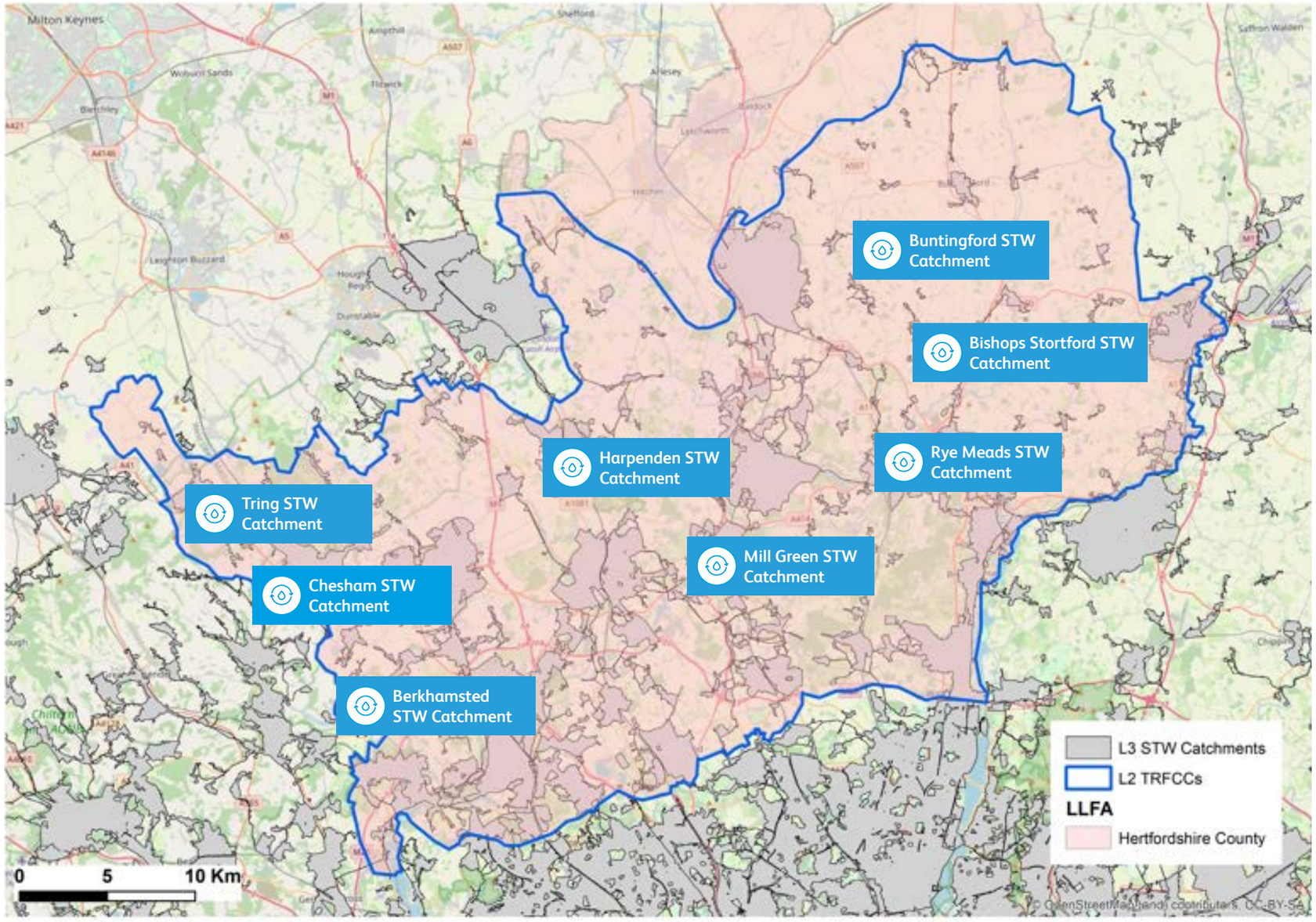
Funding and delivery

This DWMP is a 25-year rolling strategic plan. The first 5-years of the plan will be assessed through the price review process to confirm the funding to deliver the initial phase between 2025 and 2030.

Future iterations on the plan will address elements that can't be progressed due to funding restrictions, as well as changes in customer priority or technical issues.

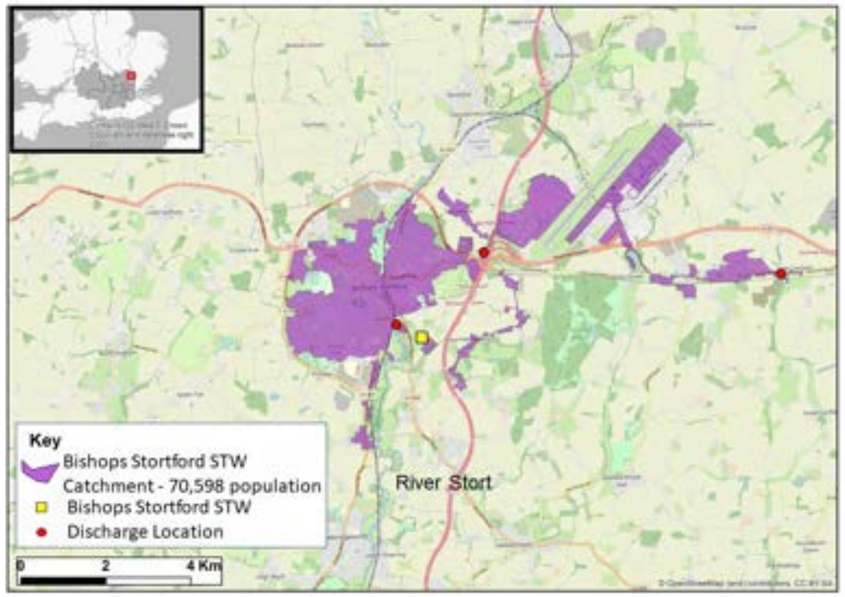
Our shared plan at catchment level

Use this interactive map by clicking on the blue boxes to find out more about our plans for a sample of large and small catchments.



Bishops Stortford STW Catchment

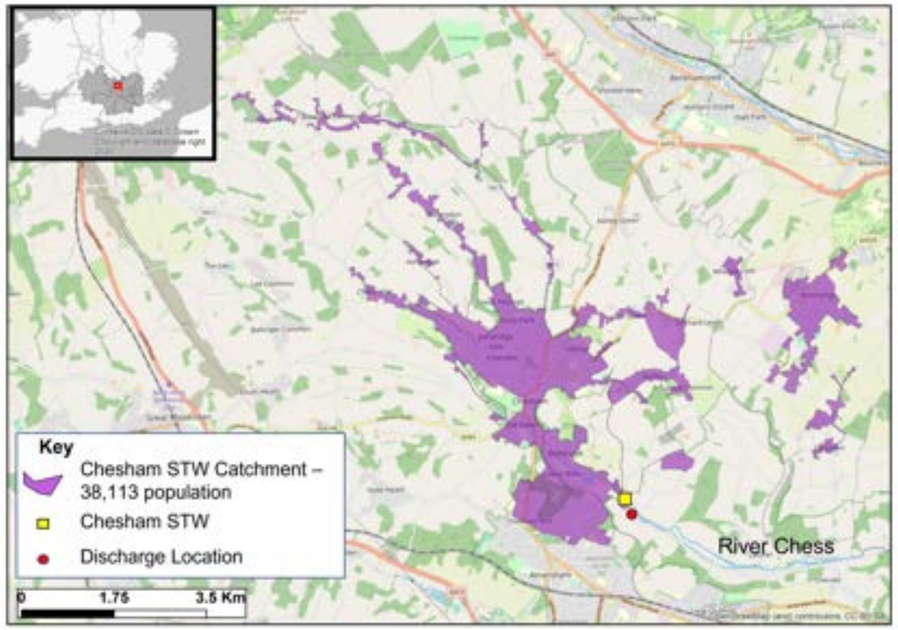
What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (29) at risk up to a 1 in 30-year storm in 2025 to 0.2 % of properties (37) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.1 % of properties (26) at risk up to a 1 in 30-year storm in 2025 to 0.2 % of properties (38) at risk by 2050 • Increased hydraulic sewer flooding - from 0.4 % to 0.6 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.4 % of properties (80) at risk up to a 1 in 50-year storm in 2025 to 0.6 % of properties (112) at risk by 2050 • The three overflows in this area discharged 14 times in 2021
Which of our solutions are best suited?	• Surface water management • Network improvements • Invest in our sewage treatment works to achieve 100 % compliance



Timescale	2025 – Short term	2030 – Medium Term	2035 – Long Term	2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Achieve 100 % STW permit compliance			
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions • Provide sewer network improvements to meet growth and climate change drivers	We will: • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Continue to provide sewer network improvements to meet growth and climate change drivers • Invest in our sewage treatment works to ensure compliance	We will: • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Continue to provide sewer network improvements to meet growth and climate change drivers • Continue to invest in our sewage treatment works to ensure compliance	

Chesham STW Catchment

What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.0 % to 0.0 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.0 % of properties (2) at risk up to a 1 in 30-year storm in 2025 to 0.0 % of properties (4) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.1 % to 0.1 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.1 % of properties (10) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (20) at risk by 2050 • Increased hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (17) at risk up to a 1 in 50-year storm in 2025 to 0.2 % of properties (29) at risk by 2050 • The only overflow in this area, at the STW, discharged 116 times in 2021
Which of our solutions are best suited?	• Sewer lining to target infiltration hotspots • Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements • Invest in our sewage treatment works to achieve 100 % compliance

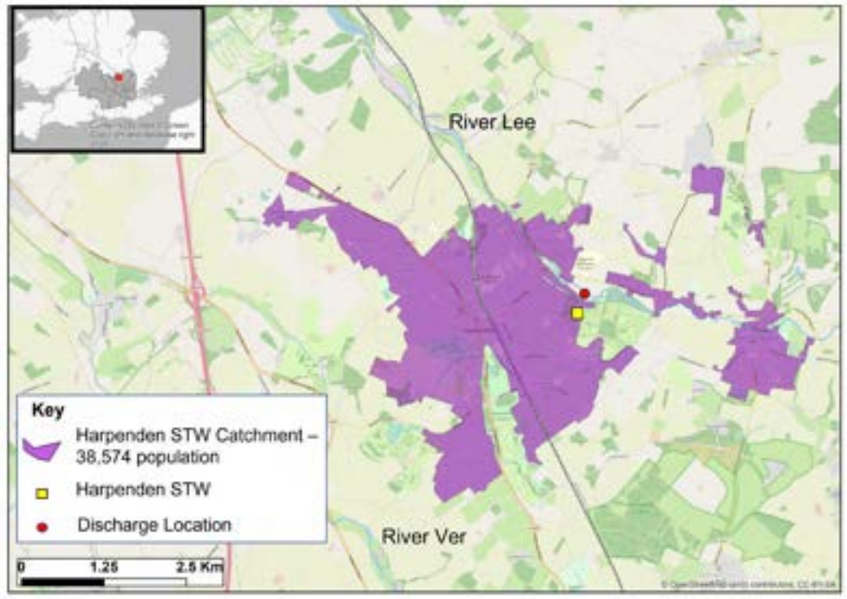


Timescale	2025 ← Short term → 2030	← Medium Term → 2035	← Long Term → 2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Achieve 100 % STW permit compliance		
How will we achieve the targets?	**We will:** • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions	**We will:** • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Invest in our sewage treatment works to ensure compliance	**We will:** • Improve the resilience of our sewers at greatest risk of groundwater inflows by undertaking sewer lining works • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures • Provide sewer network improvements

Chesham STW catchment spans two L2 strategic planning boundaries and the costs and benefits of the proposed solutions are allocated solely to the Hertfordshire catchment strategic plan.

Harpenden STW Catchment

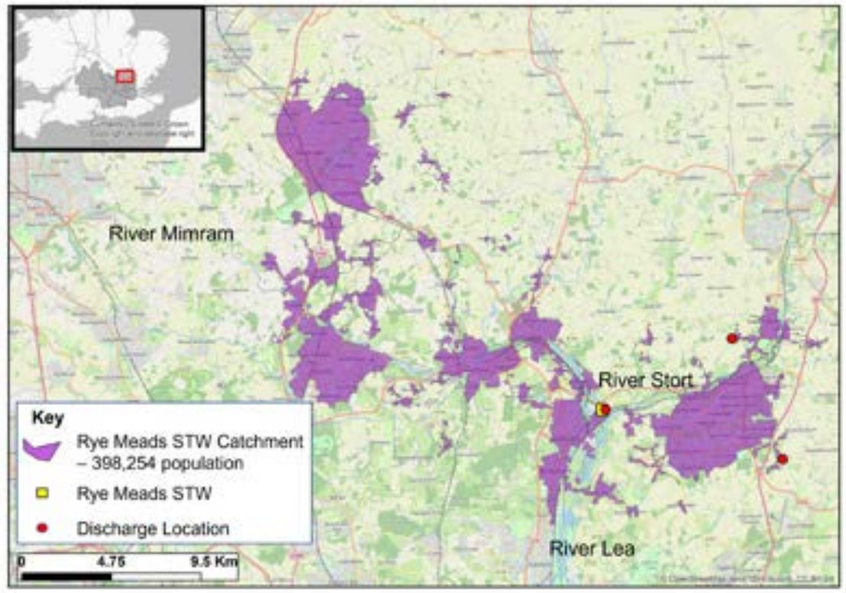
What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (16) at risk up to a 1 in 30-year storm in 2025 to 0.2 % of properties (29) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.2 % to 0.4 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.2 % of properties (32) at risk up to a 1 in 30-year storm in 2025 to 0.4 % of properties (57) at risk by 2050 • Increased hydraulic sewer flooding - from 0.4 % to 0.7 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.4 % of properties (63) at risk up to a 1 in 50-year storm in 2025 to 0.7 % of properties (110) at risk by 2050 • The only overflow in this area, at the STW, discharged 13 times in 2021
Which of our solutions are best suited?	• Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements • Invest in our sewage treatment works to achieve 100 % compliance



Timescale	2025 ← Short term → 2030	2030 ← Medium Term → 2035	2035 ← Long Term → 2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Achieve 100 % STW permit compliance		
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions	We will: • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Provide sewer network improvements to meet growth and climate change drivers • Invest in our sewage treatment works to ensure compliance	We will: • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures to prevent individual buildings from hydraulic sewer flooding • Continue to provide sewer network improvements to meet growth and climate change drivers

Rye Meads STW Catchment

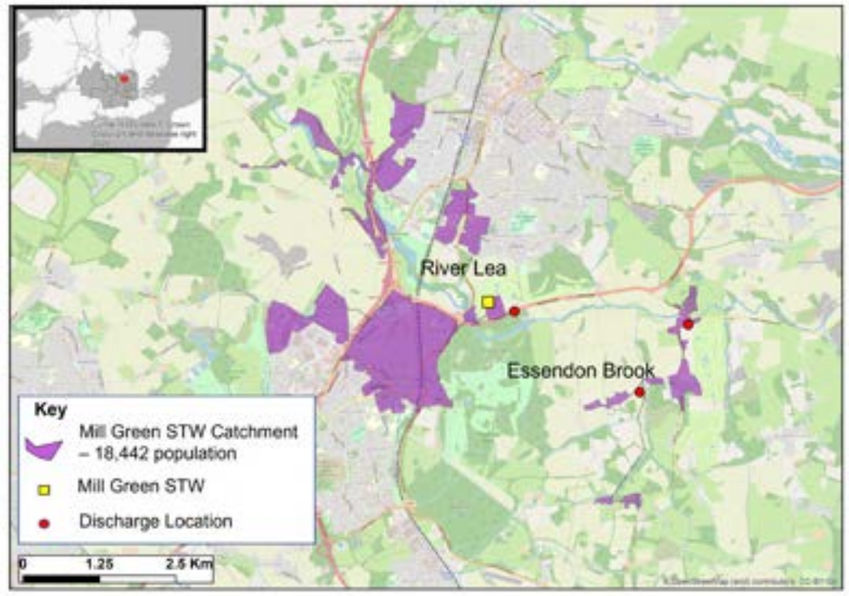
What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.1 % to 0.1 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (126) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (170) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.1 % of properties (193) at risk up to a 1 in 30-year storm in 2025 to 0.2 % of properties (278) at risk by 2050 • Increased hydraulic sewer flooding - from 0.3 % to 0.4 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.3 % of properties (461) at risk up to a 1 in 50-year storm in 2025 to 0.4 % of properties (606) at risk by 2050 • The four overflows in this area discharged 166 times in 2021
Which of our solutions are best suited?	• Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements • Invest in our sewage treatment works to achieve 100 % compliance



Timescale	2025 – Short term	2030 – Medium Term	2035 – Long Term (2050)
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Achieve 100 % STW permit compliance		
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions • Provide sewer network improvements to meet growth and climate change drivers	We will: • Further develop our catchment-level planning to reduce the risk of sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Continue to provide sewer network improvements to meet growth and climate change drivers • Invest in our sewage treatment works to ensure compliance	We will: • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures to prevent individual buildings from hydraulic sewer flooding • Continue to provide sewer network improvements to meet growth and climate change drivers

Mill Green STW Catchment

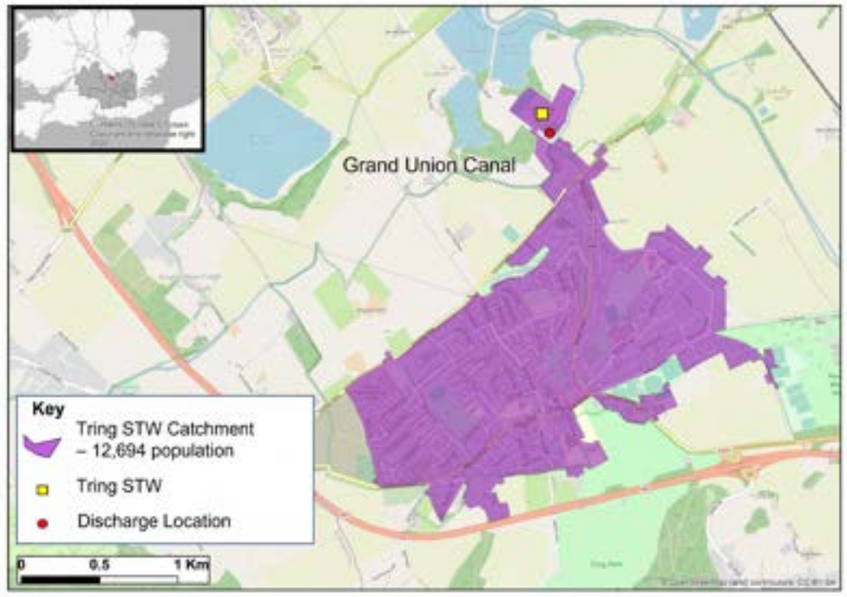
What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.0 % to 0.0 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.0 % of properties (3) at risk up to a 1 in 30-year storm in 2025 to 0.0 % of properties (4) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.0 % to 0.1 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.0 % of properties (4) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (12) at risk by 2050 • Increased hydraulic sewer flooding - from 0.1 % to 0.2 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (7) at risk up to a 1 in 50-year storm in 2025 to 0.2 % of properties (18) at risk by 2050 • The three overflows in this area discharged 8 times in 2021
Which of our solutions are best suited?	• Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements • Invest in our sewage treatment works to achieve 100 % compliance



2025	2030	2035	2050
Timescale	← Short term →	← Medium Term →	← Long Term →
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Achieve 100 % STW permit compliance		
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions	We will: • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Provide sewer network improvements to meet growth and climate change drivers • Invest in our sewage treatment works to ensure compliance	We will: • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures to prevent individual buildings from hydraulic sewer flooding • Continue to provide sewer network improvements to meet growth and climate change drivers

Tring STW Catchment

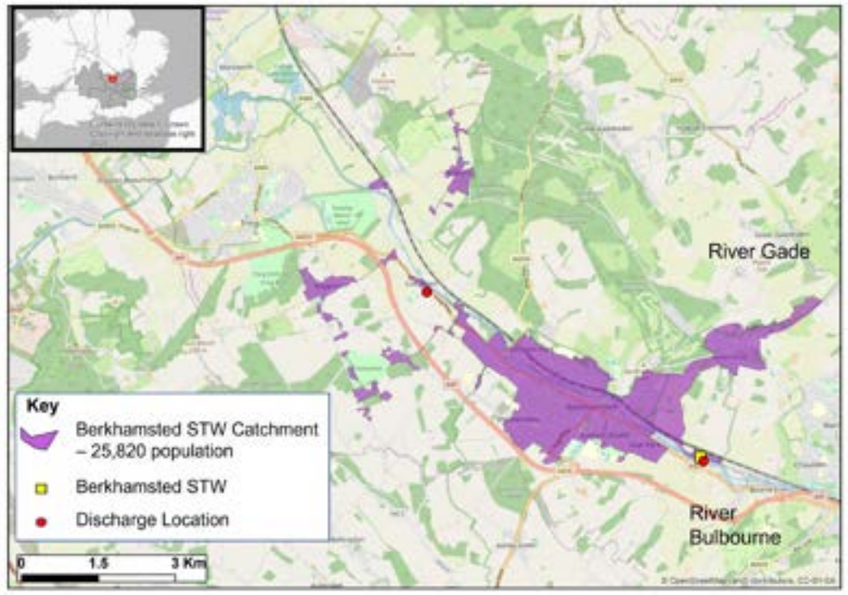
What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.2 % to 0.2 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.2 % of properties (10) at risk up to a 1 in 30-year storm in 2025 to 0.2 % of properties (14) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.4 % to 0.5 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.4 % of properties (20) at risk up to a 1 in 30-year storm in 2025 to 0.5 % of properties (26) at risk by 2050 • Increased hydraulic sewer flooding - from 0.6 % to 0.9 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.6 % of properties (36) at risk up to a 1 in 50-year storm in 2025 to 0.9 % of properties (49) at risk by 2050 • The only overflow in this area, at the STW, discharged 2 times in 2021
Which of our solutions are best suited?	• Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements



Timescale	2025 ← Short term → 2030	← Medium Term → 2035	← Long Term → 2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Maintain 100 % STW permit compliance		
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions • Invest in our sewage treatment works to ensure compliance	We will: • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems	We will: • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures to prevent individual buildings from hydraulic sewer flooding • Provide sewer network improvements to meet growth and climate change drivers

Berkhamsted STW Catchment

What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.1 % to 0.1 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (8) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (11) at risk by 2050 • Increased external hydraulic sewer flooding - from 0.1 % to 0.1 % of properties: Calculated as increased modelled risk of external hydraulic sewer flooding from 0.1 % of properties (13) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (17) at risk by 2050 • Increased hydraulic sewer flooding - from 0.2 % to 0.4 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.2 % of properties (28) at risk up to a 1 in 50-year storm in 2025 to 0.4 % of properties (41) at risk by 2050 • The two overflows in this area, at the STW, discharged 168 times in 2021
Which of our solutions are best suited?	• Sewer lining to target infiltration hotspots • Surface water management • Property level protection measures to prevent individual buildings from hydraulic sewer flooding • Network improvements

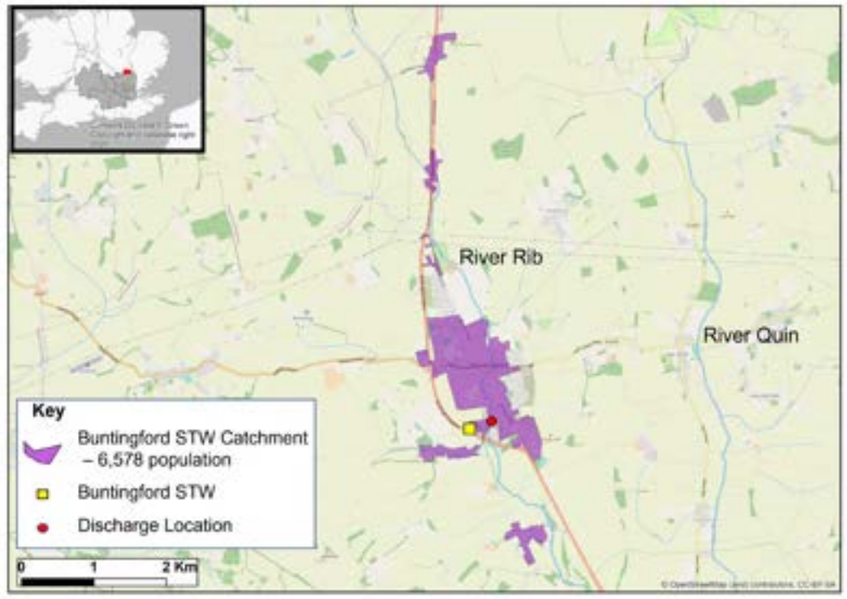


Timescale	2025 – Short term	2030 – Medium Term	2035 – Long Term	2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Maintain 100 % STW permit compliance			
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions • Provide sewer network improvements to meet growth and climate change drivers	We will: • Further develop our catchment-level planning to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems	We will: • Improve the resilience of our sewers at greatest risk of groundwater inflows by undertaking sewer lining works • Reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Implement property level protection measures • Continue to provide sewer network improvements	

Berkhamsted STW catchment spans two L2 strategic planning boundaries and the costs and benefits of the proposed solutions are allocated solely to the Central Bedfordshire, Buckinghamshire, Slough, Luton catchment strategic plan.

Buntingford STW

What are the challenges?	• Increased internal hydraulic sewer flooding - from 0.1 % to 0.1 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.1 % of properties (2) at risk up to a 1 in 30-year storm in 2025 to 0.1 % of properties (2) at risk by 2050 • Increased hydraulic sewer flooding - from 0.3 % to 0.5 % of properties: Calculated as increased modelled risk of internal hydraulic sewer flooding from 0.3 % of properties (10) at risk up to a 1 in 50-year storm in 2025 to 0.5 % of properties (17) at risk by 2050 • The only overflow in this area, at the STW, discharged 17 times in 2021
Which of our solutions are best suited?	• Surface water management • Network improvements



Timescale	2025 – Short term	2030 – Medium Term	2035 – Long Term	2050
What targets are we seeking?	To: • Reduce the number of customers at risk of internal and external hydraulic sewer flooding up to a 1 in 50-year storm by 100 % • Reduce storm discharges (where overflows are present) to <10 in an average year by 2050 • Maintain 100 % STW permit compliance			
How will we achieve the targets?	We will: • Increase the confidence in our plans for long-term investment to reduce the risk of internal and external hydraulic sewer flooding and enable catchment-level planning of surface water management solutions • Provide sewer network improvements to meet growth and climate change drivers	We will: • Further develop our catchment-level planning and implement surface water management solutions to reduce the risk of hydraulic sewer flooding by removing rainfall runoff that is entering our foul sewer system and enhance our surface water sewerage systems • Continue to provide sewer network improvements to meet growth and climate change drivers	We will: • Continue to reduce the risk of hydraulic sewer flooding by removing surface water from our foul sewer systems through the implementation of surface water management solutions • Continue to provide sewer network improvements to meet growth and climate change drivers	

Progress +

L3 STW catchment summary table

	2025 modelled baseline (no.& % of properties)					2050 Performance without DWMP (no.& % of properties)					2050 Performance with DWMP (no.& % of properties)				Preferred solutions			
L3 STW Catchments	Internal flooding (2025)	External flooding (2025)	Resilience flooding (2025)	Number of monitored storm overflows (2021)	Recorded (EDM) storm overflow discharges (2021)	Internal flooding (2050)	External flooding (2050)	Resilience flooding (2050)	Number of modelled storm overflows (2050)	Modelled average annual storm discharges (2050)	Internal flooding (2050) DWMP	External flooding (2050) DWMP	Resilience flooding (2050) DWMP	Modelled average annual storm discharges (2050) DWMP	2025-2030	2030-2035	2035-2050	Investment Band (£)
BARKWAY STW	0 (0%)	1 (0.3%)	1 (0.3%)	1	40	0 (0%)	1 (0.3%)	1 (0.3%)	1	1	0	0	0	<=10	CP, SL, SWM	CP	NI, STW	Low
BERKHAMSTED STW	8 (0.1%)	13 (0.1%)	28 (0.2%)	2	168	11 (0.1%)	17 (0.1%)	41 (0.4%)	2	33	0	0	0	<=10	CP, NI	CP	IPP, NI, SL, SWM	Medium
BRAMFIELD STW	0 (0%)	0 (0%)	0 (0%)	N/A	N/A	0 (0%)	0 (0%)	1 (0.9%)	N/A	N/A	0	0	0	N/A	CP	CP, NI, SWM	NI, STW, SWM	Low
BRAUGHING STW	1 (0.1%)	2 (0.3%)	2 (0.3%)	N/A	N/A	1 (0.1%)	3 (0.4%)	3 (0.4%)	N/A	N/A	0	0	0	N/A	CP	CP	IPP, NI, SWM	Low
BRICKENDON STW	N/A	N/A	N/A	1	67	N/A	N/A	N/A	1	8	N/A	N/A	N/A	<=10	CP, SL, SWM	CP	STW	Low
BUNTINGFORD STW	2 (0.1%)	5 (0.2%)	10 (0.3%)	1	17	2 (0.1%)	5 (0.2%)	17 (0.5%)	1	44	0	0	0	<=10	CP, NI	CP, NI, SWM	NI, SWM	Low
CHALTON (AW) STW	N/A	N/A	N/A	No data	No data	N/A	N/A	N/A	1	25	N/A	N/A	N/A	<=10	CP	CP, NI	NI, SWM	Medium
CHAPMORE END STW	N/A	N/A	N/A	1	30	N/A	N/A	N/A	1	9	N/A	N/A	N/A	<=10	CP	CP, NI, STW		Low
COTTERED STW	0 (0%)	1 (0.5%)	1 (0.5%)	1	83	0 (0%)	1 (0.5%)	1 (0.5%)	1	58	0	0	0	<=10	CP, NI, SL, SWM	CP	NI, STW	Low
DANE END STW	1 (0.3%)	1 (0.3%)	1 (0.3%)	N/A	N/A	1 (0.3%)	1 (0.3%)	1 (0.3%)	N/A	N/A	0	0	0	N/A	CP	CP	STW	Low
FURNEUX PELHAM STW	0 (0%)	1 (0.7%)	1 (0.7%)	N/A	N/A	0 (0%)	1 (0.7%)	1 (0.7%)	N/A	N/A	0	0	0	N/A	CP	CP, STW	NI, SWM	Low
GREAT GADDESDEN STW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CP, STW	CP	STW	Low
HARPENDEN STW	16 (0.1%)	32 (0.2%)	63 (0.4%)	1	13	29 (0.2%)	57 (0.4%)	110 (0.7%)	2	18	0	0	0	<=10	CP	CP, NI, STW	IPP, NI, SWM	Medium

L3 STW Catchments	2025 modelled baseline (no.& % of properties)					2050 Performance without DWMP (no.& % of properties)					2050 Performance with DWMP (no.& % of properties)				Preferred solutions			
	Internal flooding (2025)	External flooding (2025)	Resilience flooding (2025)	Number of monitored storm overflows (2021)	Recorded (EDM) storm overflow discharges (2021)	Internal flooding (2050)	External flooding (2050)	Resilience flooding (2050)	Number of modelled storm overflows (2050)	Modelled average annual storm discharges (2050)	Internal flooding (2050) DWMP	External flooding (2050) DWMP	Resilience flooding (2050) DWMP	Modelled average annual storm discharges (2050) DWMP	2025-2030	2030-2035	2035-2050	Investment Band (£)
KIMPTON STW	1 (0.1%)	1 (0.1%)	2 (0.2%)	N/A	N/A	1 (0.1%)	2 (0.2%)	3 (0.3%)	N/A	N/A	0	0	0	N/A	CP	CP	NI, STW, SWM	Low
LITTLE BERKHAMSTED STW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CP	CP, STW		Low
MAPLE LODGE STW	211 (0.1%)	552 (0.2%)	1060 (0.4%)	3	65	393 (0.1%)	705 (0.3%)	1506 (0.6%)	8	220	0	0	0	<=10	CP, NI	CP, NI, STW	IPP, NI, SL, SWM	High
MARKYATE STW	3 (0.1%)	13 (0.5%)	19 (0.7%)	1	139	5 (0.2%)	22 (0.8%)	32 (1.2%)	1	19	0	0	0	<=10	CP, NI, SL, SWM	CP	IPP, NI, SL, STW	Medium
MILL GREEN STW	3 (0%)	4 (0%)	7 (0.1%)	3	8	4 (0%)	12 (0.1%)	18 (0.2%)	3	51	0	0	0	<=10	CP	CP, NI, STW	IPP, NI, SWM	Medium
RYE MEADS STW	126 (0.1%)	193 (0.1%)	461 (0.3%)	4	166	170 (0.1%)	278 (0.2%)	606 (0.4%)	10	579	0	0	0	<=10	CP, NI	CP, NI, STW	IPP, NI, SWM	High
STANDON STW	3 (0.2%)	3 (0.2%)	6 (0.3%)	1	2	3 (0.2%)	5 (0.3%)	7 (0.4%)	1	64	0	0	0	<=10	CP	CP	NI, STW, SWM	Low
THERFIELD STW	1 (0.2%)	8 (1.7%)	12 (2.5%)	1	26	1 (0.2%)	15 (3.1%)	25 (5.2%)	1	99	0	0	0	<=10	CP, NI, SL, SWM	CP	NI, STW	Low
TRING STW	10 (0.2%)	20 (0.4%)	36 (0.6%)	1	2	14 (0.2%)	26 (0.5%)	49 (0.9%)	1	36	0	0	0	<=10	CP, NI	CP	IPP, NI, SWM	Medium
WESTON STW	0 (0%)	1 (0.2%)	1 (0.2%)	1	69	0 (0%)	1 (0.2%)	1 (0.2%)	1	20	0	0	0	<=10	CP, NI, SL, SWM	CP	NI, STW	Low
WHITWELL STW	0 (0%)	1 (0.2%)	2 (0.4%)	1	83	0 (0%)	2 (0.4%)	2 (0.4%)	1	67	0	0	0	<=10	CP, NI, SL, SWM	CP, STW	NI	Low
WIDFORD STW	1 (0.1%)	4 (0.3%)	6 (0.4%)	2	42	1 (0.1%)	6 (0.4%)	8 (0.5%)	2	104	0	0	0	<=10	CP, NI	CP	NI, STW, SWM	Medium

CP = Catchment-level planning including mapping and modelling

SWM = Surface water management

NI = Network improvements

SL = Sewer lining

STW = Treatment process technologies and protection from high river levels

IPP = Individual property level protection

Navigation index

We've developed a comprehensive document suite to share our final DWMP. This includes five summary documents, that contain increasing levels of detail, as well as Catchment Strategic Plans. To help you to navigate around our document suite and to find key DWMP content, we provide a navigation index below.

Navigation index		Protecting the environment and providing a reliable, sustainable wastewater service							Best value and delivery					Working together		DWMP stages and data				
		Storm overflows	Sewer flooding	Level of ambition & pace of delivery	Growth & climate change	Resilience: flooding & power	Groundwater	Environmental assessments	Affordability & bill impact	Best Value	Base vs Enhancement	Solutions & deliverability	Programme alignment	Partnership working	Stakeholder & customer engagement	DWMP stages & process	Level 2 regional summaries	Level 3 regional summaries	Data tables	Risk & Assurance
Summary documents	Customer summary	■	■											■	■	■				
	Non-technical summary	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	Technical summary	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	The Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	Catchment Strategic Plans x13	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■		
Technical appendices x11	Appendix A - Strategic context											■				■				
	Appendix B - Risk-Based catchment screening															■				
	Appendix C - Baseline risk and Vulnerability assessment				■	■										■				
	Appendix D - Options development and appraisal	■										■				■				
	Appendix E - Programme appraisal	■		■		■			■	■	■	■	■			■				
	Appendix F - Stakeholder engagement														■	■				
	Appendix G - Adaptive pathway planning	■	■		■															
	Appendix H – Customer engagement Part A – Draft DWMP														■	■				
	Appendix I - Risk and uncertainty											■								■
	Appendix J - DWMP and WRMP alignment												■							
	Appendix M - Assurance																			■
New technical appendices x9	Appendix N - You Said, We Did (YSWD)	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	Appendix O - What base buys										■									
	Appendix P - Response to July 2021 Floods		■	■	■	■			■			■	■	■	■					
	Appendix Q - Storm overflows	■		■	■				■				■							
	Appendix R - Delivery of SuDS and nature-based solutions	■	■	■	■	■			■	■		■	■	■	■					
	Appendix S - Partnership opportunities and working			■								■		■	■					
	Appendix T - Groundwater quality						■													
	Appendix U - Resilience		■		■	■							■	■	■					
	Appendix V – Customer engagement Part B – Consultation Survey Report														■					
Environmental assessments	Appendix K - Strategic environmental assessment (SEA)							■												
	Appendix L - Habitats regulations assessment (HRA)							■												
Portals and data	Customer portal	■	■							■		■		■	■	■	■	■		
	Practitioner portal	■	■											■	■		■	■		
	Data tables			■							■								■	
	Data tables commentary																		■	

Find all the documents in our DWMP suite on our website.

Work with us

We want to continue to draw on your expertise and local knowledge and invite you to work further with us to meet the future needs of drainage and wastewater services in our region.

Please get in touch with us or provide feedback on this document by emailing our DWMP team at DWMP@thameswater.co.uk

For more information on our DWMP work or to share your views, please visit the DWMP portal on our website here.