



# DRAINAGE & WASTEWATER MANAGEMENT PLAN

Dŵr Cymru Welsh Water

## Drainage and Wastewater Management Plan 2024 Non-Technical Summary

November 2023



IN PARTNERSHIP WITH



## Contents

Preface .....	7
1 Introduction .....	10
1.1 What is a DWMP .....	10
1.2 Why is this document being published? .....	11
1.3 Why is the plan important? .....	12
1.4 Who is involved? .....	12
What are we hoping to address? .....	14
1.5 Strategic Directions .....	17
1.5.1 Welsh Government Water Strategy for Wales .....	17
1.5.2 OFWAT Priorities for the Welsh sector through PR24 .....	18
1.6 How we have met the strategic directions .....	19
1.7 Policy .....	20
1.8 How your comments have influenced the Plan .....	20
2 Our operating area .....	21
2.1 What does Welsh Water do? .....	21
2.2 How we divided our area for the DWMP .....	23
3 How we developed our plan .....	25
3.1 What are the key parts of the DWMP? .....	25
3.2 Approach to Planning .....	27
3.3 Principles of Capacity .....	27
3.4 Scenario Planning .....	29
3.5 How have we considered risks to customers and the environment? .....	32
4 Risk .....	34
4.1 Why do we need to develop a programme of work? .....	34
4.2 How have we assessed sewer capacity? .....	34
4.3 The Sewage Plan .....	36
4.4 The Drainage Plan .....	38
4.5 The Review of Consents Plan .....	39
4.5.1 River water quality – continuous and intermittent .....	39
4.5.2 Bathing waters and shellfish waters .....	39
4.5.3 Marine water quality and protected areas .....	39
4.5.4 Biodiversity, invasive non-native species and barriers to fish migration .....	39
4.5.5 Net Zero .....	39
4.6 The Flood Plan .....	39

5	Strategic Company Level Risk and Estimated Costs .....	40
5.1.1	The destinations .....	40
5.1.2	Objectives - target and cost information .....	41
5.2	Location Planning Priorities .....	43
5.3	Baseline Risk and Vulnerability Assessment.....	44
5.4	Risk Results using the Framework Methodology.....	45
5.5	The Options Development Approach.....	47
5.5.1	Journey Plans .....	47
5.5.2	Opportunities for working together.....	50
5.5.3	Cost of the destination plans .....	52
5.5.4	Cost of the National Environment Programme.....	52
5.5.5	Cost to maintain our service .....	53
5.5.6	Constraints.....	54
5.6	The Programme .....	55
6	The Localised Risk Plan .....	57
6.1	Localised BRAVA .....	57
6.2	Problem characterisation .....	58
6.3	What did we solve in the 44 catchments? .....	58
6.3.1	Costing the solutions .....	59
6.3.2	Links to environment assessment.....	60
6.3.3	Handing off to the business plan and reprofiling 2030 to 2050.....	60
6.3.4	Why did we resolve collapses and other cause flooding differently?.....	62
6.4	Breaking down investment into manageable stages .....	63
6.4.1	How to undertake an optimisation appraisal .....	63
6.5	What about the issue of storm overflows? .....	65
6.6	Local Plans .....	66
6.7	The Final DWMP Programme .....	68
6.8	Progressing the area summaries.....	69
7	What about the potential impact of our proposals on the environment? .....	70
8	Adaptive Pathway.....	71
8.1	What is an adaptive pathway? .....	71
8.2	Results of adaptive planning.....	71
8.2.1	Cost.....	72
8.2.2	Tipping Points and Decision Points .....	73
8.2.3	Development of the Adaptive Plan .....	74
8.2.4	Ambition for localised adaptive pathways.....	74

9	Engagement .....	76
9.1	How we will engage with stakeholders.....	77
9.2	How have we engaged with our customers? .....	78
9.3	How we will engage with our regulators and government .....	78
9.4	What will engagement look like going forwards .....	78
10	What Our Plan Has Established .....	80
11	What happens next.....	82
11.1	Our Approach to Cycle 2 of the Plan .....	83
11.2	The Annual Review of the Plan .....	83

## List of Figures

Figure 1 Summary of the key future challenges and the need for action .....	16
Figure 2 Map showing Welsh Water’s operating area. ....	21
Figure 3 Diagram showing how the Plan consists of four levels (Levels 1, 2, 3, and 4).....	23
Figure 4 Map showing Welsh Water wastewater operating area. ....	24
Figure 5 Diagram showing the stages of 5-year development of DWMP .....	25
Figure 6 Illustration of the capacity of a typical sewer.....	27
Figure 7 Concept showing the 4 areas of planning. ....	30
Figure 8 Chart showing a typical year of rainfall in Wales and defined areas of rainfall intensity and frequency.....	31
Figure 9 Diagram showing key planning themes and links with risk areas.....	33
Figure 10 Opportunity Map showing what type of risk and where we would like to work with a 3rd party .....	38
Figure 11 Most Likely investment versus the Long-Term Delivery Strategy graph.....	42
Figure 12 Matrix showing customer service and environmental protection priorities.....	43
Figure 13 BRAVA (Baseline Risk and Vulnerability Assessment) scores at Level 4 showing the distribution of risk between no or low risk '0' some risk '1' and significant risk '2' .....	44
Figure 14 Map showing areas at risk of flooding and pollution in 2050 if we do not start to invest...	45
Figure 15 The Journey Plan .....	48
Figure 16 how the journey plan could summarise the programmes at a Level4 catchment level. ....	50
Figure 17 Most likely versus the Long Term Delivery Strategy core plan.....	55
Figure 18 Localised BRAVA L2 Ynys Mon showing 2050 risks.....	57
Figure 19 showing an example of the bin tests carried out.....	59
Figure 20 showing the investment profile between 2025 and 2050 with a doubling of investment each decade. ....	61
Figure 21 Showing the investment for the 44 catchments with a doubling of investment every 5 years while achieving all solutions by 2050 .....	62
Figure 22 An example of a Nature Based solution that supplies benefits to multiple organisations. .	67
Figure 23 Programme for schemes and their cost over time, post PR24 influence.....	68
Figure 24 Plan investment graph example for consideration in DWMP29. ....	69
Figure 25 Illustration of adaptive planning from Ofwat’s PR24 requirements for long-term delivery strategies. ....	71
Figure 26 Variation in properties at risk of internal sewer flooding between adaptive pathways.....	72
Figure 27 Reference option cost variation for each of the three potential scenarios that includes both Storm overflows and customer flooding with a target of 40 spills .....	73
Figure 28 A graphical representation of a localised investment adaptive plan.....	75
Figure 29 reproduced from Figure 16.....	75
Figure 30 image showing joint working structure to support the engagement process. ....	77
Figure 31 New development Natural flood management.....	84

## List of Tables

Table 1 The seven Guiding Principles for Drainage and Wastewater Management Plans.....	11
Table 2 showing the five steps of a DWMP. ....	26
Table 3 DCWW Identifying the separate capacity assessments required. ....	35
Table 4 Showing the highest area at risk of being a deficit in terms of a DWF capacity assessment at a strategic level. ....	37
Table 5 Cost estimates to reach varying spill frequencies over two time periods 2030 and 2050. ....	41
Table 6 Showing the estimated cost to resolve customer flooding in the short term and by 2050 ....	41
Table 7 Showing the estimated cost to deliver the current NEP and what this could rise to by 2050. ....	41
Table 8 Key to the Journey Plan .....	48
Table 9 showing the investment expected to address the NEP and WINEP .....	53
Table 10 Problem characterisation from the DWMP Framework .....	58
Table 11 Investment Scenarios. ....	64

## Preface

We have completed our first DWMP. This DWMP is being published as a final version after a 10-week consultation. We thank you for your comments on what we have produced and your opinions on how to prepare future DWMP's. We appreciate your comments on our approach to customer and environmental priorities, and how those priorities are to be used in the production of future plans.

This plan is different to other plans we have prepared; it not only tries to answer how we remain compliant with our operating licence, but it also tries to prepare the company for future challenges to society.

One of these challenges is the legacy of combined sewers, which are reliant on storm overflows to prevent localised customer flooding. We need to transition to separate foul and surface water sewers to reduce the need for storm overflows where possible, whilst maintaining our performance. The cost of achieving this during the 21<sup>st</sup> century is challenging. The environmental benefit of achieving this separation over time is to reduce nutrients, such as phosphates and nitrates, entering rivers, seas and groundwater. This is a major driver to achieve high standards set out in the water framework directive.

We need to set out the complexity of the drainage issues across our operating area. Our combined sewers often accept inflows of surface water from roads, car parks, building roofs and even land drainage, which we do not own or control. We need to work closely with other stakeholders, and need their ongoing support, to gather the evidence and deliver the right long-term solutions.

Our DWMP shows that the costs of making this transition will be significant. The DWMP provides an evidence base to begin discussion with Welsh Government, and our regulators, on the pace of change that they expect to see which will also be acceptable to you, our customers. It goes beyond the current focus on storm overflows, influencing long-term integrated drainage priorities for Wales and the border areas of England where we operate. We need access to funding to enable us to alter assets that are not owned by, or the responsibility of, the water company to bring about the real change that our customers and stakeholders wish to see. We are recommending that a National Drainage Programme is put in place alongside the National Environment Programme so that there are clear links for all parties, and actions for stakeholders to carry out and contribute towards our country's future in a Team Wales style.

The National Environment Programme includes investment in outcomes that are needed to meet today's challenges; however, this level of investment will impact customer bills. In our approach, we have considered how to include a methodology to proactively drive environmental improvements and we ask NRW/EA to work with us on this to agree an approach that fits alongside the current NEP methodology in readiness for DWMP29.

We recognise that stakeholders are looking to us to re-address storm overflows and minimise their use. Our preferred approach considers how to make widespread improvements at an affordable rate for our customers. We have estimated that to remove storm overflows and customer flooding would cost upwards of £13bn if it were possible and practical to be achieved everywhere. Welsh Government has carried out a similar estimate and suggest the cost is even higher, near to £48bn. This quantum, when considered as a bill increase, is not tenable and unlikely to be acceptable to our customers. Ultimately, the pace of the improvements we can make will be heavily dictated by the scale of water and sewerage bills that our customers can afford to pay now and in the future.

The pace of improvements required is also linked to real changes on the ground and the availability of contractors and the associated skilled workforce. This is a short-term issue as it will take time for the supply chain to adapt. There will also be an impact while construction work is taking place; we are mindful that customers have asked us to be considerate when developing our approach, so they do not feel that we are continually causing disruption. We need to ensure that we can explain why we have made these decisions.

As part of developing our first DWMP, we have followed the national DWMP Framework but have also developed our own innovative approaches to planning, which allow choices to be made in terms of what needs to be achieved in the short term, and then creating a pathway for each local area to maintain progress to that destination.

This builds on principles developed by all companies for water and sewerage planning to gain a holistic catchment approach to finding risks, developing options to resolve those risks, and providing an indicative timeline of when that risk may materialise and when the solution will need to be resolved.

The Plan and the regional summaries lay out the types of risks that we are facing, the strategic option types that are needed in each location to address those risks, and a high-level cost to get to improved performance in our wastewater systems.

This Plan has been written to explain the approach we have taken, the pace of change that is realistic and how we can integrate our approach with other stakeholders to deliver the best solutions for our customers and the environment we all share. We have identified several different investment scenarios to get us to our long-term destination in systematic, affordable steps.

We thank you for providing your opinion on which approach to take for our next cycle. We will introduce the preferred choices in our approach while developing the next Plan. The Plan, and the regional summaries which support it, lay out the types of risks we are facing, the types of strategic options that are needed in each location to address those risks, and a high-level cost to get to a future improvement. The Better River Quality Taskforce has also informed us of the milestone we need to achieve in terms of combined sewer overflow (CSO) improvements, and we will continue to work with the taskforce until we achieve the goal.

Alongside the Plan, we have undertaken a Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) of the options developed so far. These documents are also available to view.



How to use these documents

This suite of documents which make up our DWMP are as follows:

**The Plan** – A technical appraisal of risk, utilising different methodologies to inform and establish local and national best practice. This includes a strategic option assessment to aid understanding of the scale of the task to manage future pressures, supported by a staged option appraisal methodology. The document also includes programme appraisal methodology to ensure consistency with other long-term planning in the water industry and examples that highlight how we propose to undertake this detailed assessment in the second DWMP cycle.

**The Technical Summary** – A technical account of the first cycle plan presenting methodologies carried out.

**The Non-Technical Summary** – A Stakeholder facing summary of the key points and messages from the main plan.

**The Area Summaries** – A series of summaries, setting out the proposed regional (L2) and local (L3) strategy, risks, options, and preferred options.

**Strategic Environmental Assessment and Post Adoption Statement** – A formal review of the potential environmental impact of the proposals being promoted by the DWMP, to ensure that the most sustainable options are being promoted.

**Habitats Regulations Assessment** – A formal review of the potential impact of the DWMP proposals on protected habitats.

**The suite of customer facing documents** – A set of stage-based publications to continually engage with customers and stakeholders as the Plan develops.

- The DWMP Customer leaflet - a quick-read overview for customers
- The Strategic Context – produced at the end of the Strategic Context phase of each cycle.
- How and where and we want to work with you – produced at the end of the Risk Assessment stage of each cycle.
- The Options process – produced at the end of the Options Development phase of each cycle.
- The Programme – produced at the end of the Programme Appraisal stage of each cycle.
- The Statement of Response to the public consultation of the draft DWMP.

The documents produced have been written to engage with different audiences, assuming differing levels of understanding. The same material has been used to inform each document and the same message, strategy and principles have been reiterated.

Customers are directed to the suite of customer-facing booklets as these set out the principles and strategies of wastewater and drainage planning in a simpler and easier to understand format.

The Non-Technical Plan is aimed at stakeholders and councils and provides more detail, but still references the same strategies and principles.

The Plan and the Technical summary are aimed at our regulators and contain detailed information regarding methodology and practice. These documents are set out this way to inform the change between non statutory and statutory status.

A glossary of common terms used within these documents can be found in Appendix A.

# 1 Introduction

## 1.1 What is a DWMP

The Drainage and Wastewater Management Plan (DWMP) is a long-term planning study that looks at drainage and sewerage needs over the next 25 years as a minimum. The Plan looks at future trends and embeds an approach of working together with others to investigate and identify options for the sustainable management of our wastewater services.

	
<p>This is a customer-driven plan that will set out how we intend to manage future challenges brought about by population growth, urban creep, and climate change.</p>	
	<p>It will set out how we intend to extend, improve, and maintain drainage and wastewater systems across Wales and the areas of England that we serve.</p>
	<p>It plans for the long-term, setting out targets that are appropriate to the risks we face, for a minimum period of 25 years that covers both England and Wales.</p>
	<p>It is a best practice approach built on processes already established such as Water Resources Management Plans and Sustainable Drainage Plans.</p>
	<p>It demonstrates greater transparency, robustness, and line of sight to investment decisions that affect our customers.</p>
	<p>Developing this plan will help us work towards our Welsh Water 2050 vision to “earn the trust of our customers every day” and to achieve our mission of becoming “a truly world-class, resilient, and sustainable service for the benefit of future generations”.</p>

The DWMP is a joint exercise between the Welsh and UK Governments, water companies, regulators, and other organisations. It is focused on our customers and our environment, considering how we will respond to future challenges. The Plan sets out how we will extend, improve, and maintain our drainage and wastewater systems to meet government and customer requirements.

The Plan assesses the level of risk we face from climate change, urban development, and a changing population. It looks 25 years into the future, as a minimum, with the current Plan covering how we will deal with the challenges that we expect to arise between 2025 to 2050. It also reviews how we can respond to some of the most significant challenges over an even longer period.

We intend to update our plans every 5-years, with progress reviews taking place every year. Whilst we will be presenting our progress on this Plan, we will also be feeding into the

development of the next plan at the same time. The cyclical nature of the DWMP also allows us to monitor change and make decisions to keep progress on track.

This is the first time that a DWMP has been created. It is one of the most complex plans that Welsh Water and the industry has ever produced. As a result, the Plan contains a lot of detailed and technical information. We have created this document to provide a shorter overview of the main Plan, and recommendations from the consultation.

## 1.2 Why is this document being published?

We are producing the DWMP because we want to have a wastewater and drainage<sup>1</sup> system that is fit for purpose in the 21<sup>st</sup> century and beyond. We need to ensure that the system protects the environment and reflects the needs of customers today, whilst also planning effectively to meet the needs of future generations.

Government has set out the ‘Guiding Principles for drainage and wastewater management plans. It includes seven principles, which are summarised in *Table 1* below:

1. Be comprehensive, evidence based and transparent in assessing current capacity and actions needed. Plans should align as far as possible with other strategic and policy planning tools.
2. Strive to deliver resilient systems.
3. Consider the impact of drainage systems and options on the environment.
4. Be collaborative. Recognise the importance of sectors working together.
5. Show leadership in an organisation’s capacity to develop and deliver a plan, and mindful of links with other strategic planning frameworks.
6. Improve customer outcomes and awareness. Consider value for money and societal awareness.
7. For Welsh companies, develop the DWMP in line with the Wellbeing of Future Generations Act 2015. DWMP’s should set out how they will help their companies and stakeholders deliver obligations set out in the Environment (Wales) Act 2016.

*Table 1 The seven Guiding Principles for Drainage and Wastewater Management Plans*

We need to ensure that we can more effectively manage urban drainage systems and water quality within each catchment. This means we must work together with the organisations and landowners who own the drains, ditches and culverts that pass rainwater in urban areas into our sewers or receive the flows from our storm overflows and treatment works.

We recognise climate change impacts are one of many ongoing pressures affecting society and we must make important decisions about the future of drainage and our water environment. We need to be ready with our plan on how to implement change which addresses these new societal challenges.

This document aims to tell you more about what we are doing and provide you with the tools to become involved in the decisions we make. More detail is available in the main Plan and regional summaries.

The DWMP will help us to do the right thing for our customers and the environment for the long term. It will help us take a joined-up and more effective approach to addressing some of the biggest challenges we face including climate change, a bigger population and growing urban areas.

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<sup>1</sup> Including those other networks that we don’t control but which are just as important for protecting the communities we serve.

### **1.3 Why is the plan important?**

You may be asking yourself how this affects you. The answer is that we all need effective sewerage and drainage to protect our health, homes, communities, and businesses – it's a vital part of everyday life.

The decisions we make today will have an impact for many years to come. We want to know what you think we should do.

Future changes will increase the risk of flooding to customers' homes, businesses and to the environment. These changes include:

- Climate change.
- A changing population.
- Increased demand for clean water.
- Larger urban areas with fewer green spaces.
- Higher service expectations.

This will also impact on the environment because our storm overflows and wastewater treatment works, which drain into our rivers and coastal waters, will have to cope with more water of varying quality.

We want to reduce the risk of flooding and our impact on the environment from water quality. The Plan sets out the steps we can take to achieve this. This plan also demonstrates how to undertake planning based on the first directions, principles and objectives set out by stakeholders; government, regulators, stakeholders, and customers. This includes ensuring that companies are making plans for the future and demonstrating how decisions are being made while ensuring plans will not adversely impact future generations.

### **1.4 Who is involved?**

There are other stakeholders involved in putting together the DWMP. The Welsh Government and regulators also have an important role:

- The government directs water companies to produce the Plan.
- Regulators check on water companies to make sure we are in line with the agreed approach with the Government, and that our Plan remains sustainable and affordable.

At Welsh Water, it's our job to supply drinking water and to take away water that's been returned to the sewer, clean it, and then return it to the rivers and seas. Along with others, we also provide a service to take away rainwater and return it to our rivers and seas to avoid homes being flooded.

### **The water industry is a regulated business.**

We are a licensed water and sewerage provider operating in Wales and some neighbouring areas of England. Our activities are influenced by the policies and legislation of the Welsh and UK Governments.

### **Regulators**

Ofwat (The Water Services Regulation Authority) regulates how much we can charge customers for the services we deliver. We are also regulated by our environmental regulators, Natural Resources Wales (NRW) in Wales, and the Environment Agency (EA) in England.

Other official bodies also look after the interests of customers. These include the Consumer Council for Water, which provides an independent voice for water and wastewater customers in Wales and England. Other bodies, such as Natural England, provide science-based and practical advice on conservation matters in England. In Wales, this function has been incorporated into NRW.

Although the DWMP is not currently a statutory obligation for water and sewerage companies in Wales and England, it is included within the Environment Act (2021), and we expect it will be made statutory for Cycle 2.

Despite the non-statutory status of this plan, the Welsh Government is the devolved Government for Wales and has powers to manage the environment. The Welsh Minister will direct DCWW (Dŵr Cymru Welsh Water) to publish plans when the process is statutory, however during this phase the water company Board will carry out this final action in 2023.

In addition to water companies, the government, and regulators, other organisations and people are involved in the management of drainage systems:

- **Local councils** - control smaller rivers and manage most road drainage.
- **Natural Resources Wales and the Environment Agency** - responsible for main rivers and coastal flood defences.
- **Landowners** - responsible for looking after their own land drainage systems and streams crossing or adjoining their land.
- **Customers** - responsible for private drainage, usually on their property.

### **We're a bit different from other water companies.**

We are a 'Not for Profit' organisation. We don't have shareholders and every penny our customers provide is put right back into keeping bills down and looking after your water supply and the environment we all share – now, and in the future<sup>2</sup>.

We are responsible for managing public sewers and sewage treatment works. We are also responsible for our section of the drainage infrastructure that collects rainwater from buildings and yards in our towns and cities. Because the ownership of these drainage systems is fragmented, it's important that we work together with the different organisations and people stakeholders to deliver the DWMP.

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<sup>2</sup> If you would like more information, it can be found at <https://corporate.dwrcymru.com/en/about-us/company-structure/glas-cymru>

## 1.5 What are we hoping to address?

The nature of the environment we operate in means that future uncertainties are likely to have a big impact on what we do, and the service we provide to customers. We must consider both the challenges and opportunities these trends present so that we can continue to meet customer needs now, and in the future. The key future trends, which we have considered as part of the development of our broader Welsh Water 2050<sup>3</sup> plan, are shown below in

 <p><b>Changing climate patterns</b></p> <p>The increasing frequency and severity of extreme weather events such as drought and flooding</p>	 <p><b>Emerging and persistent contaminants</b></p> <p>Continuing to find solutions to legacy contaminants such as microplastics and pharmaceutical compounds. This includes issues with recycling of biosolids/sludge recycling, micropollutants, nitrate vulnerable zone designations and potential associated changes in regulations.</p>
 <p><b>Decarbonisation and sustainable business practices</b></p> <p>The resource cost and trade-offs linked to implementing the necessary move towards net zero carbon to achieve 2050 target, as well as the need for energy efficiency in operations, circular economy practices, and sustainable supply chains.</p>	 <p><b>Increasing customer and stakeholder expectations.</b></p> <p>Keeping up with accelerating customer expectations around service levels and technology, while ensuring we retain customer and stakeholder trust against a background of increasing environmental concerns such as carbon net zero, water quality impacted by phosphate levels and CSO discharges, recycling of bioresources, and the other concerns of stakeholders and pressure groups</p>
 <p><b>Price caps, affordability and potential trade-offs</b></p> <p>The constraints of balancing affordability concerns for customers, price caps imposed by regulators limiting necessary investment, and the need to invest in initiatives such as improving infrastructure and environmental protection.</p>	 <p><b>Legacy Infrastructure</b></p> <p>Considering the set of risks posed by physical, biological and chemical degradation of infrastructure and/or lack of capacity in design of legacy infrastructure. Also considering the risks posed by ageing digital infrastructure.</p>
 <p><b>Regulatory changes</b></p> <p>The UK Environment Act (2021), and several other regulatory changes which will become law in a post-Brexit Wales by 2025, are likely to bring tighter environmental standards, driving significantly increased monitoring and investment costs.</p>	 <p><b>Environmental responsibility.</b></p> <p>Managing the impact of our activities on freshwater biodiversity and the important ecosystem services biodiversity brings. Considering the overall environmental responsibility of DCWW in their operations</p>

<sup>3</sup> <https://corporate.dwrwymru.com/en/about-us/our-plans>




 <p><b>Drainage and combined sewer overflows (CSOs)</b></p> <p>Managing issues of river water quality and pollution, linked to lack of treatment capacity or functionality in drainage systems, exasperated by climate change, whilst facing increasing public pressure and expectations to resolve such issues.</p>	 <p><b>Demographic and behaviour changes</b></p> <p>The growth of homeworking and its implications and preparing for a growing and ageing population.</p>
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Figure 1. The DWMP considers how we will respond to some, but not all, of these trends.

 <p><b>Changing climate patterns</b></p> <p>The increasing frequency and severity of extreme weather events such as drought and flooding</p>	 <p><b>Emerging and persistent contaminants</b></p> <p>Continuing to find solutions to legacy contaminants such as microplastics and pharmaceutical compounds. This includes issues with recycling of biosolids/sludge recycling, micropollutants, nitrate vulnerable zone designations and potential associated changes in regulations.</p>
 <p><b>Decarbonisation and sustainable business practices</b></p> <p>The resource cost and trade-offs linked to implementing the necessary move towards net zero carbon to achieve 2050 target, as well as the need for energy efficiency in operations, circular economy practices, and sustainable supply chains.</p>	 <p><b>Increasing customer and stakeholder expectations.</b></p> <p>Keeping up with accelerating customer expectations around service levels and technology, while ensuring we retain customer and stakeholder trust against a background of increasing environmental concerns such as carbon net zero, water quality impacted by phosphate levels and CSO discharges, recycling of bioresources, and the other concerns of stakeholders and pressure groups</p>
 <p><b>Price caps, affordability and potential trade-offs</b></p> <p>The constraints of balancing affordability concerns for customers, price caps imposed by regulators limiting necessary investment, and the need to invest in initiatives such as improving infrastructure and environmental protection.</p>	 <p><b>Legacy Infrastructure</b></p> <p>Considering the set of risks posed by physical, biological and chemical degradation of infrastructure and/or lack of capacity in design of legacy infrastructure. Also considering the risks posed by ageing digital infrastructure.</p>
 <p><b>Regulatory changes</b></p>	 <p><b>Environmental responsibility.</b></p>



<p>The UK Environment Act (2021), and several other regulatory changes which will become law in a post-Brexit Wales by 2025, are likely to bring tighter environmental standards, driving significantly increased monitoring and investment costs.</p>	<p>Managing the impact of our activities on freshwater biodiversity and the important ecosystem services biodiversity brings. Considering the overall environmental responsibility of DCWW in their operations</p>
<div data-bbox="212 349 336 472" data-label="Image"> </div> <p data-bbox="357 389 750 450"><b>Drainage and combined sewer overflows (CSOs)</b></p> <p data-bbox="204 501 794 680">Managing issues of river water quality and pollution, linked to lack of treatment capacity or functionality in drainage systems, exasperated by climate change, whilst facing increasing public pressure and expectations to resolve such issues.</p>	<div data-bbox="831 349 959 472" data-label="Image"> </div> <p data-bbox="983 389 1350 450"><b>Demographic and behaviour changes</b></p> <p data-bbox="820 501 1390 591">The growth of homeworking and its implications and preparing for a growing and ageing population.</p>

Figure 1 Summary of the key future challenges and the need for action

Through longer-term planning, and a greater emphasis on working together with others, the DWMP will help us to respond to these future trends and challenges.

Climate change has already brought substantial changes, including heavy and unpredictable rainfall which happens more often. This leads to more rainwater being collected and transferred to the sewer more quickly, putting pressure on the sewer network, which has a fixed capacity. To protect homes and businesses from sewer flooding, we are often reliant on storm overflows.

**Storm Overflows**

Storm overflows, or combined storm overflows (CSOs), are designed to operate when it's raining, or shortly after, to help the sewerage system cope. They provide pressure relief and protect customers from flooding by allowing the excess rainfall and diluted sewage to escape to the nearest stream or river. They typically have a limited environmental impact, but some are now operating more frequently throughout the year, because there are more heavy rainfall events that require their operation to protect property.

This highlights the need to review how storm overflows currently work, their impact on the environment, and whether they meet the needs of today and tomorrow. This is considered by the DWMP.

We need longer-term and integrated planning carried out by all those responsible for drainage, and more effective procedures for others to work with us to ensure we can meet the scale and complexity of these challenges. These approaches are considered as part of the DWMP and have culminated in the proposal to develop a national drainage programme, alongside the national environment programme. These national level programmes can then summarise to stakeholders, people living in Wales and to tourists, what we need to do and why we are using a unified voice.



## 1.6 Strategic Directions

### 1.6.1 Welsh Government Water Strategy for Wales

Within Welsh Government's Water Strategy for Wales, there is emphasis placed on establishing;

*“A framework to identify any evidence, data or regulatory gaps and consider how these might be addressed to ensure that the sewerage undertakers, regulators and other key stakeholders have the correct tools to assist them in the management of our sewerage and drainage systems.”*

We have been undertaking trials to provide information to Welsh Government in support of their aspirations. Our engagement strategy calls for the creation of additional catchment-based forums that bring together people with a variety of skills and knowledge that also support the principles of sustainable management of natural resources (SMNR). These forums should ideally cover the entire water cycle, and its relationship to the environment and our communities. By establishing these forums, we can move towards a more cohesive and collaborative approach to planning. This will help us to address any resource, funding, or legal challenges that are currently hindering our ability to meet the needs of our environment and customers. We discuss these forums in more detail in Section 9.

We have shown in the DWMP that the goals of our stakeholders may not be possible to achieve within the 25-year plan. Therefore, we need to find a better balance between meeting the needs of our customers and protecting the environment. This will help us to make improvements across our entire operating area in a more uniform way. It will also help to ensure that we are not spending too much money on one community at the expense of others.

We have also converted the Water Resources Management Plan approach of Annual Average, Critical Period, the review of consents and Drought (extreme weather) planning into four separate levels of planning. This is an important change and recommendation for the industry to incorporate into the DWMP framework.

The annual average plan, or sewage plan, sets the policy for how much sewage capacity we need now and in the future with the current consents and compliance. This ensures that we have enough capacity to handle all the sewage that is generated, especially during dry and light rain periods.

The critical period, or Drainage Plan, is the point where rainfall and climate change impacts the network most. This sets the policy point where SuDS (Sustainable Drainage Systems) and Nature Based Solutions should be the first consideration in a hierarchy of options, as long term sustainability becomes paramount to deliver. This also allows the construction of tanks and storage, if the benefit is required within the short term as a trade-off between what is needed and the time, to realise the benefits from a green infrastructure or SuDS solution.

The Review of Consents (RoC) plan, which is the same as the RoC within a Water Resources Management Plan, looks at scenarios into the future relating to new permits, new standards, and other National Environmental Programme drivers. The RoC Plan also considers what possible futures could there be, for example 'what could be the pressures on the future river environment be', and 'what land use changes in the catchment could there be from agriculture or something else'. This area provides a clear separation between what we must do now, so our assets are working properly (which is evaluated in the sewage and drainage plans) against what needs to be done to drive improvements to national programmes. This section includes work that is legally required and work that is to be done as it is the right thing to do.

The Flood Plan is our document for extreme rainfall weather planning. The Flood Plan is a direct opposite to the statutory Drought Plan. Flood planning is for when there is a named storm or when the river gets out of its banks, and the company has to deliver its contribution to national flood defences to protect communities, while also enabling a quick return to normal service once an event has occurred.

These recommendations are not currently part of the DWMP Framework or Ofwat methodology. However, we believe that they would provide additional benefits for long-term delivery strategies. They would also help to ensure that the utilisation and lifespan of a solution are considered from the outset and ensure that affordable plans are maintained, and customers know what they are paying for.

#### 1.6.2 Ofwat Priorities for the Welsh sector through PR24

Ofwat's summary of Welsh Government's strategic objectives are reproduced below:

- *adopt an outcomes focused approach that promotes an appropriate focus on addressing long-term risks, safeguarding long-term resilience and performance and ensuring that the timing of investment results in intergenerational equity;*
- *pursue a preventative approach by encouraging companies to understand and consider how problems could be addressed at source;*
- *deliver value for money for customers, communities and the environment and challenge companies to provide sustainable and effective support to vulnerable customers and customers who are struggling to pay;*
- *challenge companies to deliver best value solutions by encouraging investment that responds to multiple drivers or has multiple benefits and that takes account of outcomes and the wider environmental and social value of solutions;*
- *encourage companies to meaningfully involve, engage with and take account of the views of customers and stakeholders on long term outcomes, priorities and pace of delivery, and use effective collaboration to maximise the impact and effectiveness of regulation;*
- *deliver a cohesive and transparent regulatory framework that, taken as a whole, is proportionate, effective, transparent and efficient and challenges companies to provide clear and compelling evidence to underpin their investment plans; and*
- *challenge companies to seek new ways of working to deliver for customers and the environment more efficiently.*

Specifically relating to WRMP and DWMP, the following expectations have been bulleted. Through WRMPs and DWMPs we expect companies to:

- *consider a wide range of options that mitigate the risks identified, including nature-based solutions, catchment-scale schemes and traditional grey infrastructure interventions.*
- *demonstrate that adjustments to operational and maintenance regimes have been implemented before exploring enhancement options;*
- *fully consider interdependencies with other stakeholders' strategic and opportunities for partnership working, including co-funding and co-delivery; and*
- *make efficient use of current technology such as smart metering, and investigate the use of emerging technology including smart data and networks.*

## 1.7 How we have met the strategic directions

Within the development of our plan, we have addressed the following expectations:

- We have put customers at the heart of our plan. Their feedback influences and directs the plan.
- We have worked with stakeholders to continually inform and incorporate comments into our plan through the process. The methodologies and approaches have been created jointly with these organisations.
- While complying with the DWMP Framework, we have developed an outcomes-focused approach that considers both current and future risks, as well as the costs to both current and future customers.
- We have produced solutions that seek to provide value for money. However, we recognise that we need to rethink as an industry how to provide value for money for all customers and the environment, without some communities being disproportionately disadvantaged.
- We have created a process that considers the carbon, environmental and societal benefit.

Our plan has delivered the following that meets the DWMP expectations set out by Ofwat:

- In our plan, we have included not only the list of solutions detailed in the DWMP framework, but also more detailed solutions. We have included just over 80 interventions or options that could work in different situations.
- We have explored with our customers whether they would agree to paying a little more for the added resilience that an additional allowance would provide in our networks and at our treatment works. Customers are supportive of this additional resilience approach (headroom).
- Through our trials with councils and NRW, we have explored a variety of methodologies for developing solutions, planning investigations, and creating community materials. We are still building on our approach but will need support from Welsh Government to extend these outcomes to a uniform methodology for Wales.
- We have developed a programme to introduce smart meters in every catchment area. These meters will provide us with more information than traditional meters, including day-to-day usage and long-term trends. This information will help us to produce more accurate long-term projections. However, the cost of this programme is a factor, so we have created a strategy to gradually improve the number of permanent metering locations.

## 1.8 Policy

We believe the right solution should be driven by climate action, as well as efficient use of funds. However, we recognise that the achievement of our goals depends on policy change at a Welsh and UK government level. The DWMP has trialled new approaches to achieve our strategic aims and we hope that this will provide government with the evidence it needs to consider new legislation that enables us to achieve our ambitions. We acknowledge that this type of policy change takes time, so we have made sure that options that depend on policy change are only considered for delivery 10 years from Plan commencement.

## 1.9 How your comments have influenced the Plan

We held a public consultation on our draft Plan from 27 July 2022 to 7 October 2022, where we received responses from seven stakeholders, three regulators, three customers and two from Welsh Government. We also undertook customer research in 2022, where we discussed the draft plan with 500 customers and 100 businesses.

As part of DWMP29, and in response to the feedback gathered during Cycle 1 and the consultation, we aim to:

- Increase customer awareness through annual updates and community forums.
- Use customer documents and social media to keep customers informed of wastewater and drainage progress.
- Inform and advise customers on how they can manage wastewater.
- Invest in managing wastewater and handling additional rainfall, prioritising sustainability over least cost, and explore joint working opportunities.
- Improve our environmental benefit approach and investigate solutions for managing customer flooding and preventing floods at a cost that customers can afford.
- Address concerns regarding sewer overflow impacts to our rivers, working with stakeholders to identify opportunities and involve communities.
- Create affordable incremental plans and gradually improve all areas over time based on weather frequency and intensity.
- Review the approach to historical sites to ensure access and building is carried out in a sympathetic manner.

Welsh Government have also provided their strategic feedback on the content of our Plan. We will work with them as we move into the statutory phase of the DWMP.

## 2 Our operating area

### 2.1 What does Welsh Water do?

We are the statutory water and sewerage company for around 1.4 million customers in Wales and some parts of England. Our operating area is shown in the map below (Figure 2) and this contains some of the most important rivers, and many blue flag bathing waters, in the UK. Part of our role is protecting these waters.

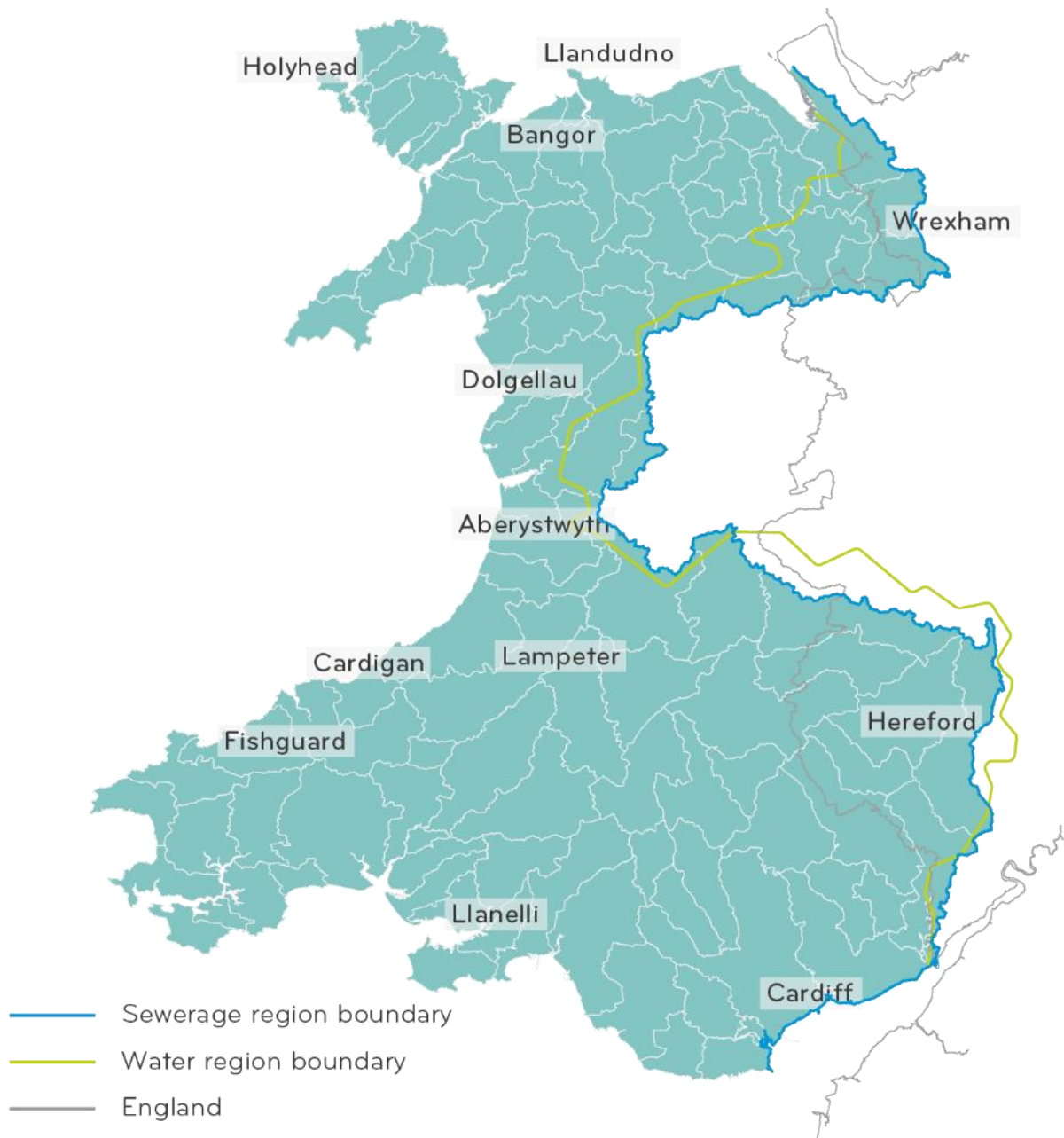






Figure 2 Map showing Welsh Water's operating area.

The information below includes some key statistics on our customers, our company, our assets (the physical infrastructure we own), and our work with local communities.<sup>4</sup>

 <b>SERVING OUR CUSTOMERS</b>		
1.4 million homes and businesses	3 million people in most of Wales, Herefordshire, and parts of Deeside	Over 600 million litres of wastewater treated on an average day
 <b>OUR COMPANY</b>		
The 4 <sup>th</sup> largest company in Wales	Employ over 3,000 people	Completed a £1.5 billion investment programme 2010-15
 <b>OUR ASSETS</b>		
Maintaining over 30,000km of sewers and over 26,500km of water mains	Managing over 800 wastewater treatment works, including improvements to meet new environmental standards and 69 Water Treatment Works	Looking after more than 2,500 sewage pumping stations and 679 water pumping stations and over 2,000 combined storm overflows (CSOs)
 <b>IN THE COMMUNITY</b>		
One million visitors to our reservoir sites and visitor centres every year	Over 164,000 children have visited our education centres to date	Looking after 40,000 hectares of land

Find out more about how water companies in England and Wales are performing at: <https://discoverwater.co.uk/>

<sup>4</sup> The table shows outline statistics from 2020. These are subject to change.



## 2.2 How we divided our area for the DWMP

A key part of the Plan is making sure that there is early, continual, and effective engagement between organisations and stakeholders, from a national to local scale.

We have developed a structured approach to these different scales, using DWMP ‘plan areas’ to present the findings of our Plan at different geographical levels.

- **Level 1 - Company Operational Level**
  - The whole of our wastewater operating area, including all L2, L3 and L4 areas, is called the ‘Company Operational Level’.
- **Level 2 - Strategic Planning Units**
  - The areas we serve which are divided by blue border lines into 13 areas called ‘Strategic Planning Units’.
- **Level 3 - Tactical Planning Units**
  - The areas are then divided again by green border lines into 106 areas, referred to as ‘Tactical Planning Units’.
- **Level 4 - Local Planning Areas**
  - These areas are not shown on the map as they would show as a mass of dots. The number of catchments within each tactical planning unit varies.

Figure 3 below shows the four levels of planning, and Figure 4 shows our operating area divided by the operating levels.

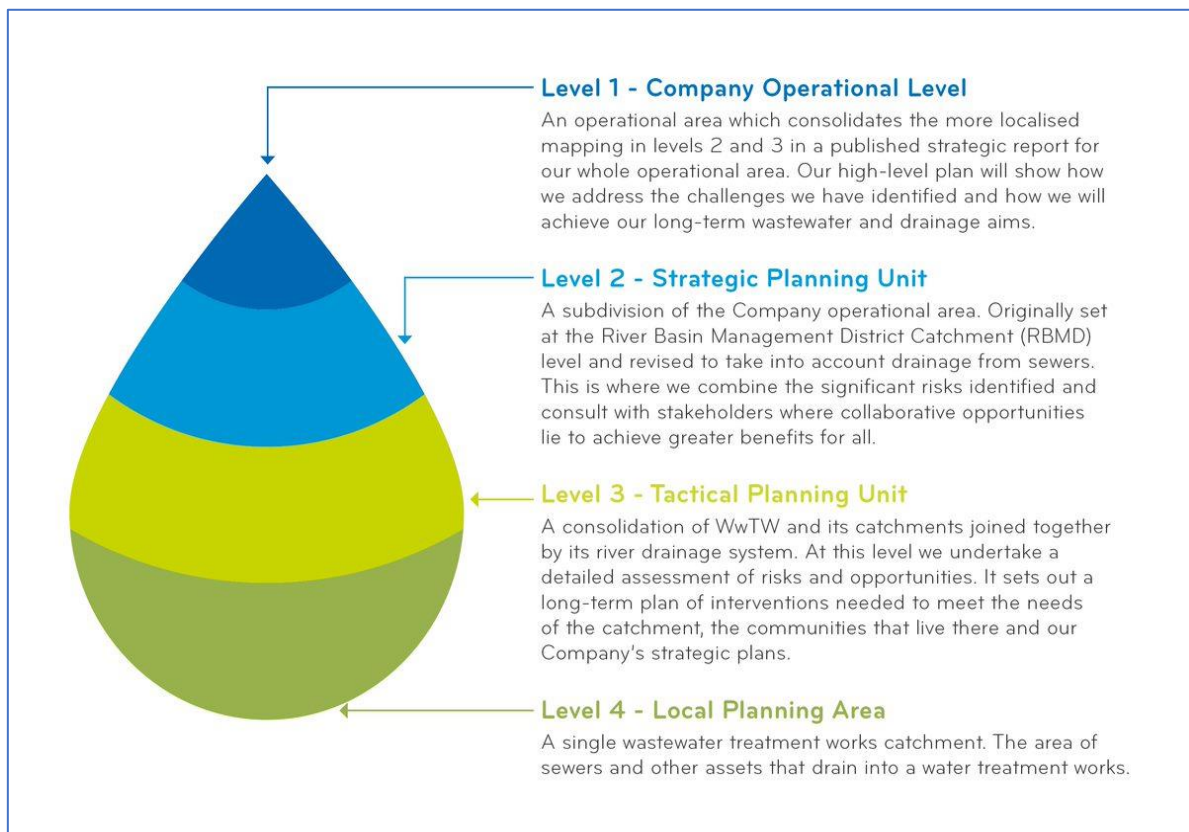


Figure 3 Diagram showing how the Plan consists of four levels (Levels 1, 2, 3, and 4).

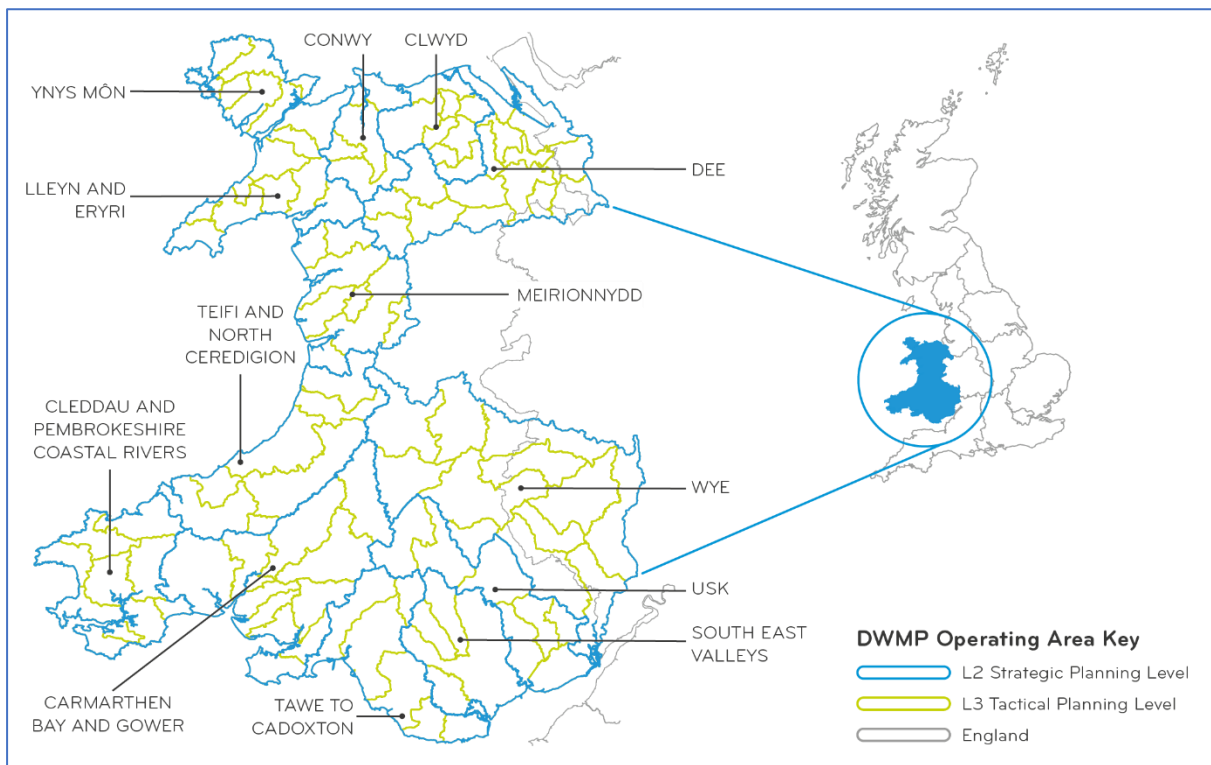


Figure 4 Map showing Welsh Water wastewater operating area.

These levels help us to summarise key messages to allow us to engage appropriately with different audiences. For example, we need to use a different approach and provide different information when speaking to a local community about their concerns compared to engaging with organisations at a national level.

By acknowledging the differences between these levels, we can provide a tailored approach to engagement and collect accurate information from different groups.



### 3 How we developed our plan

#### 3.1 What are the key parts of the DWMP?

Water and sewerage companies have been asked to produce DWMP's for the first time with guidance from a nationally agreed framework. This framework is a document which sets out the required steps for developing a DWMP and has been agreed with government and regulators.

Other organisations and interested groups also contributed to the development of the framework. This is the first step on the journey to improve the strategic planning of drainage and wastewater services. In our first plan, we trialled both traditional methodologies and new approaches so that, together, we can direct the next plan utilising the best methodologies and processes.

We have spent our time undertaking trials to ensure that government has the breadth of examples to reflect on prior to making the process statutory. However, the methodology to produce the National environment programme was not replicated in the framework. Whilst there are some similarities, the NEP has been written as an additional section so that investment it contains can be shown to provide a more holistic 25-year company plan.

We are recommending that the NEP becomes an integrated process and we have named this the "review of consents plan". By doing this, we hope to be able to demonstrate the additional cost to customers, benefits to the environment and investment needed to maintain our operating licence.

You can find out more information on the national Water UK DWMP Framework by visiting [www.water.org.uk](http://www.water.org.uk)

At the start of the DWMP, we set out our long-term aims and looked at different ways of achieving these aims. We have also considered when we need to deliver solutions to protect our customers and the environment that we all share.

The main stages for the creation of the DWMP are shown in Table 2 and Figure 5 below:

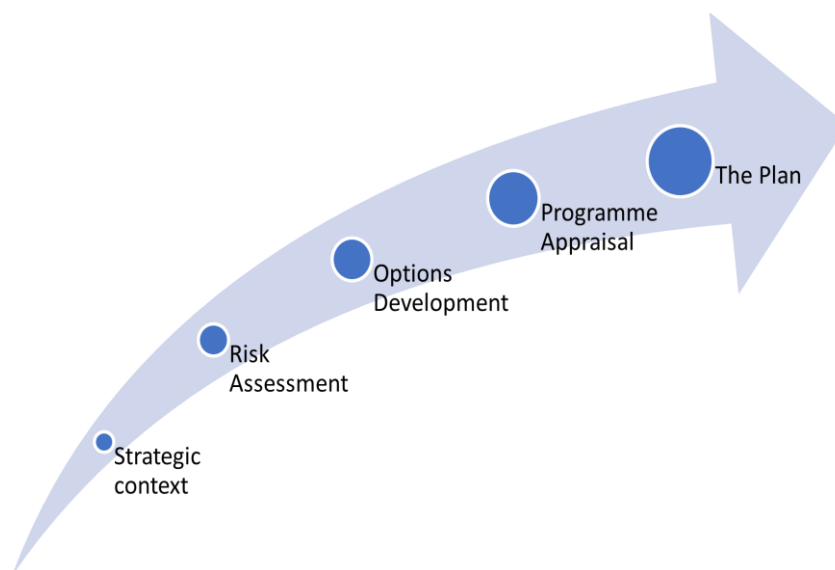


Figure 5 Diagram showing the stages of 5-year development of DWMP

In developing our plan, we have reflected heavily on the WRMP process, which has been in place for over 20 years, to provide additional direction. The following three stages have been replicated in the DWMP as seen in Table 2:

- Pre-consultation and prepare the draft plan carried out in Stage 1.
- Publish the draft plan and carry out a formal consultation carried out in Stage 5.
- Assess consultation responses, revise the draft plan and, following direction from government, publish a final plan in Stage 5.

Table 2 showing the five steps of a DWMP.

DWMP Process Stage	Description
<b>Strategic Context</b>	The first stage in the DWMP planning process is Strategic Context, which identifies the big issues faced now and, in the future, as well as the scope of actions needed to address them. This stage also allows us to consider future aims for the services we deliver.
<b>Risk Assessment</b>	The Risk Assessment stage outlines information about drainage and wastewater issues that are being experienced or have already been identified. It will also look at current and future risks, and their causes.
<b>Options Development</b>	The Options Development stage outlines the process of developing solutions to address the risks and their degree of uncertainty.
<b>Programme Appraisal</b>	The Programmes Appraisal stage takes the preferred suite of solutions and assesses for various programmes and pace over the life of the Plan to develop the best value programme.
<b>Consultation and Publication – incorporating:</b>  <b>a) Draft DWMP</b> <b>b) Revised Draft DWMP</b> <b>c) Final DWMP</b>	Publishing the Draft DWMP for public consultation (2022). Public consultation of the draft DWMP which will involve consultation with customers, stakeholders, and regulators.
	Production of the statement of response and revised draft plan taking account of comments where possible in the current plan and logging actions to be included in the next plan where they are not.
	Welsh Government and the Board providing permission to publish the Final DWMP in 2023.

### 3.2 Approach to Planning

The plan has developed as the framework has been delivered. The plan is currently made up of two different approaches:

The first approach is a strategic overview at a company level discussing results from a high-level extrapolation. These results highlight what policies or company objectives could be chosen, and indicate how much these decisions could cost. We have created a strategic overview for storm overflows and customer flooding during this cycle.

The second approach is a more detailed assessment of the highest priority catchment based on the scale and complexity of risks to be addressed and targeting a combination of worst customer service and highest designated environmental location. The results build from the risk analysis carried out to produce the strategic overview, and develop strategic options, going further to develop options appraisal processes, detailing what solution needs to be carried out in the next 5 years.

We would then see what solutions are needed for the subsequent 20 years. We have produced risk assessments for all hydraulic modelled areas, followed by options assessments for only the highest priority area rated catchments, which are defined as enhanced and complex using the framework definition; these total 44 catchments.

### 3.3 Principles of Capacity



Figure 6 Illustration of the capacity of a typical sewer.

Image courtesy of St John Archaeology.

The capacity of a sewer pipe is indicatively shown in Figure 6. The amount of flow in the sewer usually increases at peak times, such as when we get up in the morning, and drops during the night. This is known as 'dry weather flow' (DWF) and all sewers must have enough capacity to carry these sewage volumes. We have shown where there is risk in the future from dry weather flow capacity using a simple capacity of the sewer versus the capacity of the treatment works approach. Where the sewer capacity is greater than the treatment works capacity, we know that a treatment works upgrade scheme is required in the future. The results of this work can be seen in each of the area summaries.

Capacity can also be used up by a heavy rainfall event. The more rainwater that enters our sewer during a storm, the more capacity of the sewer is used. When the capacity of the sewer is exceeded, there is a risk of sewer flooding. The aim is to ensure that every pipe has enough spare capacity so that sewage is contained. However, we also need to consider how much capacity we should allow for rainwater. The climate change assessments show there is a point where we cannot contain all rainwater from all storms. During our consultation, we explored where to draw the threshold line for sustainable containment of rainfall and sewage together. We will continue to assess where this line should be and, in the meantime, we will consider the general principles of 3x dry weather flow being contained and separation of higher volumes through an integrated National Drainage programme.

#### **Our Recommendation for a 'National Drainage Programme'**

The consequence of drainage is dependent on the way flooding is managed through the Flood and Coastal Erosion Committee. The committee is responsible for considering the impacts of extreme rainfall and riverbank flooding. Sewer flooding is focused on the capacity of a sewer; this is a much lower level of flooding.

Between sewer flooding and extreme flooding there is a gap which would benefit from additional Team Wales coordination. The risk from climate change and urban development needs additional coordination to proactively have National plans in place to retrofit drainage solutions.

We would support the creation of a national drainage programme, similar to the existing national environmental programme, where all stakeholders and landowners can be brought together to determine how an area can be, and should be, drained.

Our analysis shows that several areas do not have sufficient sewer capacity to cope with new development, or the impacts of climate change. When it comes to our sewage treatment works, on average, we have just enough wastewater treatment capacity to treat today's sewage flows, except for one geographical area.

Our Plan, which seeks to address these shortfalls, looks at the value of different approaches in terms of cost, impact on flooding and pollution, and the wider benefits for local people, nature, and the environment. The Plan also considers whether we can make changes on our own, or if we need to work with others to deliver these changes.

Our approach lists a **hierarchy of actions** which include:

1. Preventing groundwater getting into sewers.
2. Educational and information campaigns for customers on how they can help.
3. Surface water removal from sewers with storm overflows and building bigger pipes.
4. Pumps and treatment works to manage future developments and population changes.

The more surface water we can remove from our sewers, the less vulnerable we are to heavy rainfall and storms, which cause flooding and pollution, and the more cost efficient we can be. However, this means redirecting rainfall into other drainage networks. As such, we must work with local authorities, NRW and the EA to agree this work and how they can support us.

### 3.4 Scenario Planning

Wales is one of the wettest areas of the UK. This can lead to a greater risk of flooding and a greater reliance on storm overflows, when compared to other areas of the UK. Our Plan has concluded that we need to consider differing intensities of rainfall, and their impact on our sewerage system by effectively combining four plans in one, covering sewage, drainage, and flooding, and how future permits and new standards will impact our ability to operate. These scenarios will be further developed in Cycle 2.

We use the following elements to feed into scenario planning:

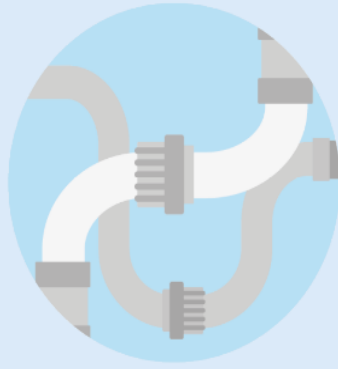
- **THE SEWAGE PLAN** - how we protect customers and the environment under dry or light rainfall conditions (typical conditions which we experience during most days of the year). We particularly want to ensure that we prevent sewage spilling from our storm overflows in this type of weather when they are most likely to have the greatest impact on the environment. In this section of the plan, we intend to provide additional scenarios around a central estimate to take account of growth projections of different rates. We have looked at the local development plan rate and historical build out rates.
- **The Drainage Plan** - how and where we need to work with others to manage drainage during heavy rainfall; not just in sewers, but also in other urban drainage systems, such as road drains. We looked at different storm frequency and intensities and carried out reference level storm assessment for all catchments to help compare results.
- **THE REVIEW OF CONSENTS PLAN** – how we consider the National Environment Programme and its impact to managing our service for today. This will also need to consider the National Drainage programme. This is currently managed and developed by our regulators.
- **THE FLOOD PLAN** - how we will work with others to reduce the risk of overland flooding or flooding from rivers and streams during severe storms. We have looked at where our assets are located and whether they are likely to be inundated by flood waters.

The graphic in Figure 7 provides a visual representation of the scenarios discussed.



### Sewage

The 'sewage' plan is about how we protect customers and the environment under normal rainfall conditions. We particularly want to make sure that we can prevent sewage spills in dry weather when they are most likely to have the greatest impact on the environment.



### Drainage

The 'drainage' plan is how/where we need to work with others to manage drainage, not just in our sewers, but also in other urban drainage systems (such as highway drains) to reduce their impact during heavy rainfall.



### Flood

The 'flood' plan is how we work with others to reduce the risk of our sewers being overwhelmed, causing flooding in severe storms. This can affect the communities we serve. In this first plan we have focused on the sewage and drainage plans. When we update our plan in the future we will include a flood plan.

### Review of Consents

The Review of Consents Plan is about how we assess possible futures that impact our decisions on the Sewage, Drainage, and Flood Plans. We work with others to ensure that the National Environment Programme, proposed National Drainage Programme, and National Infrastructure Plans are considered in our investment.

Figure 7 Concept showing the 4 areas of planning.

Figure 8 shows an idealised typical year of rainfall in Wales. In response to the combined impact of climate change, new development, and increased urbanisation we, and other drainage operators, will have to increase the amount of sewage and rainfall that systems can deal with over the long term. This increase is vital to reducing the risk of flooding and pollution. The chart shows these three elements of planning. The sewage plan is displayed as the blue band, the drainage plan as the green band and the flood plan as the pink band. The review of consents affects all three bands.

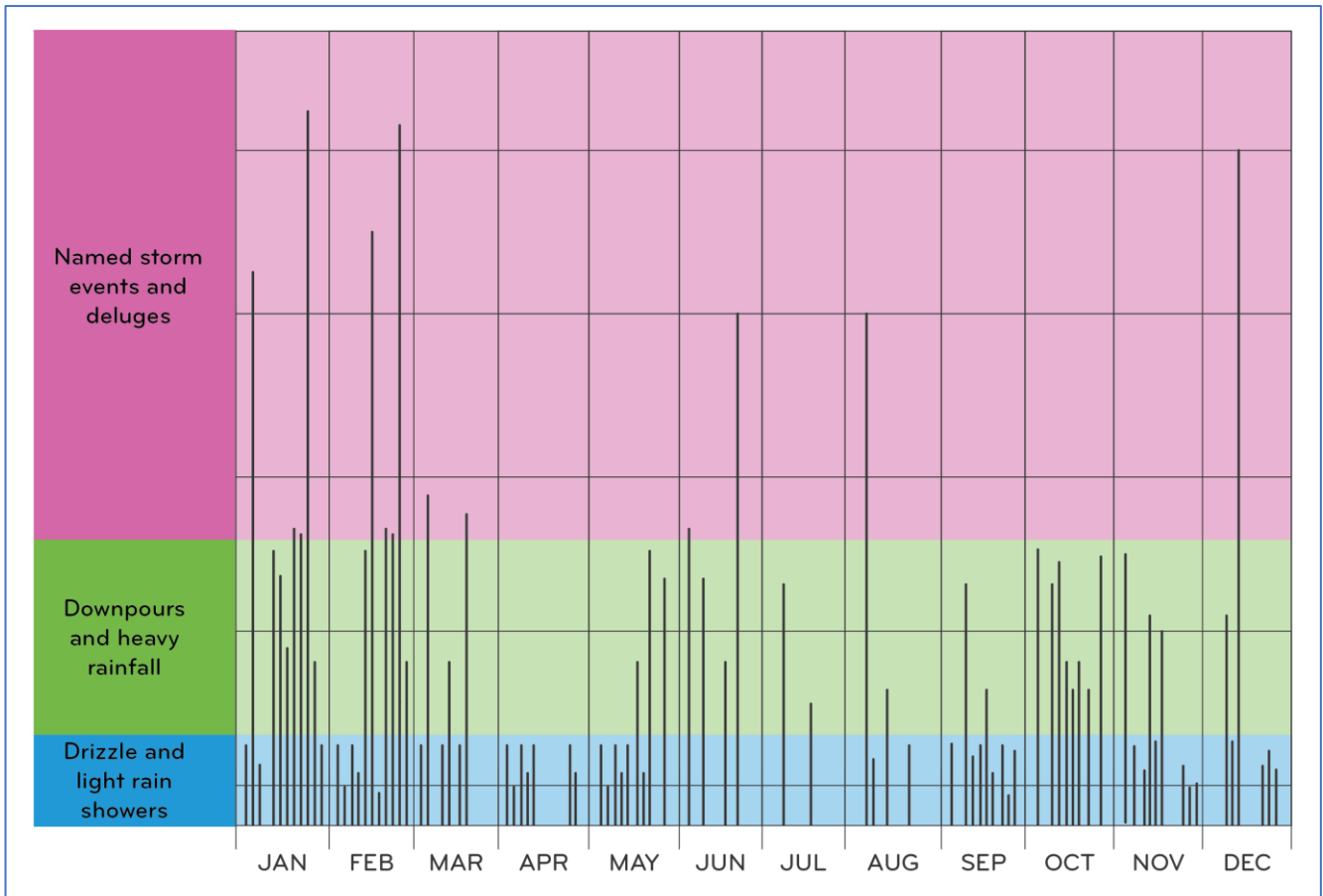


Figure 8 Chart showing a typical year of rainfall in Wales and defined areas of rainfall intensity and frequency.



### 3.5 How have we considered risks to customers and the environment?

The DWMP allows us to look at the current and future consequences of increasing rainfall (due to climate change) and increasing sewage flows (due to new development and increased urbanisation), and how the associated risk of flooding and pollution will increase over time. The NEP considers the needs of the environment and the DWMP must consider how these needs will change in the future.

To do this, we combined our long-term objectives with feedback from customers and stakeholders into three high level planning themes:

#### 1. Water quantity

Reducing the risk of flooding to communities.

#### 2. Water quality

Improving water quality for the environment.

#### 3. Resilience and maintenance

Making sure we can adapt to changes in the future, whilst also maintaining important services and protecting the environment.

#### **Resilience**

Ensuring we have a resilient wastewater and drainage network is vital and requires several key organisations to work together on a range of different themes, from assets and systems to people and culture. Responding in this joined-up way will allow us to respond to known and unknown challenges far more effectively, delivering the widest possible benefits for communities.

These themes are underpinned by more detailed national planning objectives, which allow comparisons to be made between the water and sewerage companies by our regulators. Our own specific objectives also help us to anticipate risk and be prepared to respond. The objectives informed our detailed action plans and helped us to achieve our vision, mission statement, and Welsh Water 2050 objectives and the destinations our customers have chosen.

The diagram below (Figure 9) shows an overview of the key themes and how these relate to water quality for the environment (pollution) and flooding in communities.



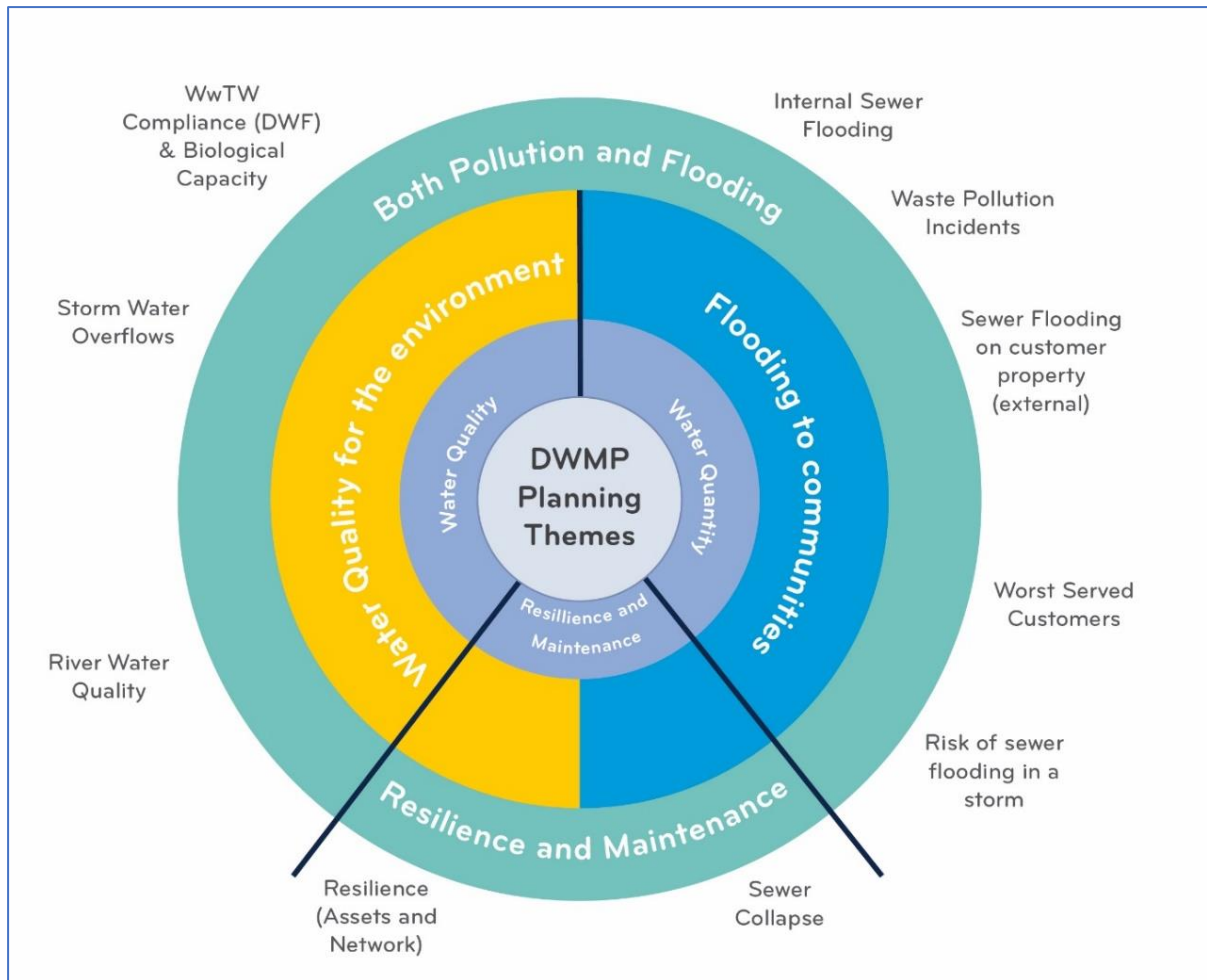


Figure 9 Diagram showing key planning themes and links with risk areas

By assessing the impact of key future challenges over the next 25 years we have been able to identify the areas that could be at increased risk of sewer flooding (where our sewers could be overloaded by the amount of rainfall draining into them) and a reduction to water quality and increased pollution (where discharges to the environment, from our storm overflows and treatment works, may not meet acceptable current and future standards) by 2050, if we do not invest and take preventative measures.

## 4 Risk

We have considered the risks that are most important and focused our first plan on responding to these.

Our company carries out planning of our assets as part of business planning each 5-year period. A DWMP provides the analysis to support strategic direction and provides the programme of work to achieve that direction. With the DWMP being a cyclical process taking place every 5 years, the direction and progress can be measured and re-evaluated to remain on track.

### 4.1 Why do we need to develop a programme of work?

The DWMP sets out the choices that we must make to deal with risks. These risks will become a reality if we do not invest for the long term. We need to produce the solutions to support a programme of work to establish the cost and benefits to society, so that progress can be measured against the programme.

We want to deliver continuous improvement across Wales and the borders which reflect the different characteristics of these areas, such as high mountains or steep sided valleys, and flat plains. This means that one solution does not fit all areas and our programme needs to be reflective of natural and constructed drainage systems.

The scale of the work required needs to be considered while producing programmes of work as its difficult to gauge the right scope of work when producing the first plan.

There are also new requirements for water companies outlined in the Environment Act 2021, highlighting the importance of having a robust understanding of the capacity of sewerage and drainage systems.

### 4.2 How have we assessed sewer capacity?

To develop the solutions needed to reach our chosen objectives we have followed the stages of the national DWMP framework, shown above. However, because this is our first DWMP, we have had to collect the data and develop the tools to make these assessments.

We have developed a process for the Plan that will allow us to quickly target investigations at the highest priority areas in a local catchment at an early stage in the DWMP process. It also allows us to monitor progress and carry out annual assessments more easily.

Our method for forecasting and understanding capacity includes:

- Defining the capacity of the environment.
- Defining the capacity of treatment facilities.
- Defining the capacity of the drainage network.

More detail on these definitions is found in Table 3.



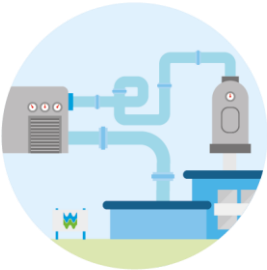
<p><b>Defining the capacity of the environment</b></p> 	<ul style="list-style-type: none"> <li>• Understand the flow and quality of the river or coastal water today and how they will change in the future.</li> <li>• A key challenge in this area relates to how changes in the environment, resulting from climate change or different land use, may affect the quality of river and coastal waters, particularly when combined with population growth.</li> <li>• This is important as changes in this area will have a direct impact on planning where and when we should invest.</li> </ul>
<p><b>Defining the capacity of treatment facilities</b></p> 	<ul style="list-style-type: none"> <li>• The capacity of our wastewater treatment works has been taken from the legal permit conditions that govern their operation.</li> <li>• We have identified treatment facilities that may not have enough capacity in the future and, with scenario planning, considered which are to be prioritised first. We have listed these for further investigation as part of the Plan, but we recognise that during the next 5 years those treatment works with NEP risks will need to be prioritised.</li> <li>• We have developed solutions for treatment as part of our standard approach to managing growth.</li> </ul>
<p><b>Defining the capacity of the network</b></p> 	<ul style="list-style-type: none"> <li>• We have carried out an assessment of network capacity by looking at how much water and sewage enters the network under conditions of light rainfall or dry weather.</li> <li>• We have also considered how much network capacity we need during wet weather to protect our customers from flooding.</li> <li>• This has allowed us to pinpoint areas where pipes might not be big enough or where we need to reduce or separate water flows.</li> <li>• To prioritise this assessment, we have used a scenario approach considering different forecasts for what the future could look like in terms of climate change, a bigger population and growing urban areas.</li> <li>• Overall, this process allows us to understand whether the current network can meet the needs of today and tomorrow.</li> </ul>

Table 3 DCWW Identifying the separate capacity assessments required.

## **Defining The Future Capacity of The Environment**

### **Statutory Environmental Improvement Programmes (NEP) (National Environment Programme (NEP) and Water Industry National Environment Programme (WINEP))**

We deliver investment aimed at improving the protection of the environment at the direction of our environmental regulators Natural Resources Wales (NRW) and the Environment Agency (EA).

We are including these outcomes in the DWMP as they become certain. However, our new environmental forecast model has indicated several sites that could be part of a future programme. We will investigate these as part of the Plan's development to inform the next cycle and work with our regulators to improve how we do this. As the NEP programme become known, and further information is provided by our environmental regulators, we will incorporate these into our plans.

### **4.3 The Sewage Plan**

We check whether our system is of adequate size to manage Dry Weather Flow (DWF) plus an additional allowance for light rain. The main variables of DWF we need to consider are:

- The population of the area.
- The amount of sewage the population returns to the sewer as consumption.
- Any trade use put to the sewer.
- Any infiltration that gets into the system through cracks or other causes.
- With the addition of light rain, we add a percentage allowance known as 'Formula A' or '3DWF' to do this.
- The Permit volume and quality parameters, the amount our environmental regulator allows us to return to the environment as a discharge to a river or sea.

For each region, area, and catchment we have calculated the balance to find out if the amount we are forecasting to be contained in the sewer is within the limit we are permitted to discharge.

Table 4 shows where the highest risk occurs at Level 2, with red is highlighting a positive balance, and orange indicating a negative balance that needs further investigation. This table shows that, if all the networks were connected, and if all the discharge values were added together in a region, which region would have insufficient capacity.

Conwy has been noted as having the highest risk. This is a simple assessment and includes assumptions, such as anticipated infiltration and maximum permitted trade contribution to the sewer. This assessment provides priority areas to focus catchment studies. More information on these can be seen in the area summaries for each level 2 and level 3. With the addition of

the allowance for light rain, a further two areas become unbalanced and are the next areas for catchment studies; these are Llyn and Eryri, and Wye.

Table 4 Showing the highest area at risk of being a deficit in terms of a DWF capacity assessment at a strategic level.

Level 2	2025-29	2030-34	2035-2039	2040-2044	2045-2050
Dee	Green	Green	Green	Green	Green
Clwyd	Green	Green	Green	Green	Green
Conwy	Orange	Orange	Orange	Orange	Orange
Gwynedd	Green	Green	Green	Green	Green
Ynys Mon	Green	Green	Green	Green	Green
Meirionnydd	Green	Green	Green	Green	Green
Teifi	Green	Green	Green	Green	Green
Pembrokeshire	Green	Green	Green	Green	Green
Swansea	Green	Green	Green	Green	Green
Tywi and Gower	Green	Green	Green	Green	Green
Cardiff	Green	Green	Green	Green	Green
USK	Green	Green	Green	Green	Green
Wye	Green	Green	Green	Green	Green

(Where Green means balanced, and orange means unbalanced).

We also assess whether the size of the pipe is of an adequate size to transport sewage and/or sewage with light rain. This is not a hydraulic assessment; it is an indicative assessment at this stage. By carrying out this assessment in a different way to normal hydraulic assessments, we have been able to identify the root cause of short lengths of pipe across our operating area that will be too small in the future due to population rise and redevelopment of front gardens to impermeable paving.

There are 9km of pipe (from the 36,000km) at risk of being too small, but this is spread across the whole of Wales with many being a short length of 200 metres long. We know that the only solution for these short lengths is to build the pipe, or duplicate it, as the only other solution is to reduce the consumption from customers and trade or reduce infiltration. This means that, before building bigger becomes the solution, other approaches need to be driven, examples are given below:

- Support additional reduction in use linked with management of resource for the water resources and drought plans.
- Drive permanent and temporary monitoring to verify and locate opportunities to remove infiltration and miss connections.
- Review current trade permits and negotiate new permits closer to actual use.
- Building bigger when all other options have been investigated.

For this cycle the highlighted area from both the balance assessment and the pipe capacity assessment have been included in programmes of investigation as a minimum.

#### 4.4 The Drainage Plan

We have assessed our network to understand how often customers are predicted to experience internal or external sewer flooding caused by hydraulic under capacity issues. The same assessment has also indicated the number of times sewer flooding impact roads and highways or other water courses.

We have used this assessment to predict the number of occurrences of storm overflows escapes going forward, and the expected times when escapes from the network could reach a water course, causing pollution. When these assessments are combined, the map in Figure 10 highlights the coverage of risk from flooding and pollution. However, the map does not state the extent of impact or its frequency. The map indicates where, and what aspect of, risk we would like to work with other organisations on and is a tool to ask organisation to work with us.

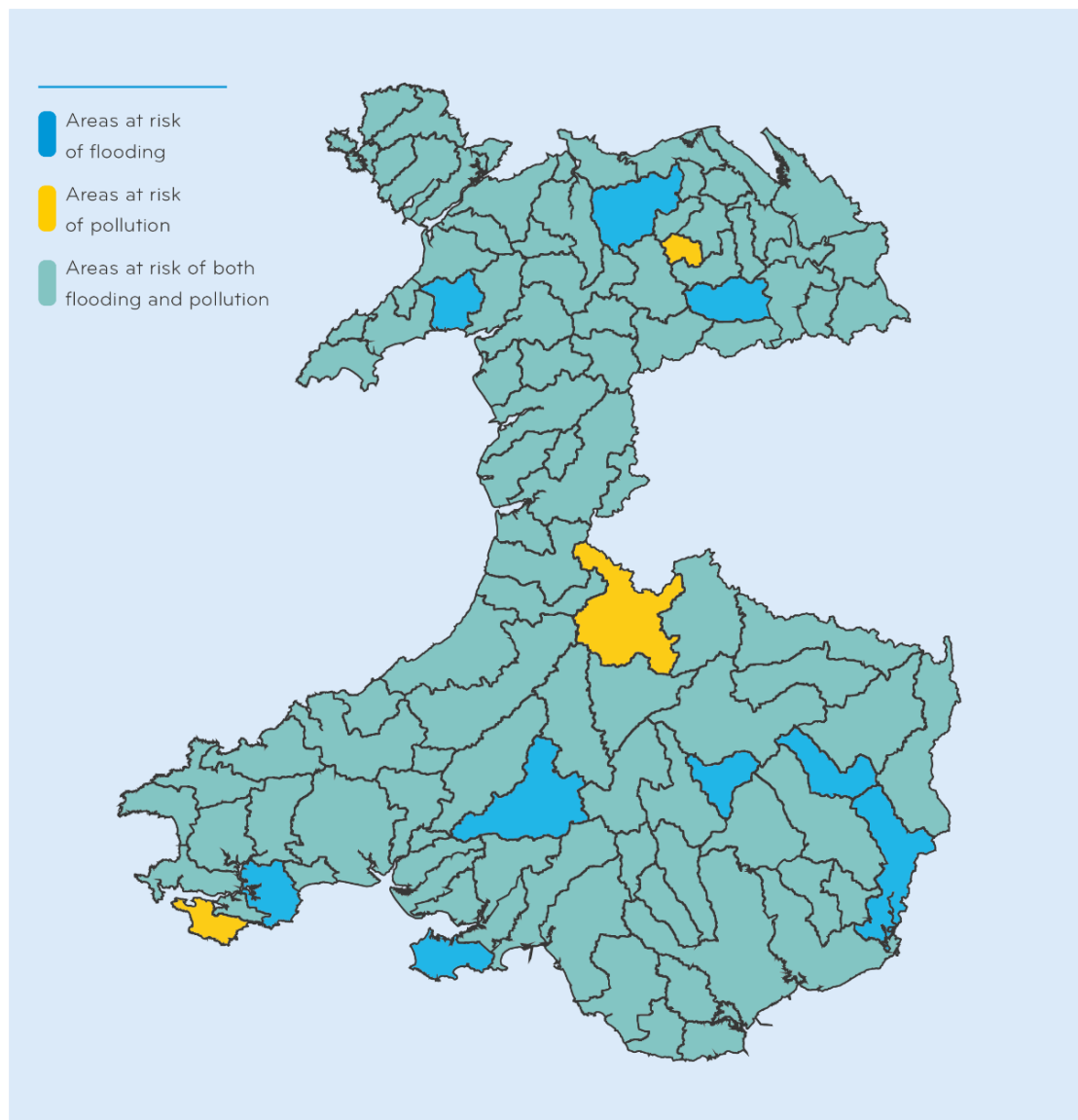


Figure 10 Opportunity Map showing what type of risk and where we would like to work with a 3rd party

## **4.5 The Review of Consents Plan**

We work together with NRW and The EA to identify the risks that are to be investigated in the next cycle of the National Environment Programme. The main drivers are listed below.

### **4.5.1 River water quality – continuous and intermittent**

Work here covers improvements to river water at locations where nutrient levels within the river can be improved. This includes nutrients such as phosphorus and ammonia levels. These improvements are above levels indicated on our current permits and will lead to a new permit in the future.

### **4.5.2 Bathing waters and shellfish waters**

We work with our environmental regulators to ensure that current shellfish and bathing waters are retained. We are also working with our regulators to increase the number of locations that wild swimming and other water users can use.

### **4.5.3 Marine water quality and protected areas**

Support the maintenance of marine protected areas including marine Conservation Zones and other protected areas, by supporting the delivery of the conservation objectives and determining if there are any impacts from our operations.

### **4.5.4 Biodiversity, invasive non-native species and barriers to fish migration**

We work with our regulators to reduce the spread of non-native species. We are reviewing our assets that are within rivers, that could cause a barrier to fish migration with a view to removing that barrier while continuing our operation. We are also working to increase the biodiversity on our land and working with others to deliver ecological improvements.

### **4.5.5 Net Zero**

We will work with our regulators to set out our commitment to balance our carbon emissions or use offset approaches to support government ambition.

## **4.6 The Flood Plan**

We will work with the National Infrastructure Commission and our regulators to ensure that flood defences that are considered as national infrastructure are maintained and improved to meet national guidance. Company flood defences not included within national infrastructure will be maintained to the company standard. We will also assess how to improve our asset resilience to flooding by reducing the time it takes to return to service after an extreme event.

To improve our resilience, we are looking at power generation and electrical resilience to a level above storm water within buildings. We have carried out an assessment of risk using GIS (Geographic Information Systems) and information obtained from NRW/EA to identify the national infrastructure flood defences and those that are company flood defences.



## 5 Strategic Company Level Risk and Estimated Costs

An assessment of how much it would cost to remove the risks that have been established was undertaken. This approach utilises the total volume of sewage that escapes from the system multiplied by an average cost to store that volume in tanks. Differing levels of containment can be costed and then used to determine the level to be achieved, and to be reached over time.

### 5.1.1 The destinations

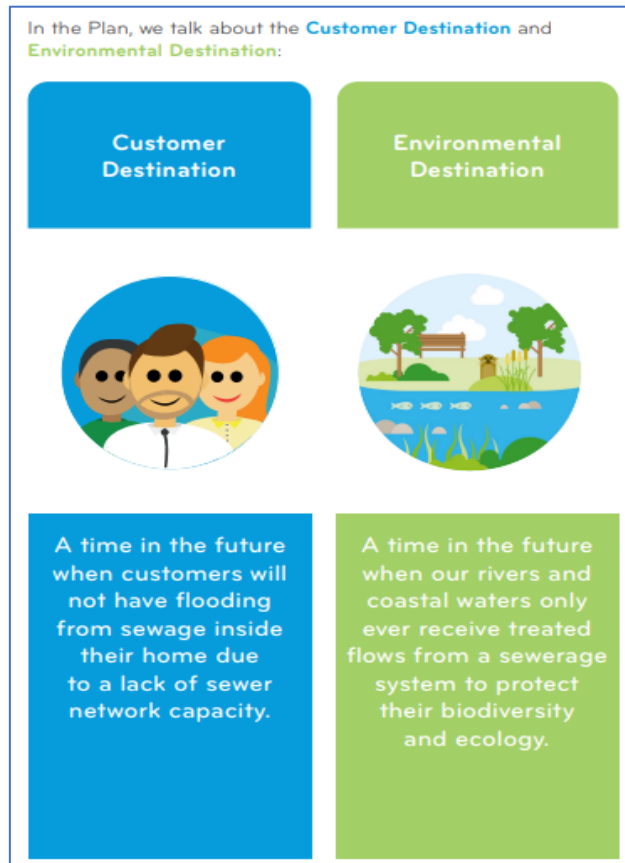
Our customers have indicated that they would like to reach two destinations.

These destinations will form the core direction for future plans.

We can return to each plan to determine our progress.

We tested this approach with our customers who supported the principle while recognising that we could not achieve this aspiration during the 25-year period of the plan. They provided some insights to what they wanted and when, and how they would like us to develop solutions to reach these destinations.

They recognised the following considerations which have (and will continue to be used) to develop our solutions:



- The scale or amount of work to be undertaken.
- That there would need to be work carried out across our whole operating area.
- That they did not want us to revisit locations again and again.
- They wanted us to be efficient with the funds that are provided to us through customer bills
- They wanted us to plan to reach the aspiration by 2075.
- They would prefer internal sewer flooding to be resolved first but not to exclude progressing storm overflows.



### 5.1.2 Objectives - target and cost information

The plan provided reference information in the form of a matrix for both storm overflows and customer flooding. The results are shown in Table 5 below.

Table 5 Cost estimates to reach varying spill frequencies over two time periods 2030 and 2050.

<b>Storm Overflow</b>	<b>2030 (in £bn)</b>	<b>2050 (in £bn)</b>
Environmental Harm	5.160	5.160
40 spills	1.125	1.175
10 spills	2.944	3.206
Zero spills	8.286	8.477

*\*Note each value is independent.*

The costs for all areas to achieve zero spills is shown in Table 5, while at the same time continuing to improve other performance targets and the additional requirements from the NEP, in a 25-year period, was found not to be affordable. This was the same for all areas to reach 10 or 40 spills. This information fed into the Better River Quality Task Force along with other 3<sup>rd</sup> party evidence which drove the first milestone target; to remove environmental harm by 2040 (as it was also noted that the milestone could not be reached in 5 years).

One of the other performance targets that had to be considered alongside the storm overflow improvement target was the number of times customers experience sewer flooding in Table 6. The anticipated cost was taken forward to inform the discussion on the overall impact on customers' bills.

Table 6 Showing the estimated cost to resolve customer flooding in the short term and by 2050

	<b>2020 (in £bn)</b>	<b>2050 (in £bn)</b>
Customer flooding	2.814	5.508

*\*Note each value is independent.*

A National Environment programme projection in Table 7 (below) was developed to indicate how we intend to increase the number of investigations and be more proactive. Interventions were produced by applying a simple projection; combing differing investigation and intervention rates multiplied by an average cost.

Table 7 Showing the estimated cost to deliver the current NEP and what this could rise to by 2050.

	<b>2025-2030</b>	<b>2050</b>
NEP/WINEP	£840k	£1,265k

This strategic information provided evidence to support the development of our approach to optioneering going forward where affordability, pace and coverage are all identified as being key aspects of plan development at the programme appraisal stage.

The costs to contain the volumes indicated for all these enhancement activities indicated that customer bills would need to be increased to achieve a conclusion within 25 years, or the pace of improvement would need to be over a longer period, such as 50 or 75 years.

We tested this with our customers who supported our approach to creating a bill profile that increases over time to deliver greater benefit while not making bills suddenly change excessively. The final company level plan and core plan are shown in later chapters.

We have taken the projection from the Long-Term Delivery Strategy combined it with the DWMP most likely forecast shown in Figure 11. Investment starts at £1.2bn rising to £2bn by 2050. Investment to deliver NEP, storm overflows and reducing customer internal flooding are all progressing at a pace that our customer's support. The LTDS does not include an allowance for NEP from 2040 as the content of the NP programme at that time is less certain.

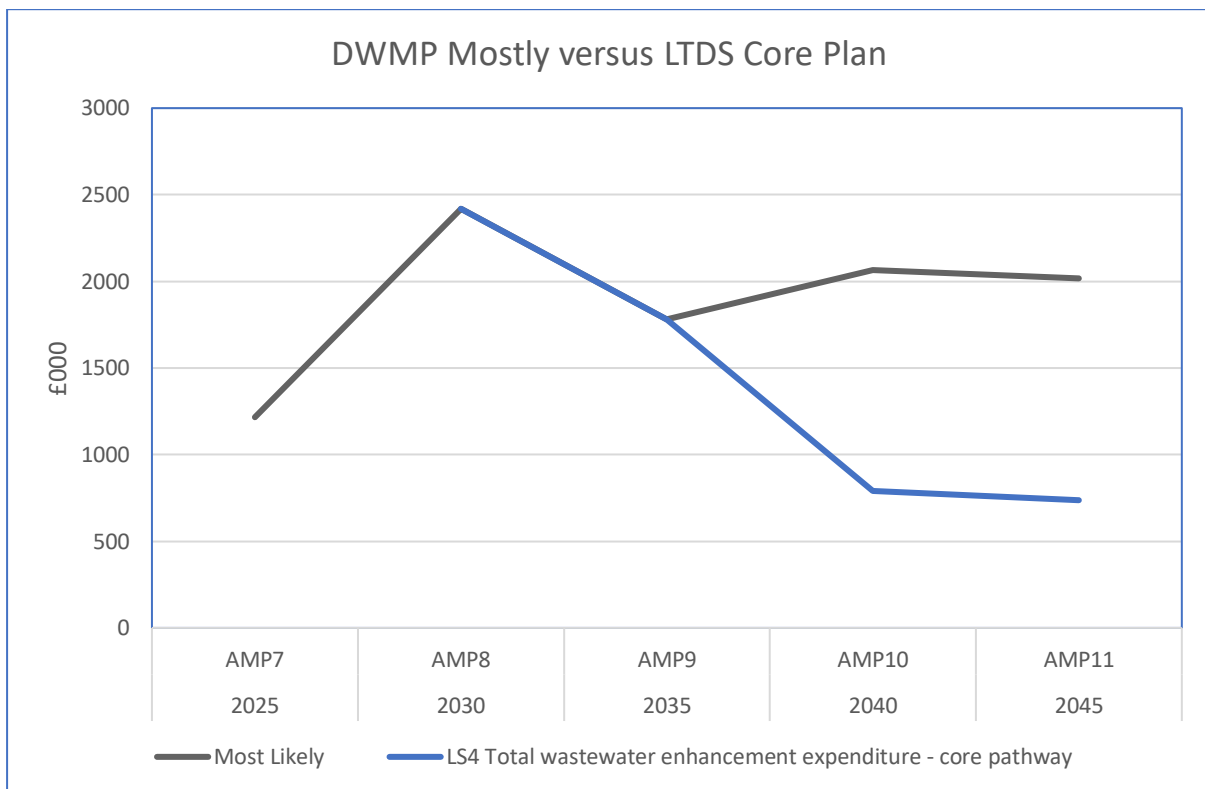


Figure 11 Most Likely investment versus the Long-Term Delivery Strategy graph.

## 5.2 Location Planning Priorities

Our overall goal is to ensure that we can protect our customers and the environment across our whole operational area. We cannot do it all at once, as explained at the strategic plan stage. As such, we need to better understand what we should prioritise first.

Our approach allows us to maximise the benefits we can deliver for both customers and the environment at the same time. This means that we will firstly concentrate on the places with the worst levels of flooding, and those areas which are the most environmentally sensitive from the effects of storm overflows.

We will then look at internal and external sewer flooding, SSSI (special areas of scientific interest) and bathing water impacts from our discharges to the environment, and so on, until we have assessed all locations.

The matrix in Figure 12 provides a visual overview of how we will reach that coverage, starting in the darkest orange and gradually working towards the green. This approach enables us to be transparent, showing the order in which we will prepare more areas into a programme of solutions for delivery, always looking at the highest risks first and then adding all the areas together to show the final programme. The framework has not been written to include the National Environment Programme; this prioritisation matrix incorporates the designation of the river or sea allowing us to combine customer and environmental risks.

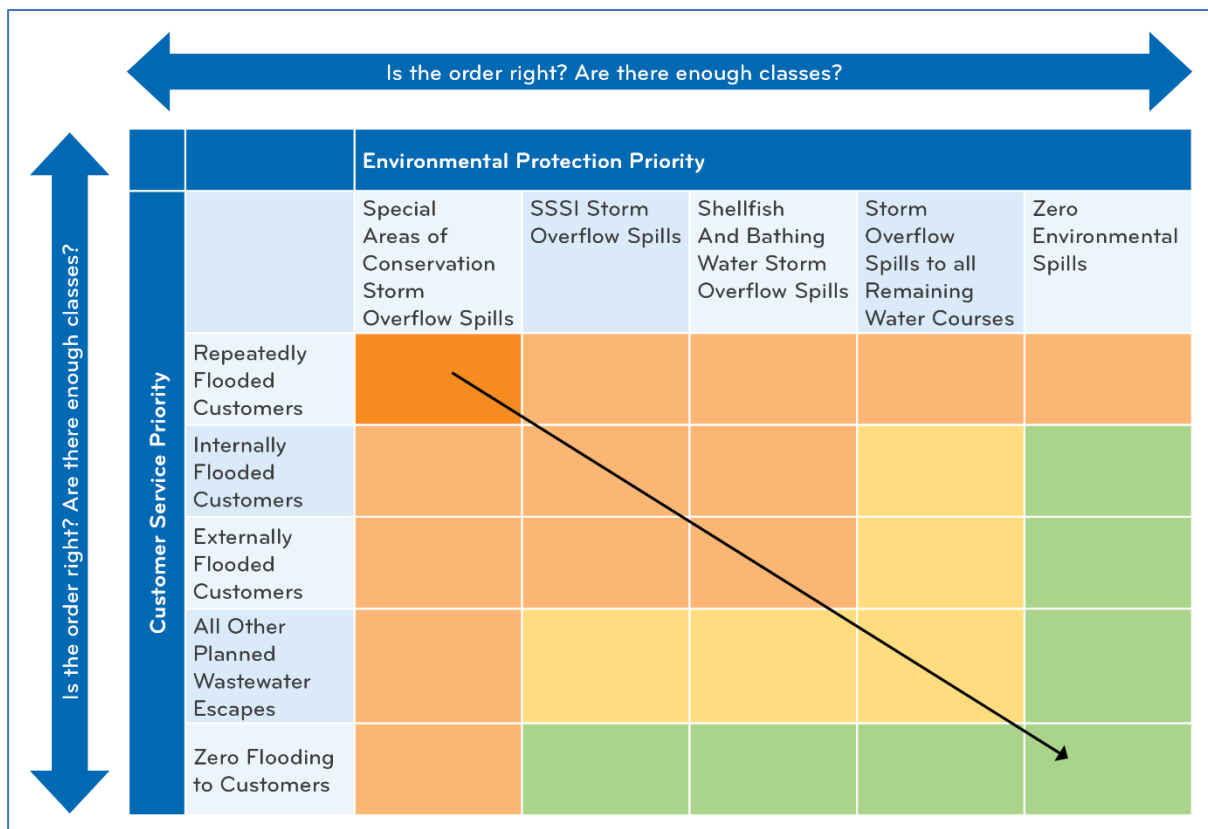


Figure 12 Matrix showing customer service and environmental protection priorities.

### 5.3 Baseline Risk and Vulnerability Assessment

The assessment of risk culminates in an amalgamation of objectives into themes. This includes risks causing flooding and pollution, and opportunities to provide resilience and drive additional maintenance work. Each area underwent a risk assessment that looked at multiple risks and each localised area was concluded to have low or no risk (grey bar) moderate risk (orange bar) or significant risk (blue bar) as shown in Figure 13.

When the risks are shown at a company level, the extent of the work required, and the complexity of the work, shows that a prioritisation approach to planning is required. The problem characterisation stage provides this.

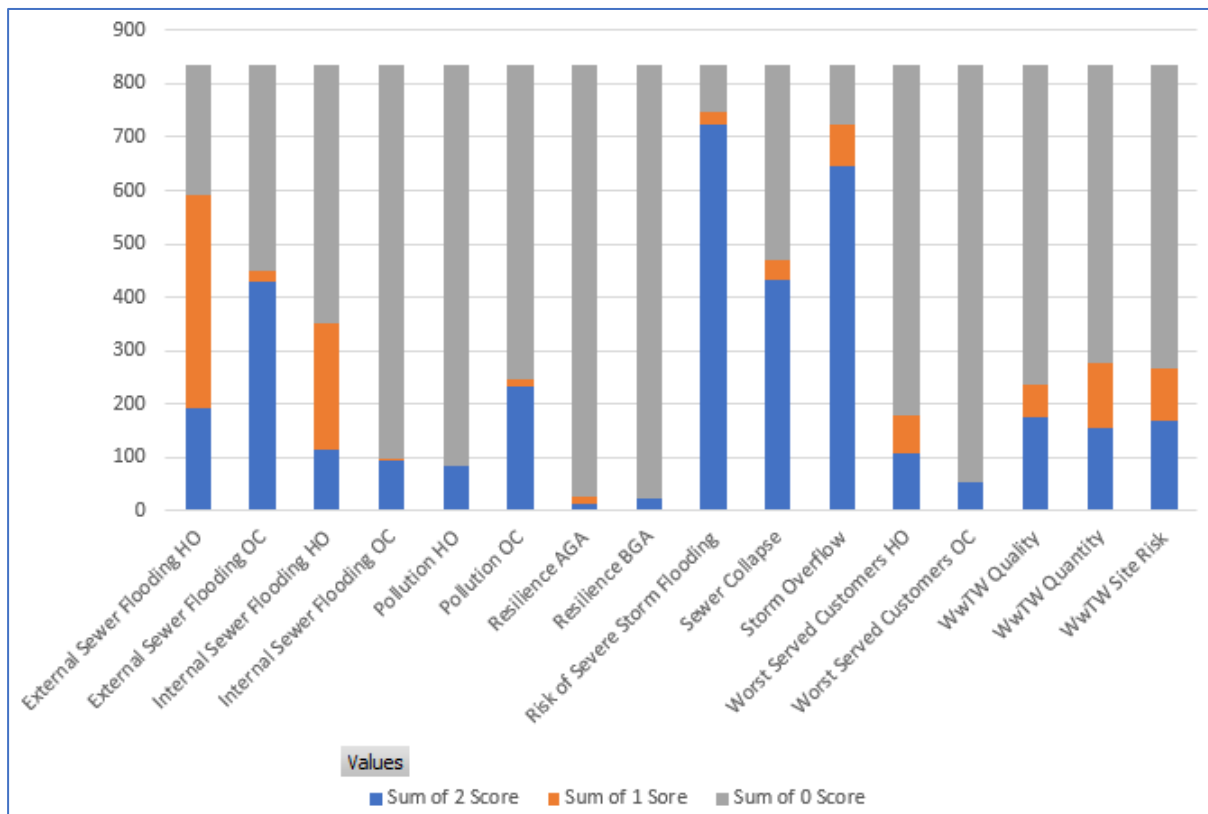


Figure 13 BRAVA (Baseline Risk and Vulnerability Assessment) scores at Level 4 showing the distribution of risk between no or low risk '0' some risk '1' and significant risk '2'

At a company level, the highest areas to focus on are storm overflows, risk of sewer flooding in extreme flooding, and sewer collapses, followed by other causes of flooding. The results show that greater than half of the level 4 catchments are of significant risk (as indicated by the blue bar).

#### 5.4 Risk Results using the Framework Methodology

The map below shows that most of the areas we serve, which we have broken down into 106 planning zones, will have increased risk of flooding, pollution, or both, without the DWMP process and investment. It also shows a strong indication of where we want (and need) to work with other stakeholders - whether that is on flooding, improving water quality, or both.

More detail regarding the results that make up the risk map can be seen in the Level 2 and level 3 summaries. A reflection on the Framework that summarises the results in this way indicate that more detail is required to understand what the map is showing. There are risks in all areas. However, the map in Figure 14 does not show which areas are higher priority as the methodology includes a 0,1,2 scale which is not detailed enough to provide clear prioritisation at a company level. An alternative approach to presenting the risk results will be investigated, and included, in DWMP29.

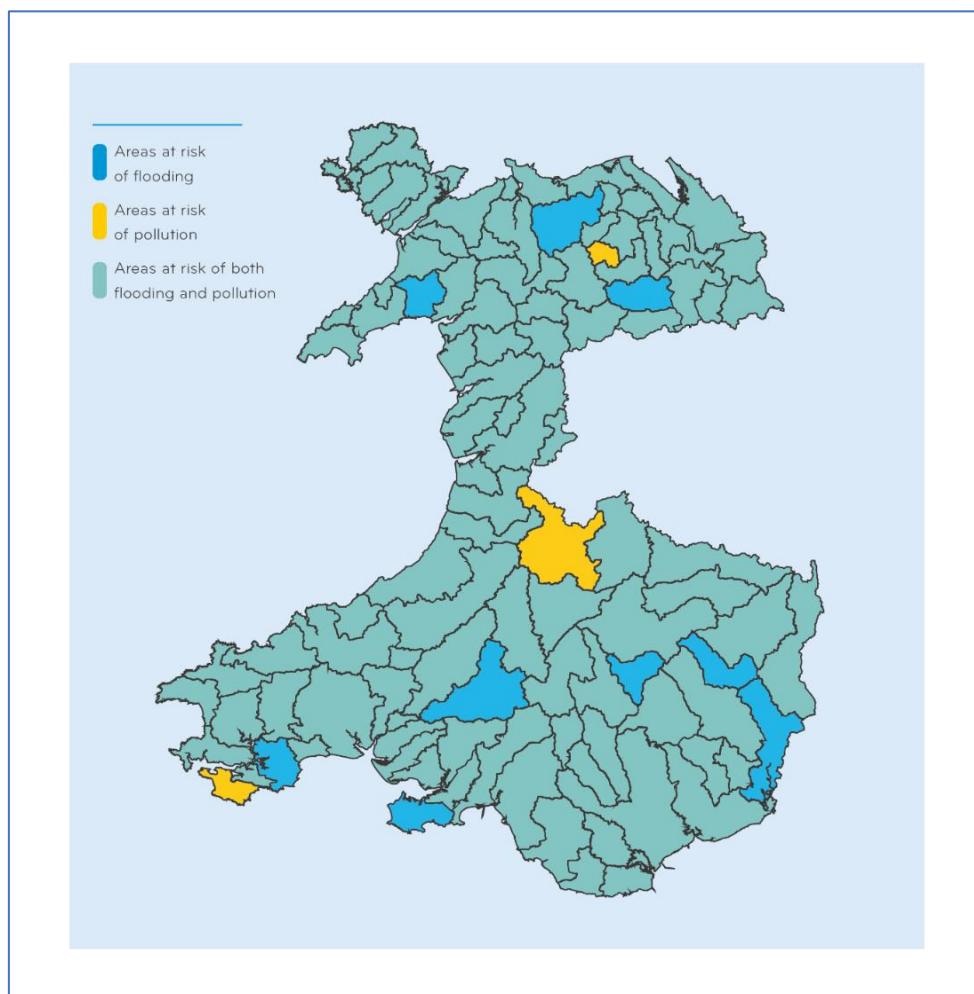


Figure 14 Map showing areas at risk of flooding and pollution in 2050 if we do not start to invest.

#### **Pollution in rivers – where does it come from?**

Pollution in our rivers comes from different sources. These include wastewater treatment works and private septic tanks, agriculture, mining, urban runoff, storm overflows, forestry, atmospheric deposition, and roads. The actual impact of any pollution is dependent on the pollutant, the sensitivity of the river, and the degree to which the pollutant is diluted.

### **How do we manage river and coastal water quality?**

Our environmental regulators manage water quality at rivers and coastlines. As a water company, we can have a significant impact on these areas. We work closely with regulators on how we can support environmental quality objectives.

We test and report on the quality of water that is discharged from our wastewater treatment works to Natural Resources Wales (NRW) and we report on how well we are doing annually. In addition, we work with regulators to understand what proportion of the pollution entering our rivers and coastal waters comes from our discharges. This helps us to focus our investment where it is needed most to help protect the environment.

Climate change may change the water levels in our rivers, particularly during dry summers. This means that, if we continue operating as we do today, it will become more difficult to ensure our rivers remain healthy.

We explored how to forecast future river water quality to understand if climate change, our forecast of our discharge from our WWTW (wastewater treatment works) and expected land use change would see a deterioration by 2050. We found that for specific quality indicators, such as nitrate and phosphorus, some rivers were at risk of deterioration which could indicate the need for a review of our permit to discharge in the future. As this is a new and innovative way to look at future river quality, we will work with NRW and EA to improve our understanding while merging the NEP into DWMP29.

Identifying opportunities to work with others is an important part of developing a DWMP. We have developed key areas and topics to start this process with our stakeholders. For example, working with local authorities and schools to reduce their water use and help pinpoint opportunities to reroute rainwater to their grounds. Working with stakeholders is explored in more detail in the 'Engagement' section of this document.

What we learnt from the undertaking of the DWMP framework was that the expectation of government and our regulators were not all captured in the DWMP Framework that was published in 2019. It is now clearer what the expectation is for the next DWMP from our financial regulator point of view. However, in terms of producing this DWMP in line with the more recent expectation from our regulators, we can only merge the final outcomes from differing workstreams together recognising that before the next DWMP in 2029 there will need to be additional reflection on how to produce a DWMP that includes all aspects of asset planning, The National Environment Programme (WINEP&NEP) with long term delivery strategies and the DWMP Framework.

The Environmental Programme also highlights where investigations are needed over the next 5 years. These are mainly focused on water bodies failing good status as part of the water framework directive. Our review of consent plan in DWMP29 will bring out these opportunities and risks alongside the flooding and pollution map in Figure 14. It's just as important to explain the investment in solutions but also to explain the investment required to understand the reason for a solution, the reason to investigate a site before concluding a solution.

## 5.5 The Options Development Approach

We chose to develop solutions using expert judgement but following the new ODA (Options Development and Appraisal) approach laid out in the framework. We found that we could do the initial stage at a company level but soon found that, at a company level, the actions to carry out were not being reduced sufficiently to narrow to a single, or 1 to 5, possibilities.

The results seemed to indicate support for programmes of work that all companies carry out routinely. When brought together into programmes of work, this culminated in the production of the journey plan which is shown in Figure 15, and individual journey plans can also be seen in the area summaries and how the journey plan can be adapted to show a localised programme, shown in Figure 16.

### 5.5.1 Journey Plans

A Journey Plan is an action plan set out as a graph over time. The coloured parts of the Journey Plan show different areas or programmes for investment. These programmes of work are activities that all wastewater companies carry out through their normal operations.

Through the development of this Plan, we have concluded that we need to carry out what we have been doing before but be more transparent in terms of why we are doing the work, and why we are working in one location rather than another.

Our consultation was created to provide answers to Cycle 2 and in recognition that, at a localised level, customers want to know that they are included in the programme of repairs or for example, if their location is included in the surface water removal plan.

Figure 15 shows how we can use the Journey Plan to communicate the programme of work to customers, whilst Figure 16 can be used to tailor the company programme. While we have not been able to provide an estimate for cost for each programme of work at this stage, the approach demonstrates how we can communicate to customers in visual and transparent way.

The key in Table 8 shows the description of the different colours represented in Figure 15.



Figure 15 The Journey Plan

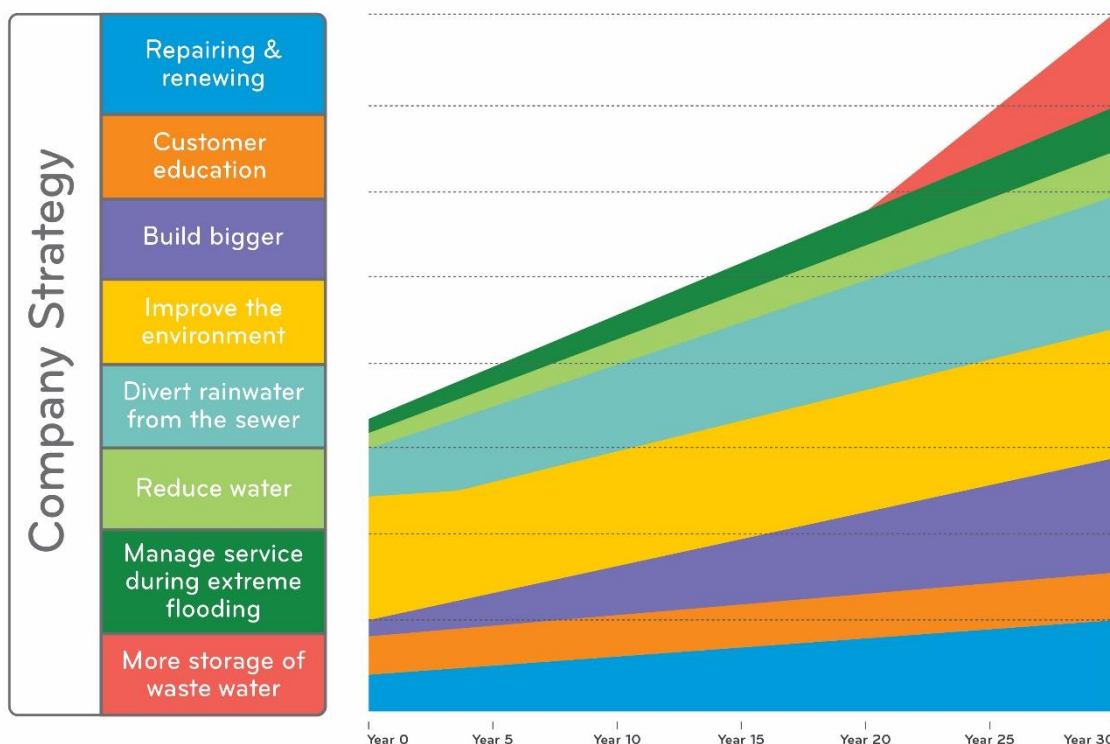


Table 8 Key to the Journey Plan

Programme	Description of actions carried out to deliver the programme
<b>Repairing and renewing Pipes</b>	Repairing and renewing sewer pipes to stop water getting in and reducing infiltration.
<b>Customer education</b>	Communicating with customers to reduce: <ul style="list-style-type: none"> <li>• Blockages caused by fats, oils, and wipes.</li> <li>• Water runoff caused by paved-over gardens and using green spaces for driveways.</li> </ul>
<b>Build bigger (Pumps, pipes, and wastewater treatment)</b>	To cope with current and future flow rates during dry weather conditions and make space in our assets to carry the additional volumes.
<b>Improving the Environment</b>	Preventing harm caused from poor quality water entering our rivers and beaches. Proactively making changes to reduce our impact on the environment.
<b>Divert rainwater from the sewer</b>	Changing surfaces that are not very good at absorbing water. <ul style="list-style-type: none"> <li>• Helping suppliers to change surfaces that are not very good at absorbing water.</li> <li>• Re-directing surface water away from roads and driveways, back into the environment.</li> </ul>
<b>Reducing water use</b>	Supporting customers to reduce water use in homes and businesses while still using what they need.

<b>Managing service during extreme flooding of wastewater</b>	Where possible, protecting our assets during extreme flooding, doing what we need to do to support national flood defences and ensuring services can go back to normal as soon as possible.
<b>More storage of wastewater</b>	Considering storage of wastewater as a last choice if we still cannot meet our goals with other options. There may be innovative approaches in future that could be chosen instead.

The Journey Plan is a strategic and company level overview of everything we must do to address the risks we face. We also produce local level Journey Plans; these can be found in the DWMP area summaries.

The main principle behind the journey plan is based on an industry that already carries out actions to resolve risks. The DWMP has taken these actions and linked them to the risks that were being returned during the ODA process. This was done for each catchment at a strategic assessment, into a hierarchy of application. It started with addressing sewer capacity and working with customers first, followed by drainage capacity, environmental capacity and linking with other plans, such as the WRMP, to manage consumption. The plan shown in Figure 16 shows how this builds together and shows that in any year or decade all programmes are being delivered but the size of the programme may be different.

To demonstrate what is being created, and how this underpins our plan, Figure 16 shows how the principles of the journey plan are translated to a catchment plan with choices being presented for future alternative programmes.

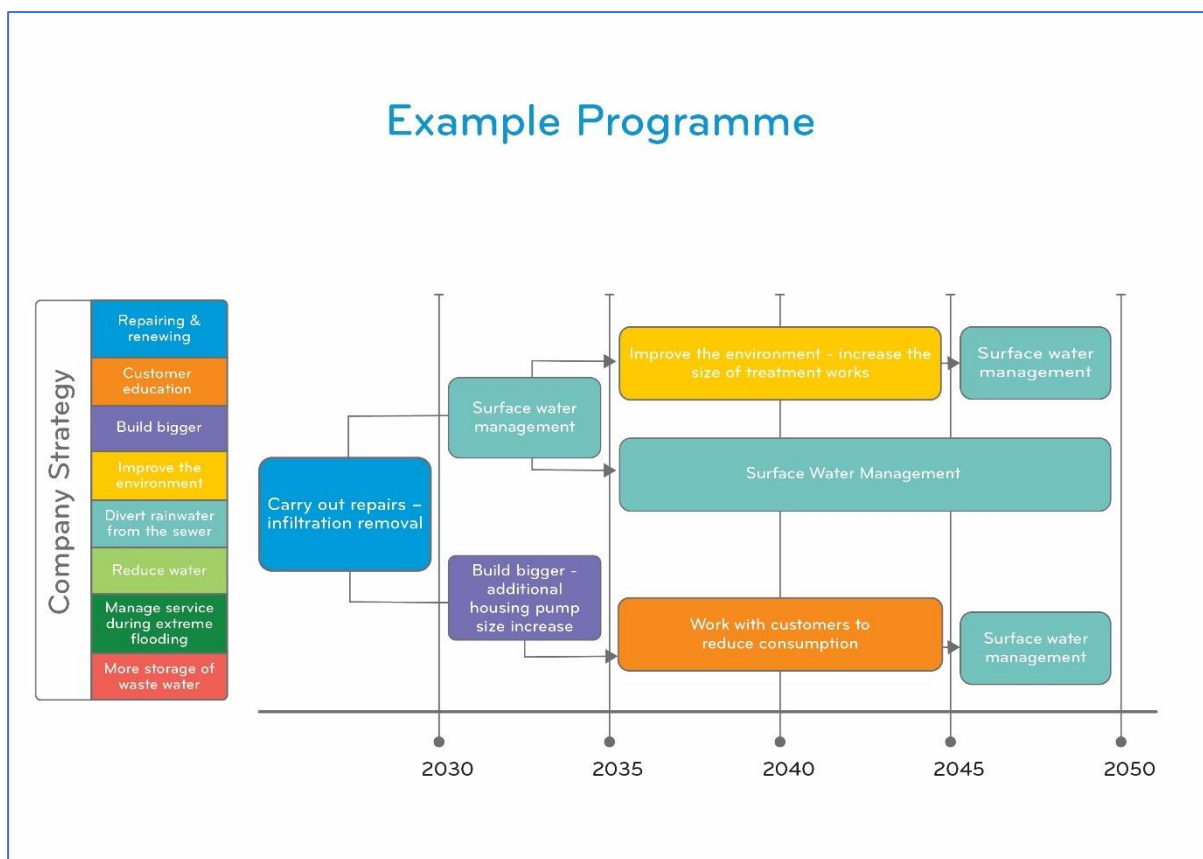


Figure 16 how the journey plan could summarise the programmes at a Level4 catchment level.

### 5.5.2 Opportunities for working together.

For Cycle 1 of the DWMP we have undertaken mini projects to identify our best opportunities to work with others. These include:

- **Retrofitting SuDS** (Sustainable Drainage Systems) in schools and public places
- **Working together** – development and continued cost of support by Stakeholders
- **Education** - Water efficiency and water consumption information
- **Education** – Campaigns blockages, fats, oils and greases and non-flushable products. These products include: wet wipes, sanitary products, nappies and fats oils and grease from cooking.

We have estimated the cost of a continuous programme of work in these areas and this is explained below.

#### *Retrofitting schools and public spaces*

We undertook a GIS analysis to establish locations where there could be an opportunity to work with councils to proactively prepare plans to reduce rainwater from roofs. The programme produced identified approximately 25 years of investigations. We learnt that councils are empowered to drive this work themselves to reduce the impact in extreme flooding and the programmes can and has been carried out already when school buildings are being renovated or replaced. The same can be achieved for public and government buildings. This information then helps the joint project board continue to map opportunities that are for retrofitting when there are no plans to upgrade the buildings in existence.

#### *Working together – formalising engagement*

Our approach to engagement discussed in Section 8 builds in the current availability of joint forums that discuss both issues for 'quality' and 'quantity' and the recognition that NRW's Area summaries carry out engagement with stakeholders and those that live in the vicinity. We found that there are no current forums that bring together the water cycles to manage both risks from quality and quantity risks. The area statements were set up to meet SMNR with wide coverage of risks but was too broad for the water cycle without being a set up as a group that feeds into the summary.

What is needed is three tiers, each with a specific responsibility. The responsibility being the project boards that develop the scopes of work, investigation opportunities and presents them to the strategic forum for support and funding and the community boards to support the project boards once the go ahead to deliver a project has been given.

We estimated the cost for the strategic forums and project boards with the simple assumption that the overall cost would have to be shared between the stakeholders who participate. With the initial assumption being that the cost would be shared equally between ourselves, NRW/EA and the councils. Costs were based on the 13 river basins for project boards and four regions for strategic forums. However, this type of engagement is really funded as time from a resource within the organisation. The estimate has been calculated to enable government to understand the likely cost of proactive joint work bringing together with the aim of developing the national drainage and environment programmes.

#### *Water Efficiency and Water consumption*

Our company already has an approach to support customers to reduce their water usage with a view to being more efficient with the water they want without wasting it. Our approach is to support this programme of work by delivering the same message when we are meeting or working with customers. We have material on our website, and we offer water saving devices. We will support the same campaigns and work with our water colleagues.

#### *Fats Oils and Greases, Wet wipes and other non-flushable objects*

We have a campaign at the company level named "Stop the block". This looked at developing differing layers for target audiences, but using the same campaign message. We considered TV advertising, radio messaging, newspapers, social media, Royal Welsh Show (and other local events), and a caravan placed in a local carpark.

We thought about how best to reach customers, and then tried to quantify the benefits of the intensive campaigns. We concluded that at this point, not enough was known to understand the impact to customers from these intensive campaigns. We will look at it again however we already engage using caravans at car parks and larger events such as the Royal Welsh show using the "stop the block" material, our approach is to continue as we have been.

#### *Infiltration programmes – Misuse and cross connections*

We are investigating, monitoring and removing water that is getting into the sewers. This programme is carried out as part of our operational activities when they are found but also as part of programmes of work to improve drainage as part of retrofitting surface water management. There are 2 areas where customers can help. We need to find and work with customers who have misconnected sewers on the property to surface water that runs to localised streams. And we need to work with stakeholders to systematically disconnect pipe work that has been connected bringing in runoff from farms, for example, into foul-only sewers.

### 5.5.3 Cost of the destination plans

The estimated cost of differing approach to storm overflow and to resolve customer flooding is summarised in Table 9 below.

Table 9 Table showing costs related to three possible longer-term destinations.

Category	Zero storm overflow spills and no sewage flooding in customers' homes due to lack of capacity	Remove environmental harm from storm overflow and no sewage flooding in customers' homes due to lack of capacity	10 spills per year from storm overflows and no sewage flooding in customers' homes due to lack of capacity	40 spills per year from storm overflows and no sewage flooding in customers' homes due to a lack of capacity
Cost of customer destination	£5.508 Billion	£5.508 Billion	£5.508 Billion	£5.508 Billion
Cost of varying environmental destination	£8.477 Billion	£5.160 Billion	£3.206 Billion	£1.175 Billion
Total	£13.985 Billion	£10.668 Billion	£8.714Billion	£6.683 Billion

Note: These costs are subject to change and have been included for illustrative purposes.

The likely costs of the long term plan are shown in Table 9 and illustrates the predicted costs of carrying out this work to varying levels of attainment. Additionally, we know that once we have reached our destinations, there will be further costs associated with maintenance which will continue to keep bills higher if our plans do not insist on more sustainable low carbon solutions. However, it is important to note that there are many other destinations to add over time, and combinations of destinations, that the DWMP can produce cost estimates for. Those outputs can be used to inform the debate with government, regulators, and customers about the most appropriate pace of investment and the level of protection our customers want us to provide.

#### Storm Overflow Evidence Project

The Storm Overflow Evidence Project (prepared for the Storm Overflow Task Force in 2021) estimated the cost of eliminating storm overflows in England alone at between 150 and 600 billion pounds. A similar project is currently underway in Wales. We expect it to come to a comparable conclusion.

### 5.5.4 Cost of the National Environment Programme

The latest NEP has been estimated to be in the region of £900m. This is an increase from previous NEP programmes and we are anticipating that as we drive more proactive

investigations the programme will continue to rise until we reach all water bodies as defined by NRW achieving Good Status. The forecast of investment is laid out in Table 9.

*Table 9 showing the investment expected to address the NEP and WINEP*

<b>NEP</b>	<b>2025 (£m)</b>	<b>2050 (£m)</b>
WINEP/NEP Overflows	393	560
WINEP/NEP Other drivers	542	781
Total	935	1341






#### 5.5.5 Cost to maintain our service

As any company must recognise, there are costs that are estimated to account for daily running costs. These costs to just maintain our assets and keep the company operating are in addition to the investment discussed so far, to enhance our service. The difference being that we know that assets will need to be replaced and that staff are required to meet customers. The additional investment is required to keep up with expected housing development and risks from climate change and drive environmental improvement to reduce the impact of our operation.

We are always looking to be efficient with the allocation for maintenance spend. Our regulator provides an estimate based on a model of key parameters to allocate a fund and it's this fund we use to carry out statutory maintenance and other activities such as network cleaning to remove grit, fund the team of operatives to meet customers, operate treatment plants and so on.

### 5.5.6 Constraints

The work we are able to deliver through the DWMP and investment programmes is limited by the following constraints, summarised below.

	<p><b>Affordability</b></p> <p>Understanding the limitations on customers' ability to pay for additional or improved services. The pace of change is set by customers' ability to pay their bills. If customers are struggling to pay their bills then the pace of change needs to reflect this. When customer are able to pay their bills and times are better, then we can speed up the pace of change.</p>
	<p><b>Deliverability</b></p> <p>While considering affordability, we cannot create a programme of work without considering the distribution of improvements over time. We need to ensure that work is carried in a way that ensures that the community is not impacted too disproportionately. Planning the locations of work to be improved so that our service is maintained is just as important as the limitations on affordability.</p> <p>Deliverability is about the right number of solutions that matches the cost available from affordability and finance ability.</p>
	<p><b>Finance ability</b></p> <p>As we move from the sewage plan to the Drainage Plan the capability of funding solutions and improvements becomes more complex. Within the Drainage Plan there are opportunities that are not in a water companies' direct ownership but would still be beneficial to support. Further, as these plans and proposals develop, we will need to continue to work collaboratively with government to make legislation easier to navigate, and in turn this may result in greater efficiencies to deliver drainage solutions with other stakeholders.</p>
	<p><b>Technically Feasible</b></p> <p>One of the core assumptions in options development is that there is a sling listing of solutions that could work to address the problem at hand. The approach must ensure that there is consideration to new innovative or blue sky thinking. What this means is that there are 2 stages of assessment for these examples. First the research to find new approaches then the assessment to understand if the approach is technically feasible yet.</p>
	<p><b>Customer Promotable</b></p> <p>There are also some solutions that are completely feasible to deliver but from a customer point of view just would not be acceptable.</p>



## 5.6 The Programme

When each of the contributing sections are put together the company is most likely going to need an investment in the region of £1.2bn during 2025-2030 rising to £2bn by 2050.

The Figure 17 shows that the DWMP is predicting a higher investment going forward in the region of £2bn. The approach taken using Ofwat methodology for the long-term delivery strategy indicates a core plan that drops down in the last decade below current investment levels. The drop in the LTDS forecast links to the Ofwat methodology that reflects that investment in NEPs of the future is less defined and less certain so should not be included in the LTDS forecast. The DWMP is forecasting the expectation that future NEPs will be of considerable size and drive a more proactive investigation programme that in turn will lead to more improvements to our rivers and coastal waters.

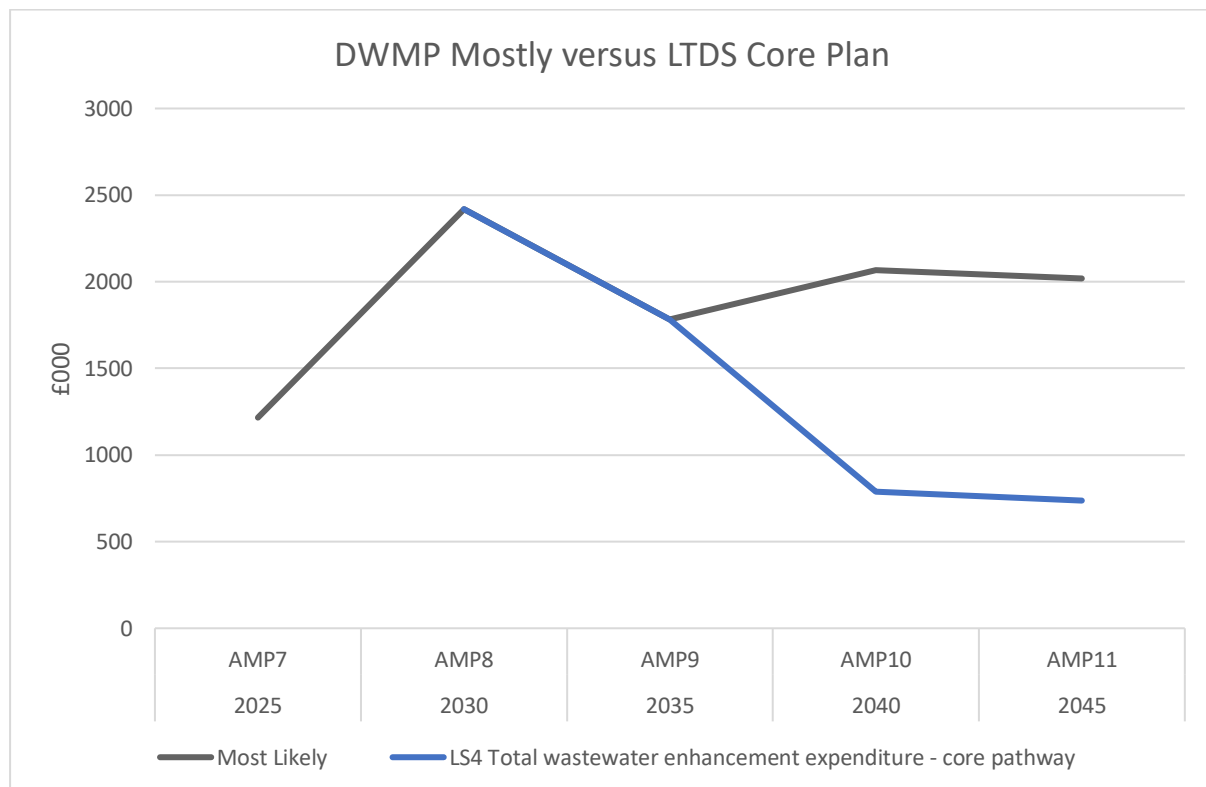


Figure 17 Most likely versus the Long Term Delivery Strategy core plan.

The balance between differing aspects of priority beneath the most likely investment profile means that we will continue to drive improvements in the environment, reduce flooding to customers, build in operational resilience and support the drive to Net Carbon and improve biodiversity. Taking our customers views to make improvements continually to reduce the need for sudden bill increases allows us to reconsider how we develop solutions so that customers of today enable improvements but also allowing customers of the future to pay their fair share.

The new understanding that a DWMP needs to not only include the DWMP Framework, but also the National Environment Programme (NEP) and Asset Planning processes, means that ultimately the amount of investment required every 5 years will be heavily dictated by the requirements driven from the NEP. The NEP in previous five year periods has been greater than 50% of the overall investment to maintain the sewerage and drainage service, which leaves less available funds to make a step change in levels of service. Each 5-year period

aims to maintain the company's licence agreements and make the changes required to address the Water Framework Directive.

Our plan has been developed using the DWMP framework, and further integration with investment planning, regulators, and other Risk Management Authorities (RMAs) is necessary.

In our draft plan, we presented four alternative investment scenarios, and after consultation, it was determined that the preference is for lower current bills without demanding a sudden increase, as has been seen in the energy sector. We have prioritised our first 39 sites based on this preference, and the investment profile depicts how these sites will be addressed over time.

These investments will result in a decrease in internal flooding and CSO spills. Most importantly, the plan outlines how we intend to spread the workload over time to ensure affordability. Ultimately, the plan will provide the government with a true understanding of the cost of drainage and wastewater management and the rate of change that is feasible based on affordability.

We have also linked these investment plans for 2025 to 2030, and any solutions that are not included in our asset planning for Ofwat will be spread over the remaining 20 years.

The Company strategy to reach an end destination is an important stage to consider. In reality, the ability to reach an end destination does have constraints one of the greatest constraints to accept is that there will be some instances where the end destination will be limited to what is technically feasible, the company will deliver best endeavours in these cases.

## 6 The Localised Risk Plan

Despite being informative, the Strategic Plan information does not produce solutions that can be delivered on site. What is needed in addition to the strategic assessment is review of the risks in a localised area and then a prioritisation of that location against other sites within the company.

### 6.1 Localised BRAVA

The risk assessment carried out and presented in section 5.3 is also available at other plan levels. The example in Figure 18 shows how BRAVA is distributed in Llyn and Eryri one of our Level 2 areas.

An interpretation of results in Figure 18 shows that there are 93 catchments shown as the horizontal line. All catchments have a risk of sewer flooding in an extreme storm with over 80 being very significant. The following 4 highest risks for this Level 2 area shown with over 50 localised areas with risk due to storm flow compliance at treatment works, pollution due to storms and two risks associated from blockages.

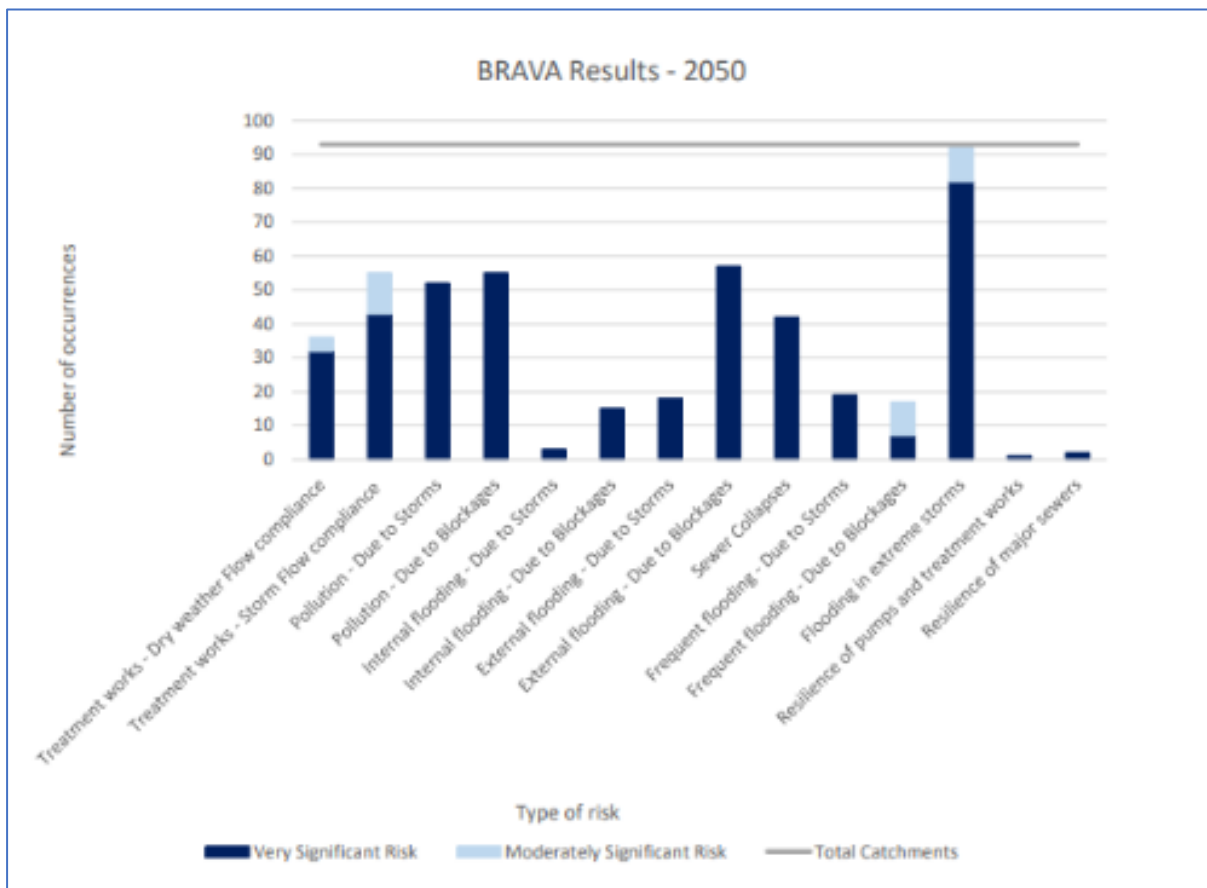


Figure 18 Localised BRAVA L2 Ynys Mon showing 2050 risks.

More information on the BRAVA risks and how they are distributed across our operating area can be found in the area summaries published on our website.

## 6.2 Problem characterisation

The Framework categorised risks into Table 10 below. This approach will be useful for future cycles once the full extent of the risks, opportunities and solutions are understood. In the meantime, the matrix in Figure 12 will be used until we have completed every box.

The Framework suggested that each Level 4 catchment needed to be assessed for its complexity versus its strategic need. From the 835 original Level 4 catchments only 44 were deemed either 'medium' or 'high'. That means that the catchment would need to score within the yellow and red zones below. Although we have many significant risks they are not all concentrated in one or two zones, and the risks are not that big a problem and not too complex to resolve.

Table 10 Problem characterisation from the DWMP Framework

		Strategic needs score ("How big is the problem?")			
		Negligible	Small	Medium	Large
		1-2	3-4	5-6	7-8
Complexity factors score ("How difficult is it to solve")	High (8+)	Low	Medium	High	High
	Medium (5-7)	Low	Low	Medium	Medium
	Low (<4)	Low	Low	Low	Medium

During this plan the approach highlighted the need to focus on 44 'Level 4' catchments where the priority matrix which combines service risk versus risks to highest designated environmental location, highlighted 39. The remaining 5 catchments have been completed between the draft and the final versions.

We have concluded that the effort required in the options development phase would be to look at the 44 catchments while the business-as-usual approach to business planning would assess the investment required for the remaining areas. While this is an appropriate framework approach the consultation noted that in terms of investment at a company level the approach excluded too many risks and as mentioned also does not include investment for NEP. This assessment has not helped our application of the long-term delivery strategy approach and we recommend that all catchments are treated equally until both risk and options are understood in all areas going forward. This is still a considerable effort in comparison to where we are as a company when we started this development, and we will follow the planning prioritisation approach until all catchments have a detailed programme of work.

## 6.3 What did we solve in the 44 catchments?

We considered the two highest risks: flooding and storm overflows. At the time of development, the media had focused on storm overflows and we had already identified that we needed to ensure a balanced approach that also drove a reduction to flooding to customers, to resolve local issues.

We took each catchment and broke it down into risk zones and then looked at each to determine if a solution was required to resolve the worst type of customer flooding and the storm overflows nearby that were also impacting a designated water course, Special Area of Conservation (SAC).

We took the company ODA outputs a stage further and realised our highest risk were concentrated on hydraulic risks in the network. We chose to develop solutions using expert judgement but following the new ODA approach laid out in the framework. We categorised the list of possible options into bin tests. With each bin being a hydraulic method to resolve a solution. They were also put into a hierarchy to drive more sustainable solutions first. An example of the bin test approach is shown in Figure 19.

Scenario description	Description	Assessed?	Catchment Example area Score	Rationale
bin1	10% impermeable area removal	Yes	0.77	Take bin forward for further testing
bin2	25% impermeable area removal	Yes	0.85	Take bin forward for further testing
bin3	50% impermeable area removal	Yes	1.17	Take bin forward for further testing
bin4	PCC reduction - 100 l/head/day	Yes	0.55	No significant impact
bin5	25% trade flow reduction	Yes	0.55	No significant impact
bin6	50% base flow removal	Yes	0.73	No significant impact
bin7	Universal upsize	No	Not Assessed	Not assessed

Figure 19 showing an example of the bin tests carried out.

What this test produced for each risk zone was a programme of solutions to be undertaken to either remove or contain volumes of mixed rainwater. As these tests were being carried out within the hydraulic model itself, and the volume of each option recorded in the spreadsheet, the location and dimensions of the solutions could also be captured, enabling the equivalent of a delivery solution to be prepared.

We recognised that other companies were trialling automation but realised that we needed more time to develop hydraulic models, so we are waiting to learn from the trials undertaken by the other companies before progressing automation. In the meantime, by concentrating manually on the ‘problem characterised’, highest priority indicated catchments we have learnt how to develop solutions and where some of the pitfalls are in terms of affordability and deliverability.

### 6.3.1 Costing the solutions

The 44 areas now having been developed producing 219 suites of solutions starting with solutions to solve 2030 and then to follow up with solutions between 2030 and 2050. The benefit to the environment, society and carbon were also calculated. The capital cost of each solution was also calculated using the company’s solution target price approach. When combined together using an Ofwat methodology know as Average incremental cost and

Average incremental and social costing approach a comparison of least cost or environmental benefit was obtained.

We took the combined best value list from the options development part of the plan and then ranked the options on each of the following:

- Least cost: What are the lowest cost options?
- Benefits: Which options bring the most environmental and social benefits?

We ranked our programme based on the greatest environmental benefit, which was supported by our customers and stakeholders during the consultation process. We are driving as many environmentally cost beneficial schemes as possible, with affordability being the next stage to consider. We looked at the combined rank of solutions, producing the best value for our customers.

We also considered further whether if the benefit were obtained earlier would the process identify were opportunities to drive proactive improvements versus those calculated to solve a risk just in time could be identified. The process worked and we could demonstrate alternative programmes based on risk at a date in the future, bring forward benefit to drive a more efficient scheme for less cost and show the least cost over the whole programme or for 2030 only or 2050 only.

We asked our customers how they wanted us to create the programme of work and the response was to drive environmental benefit not least cost, to cap the investment into a stepped profile and they supported a doubling of investment each decade as the most supported.

### [6.3.2 Links to environment assessment](#)

The environmental assessment is considered further in Section 7

What we have carried out is to bring forward information from the SEA and HRA to address these risks while we develop solutions, for example if we are to lay a new sewer, we would not lay the sewer directly through an ancient woodland. By doing this upfront we hoped to reduce the number of negative impacts found in the statutory process of SEA and HRA.

Even though we tried to predict where negatives impacts could be identified in the SEA, HRA some solutions were not progressed as the SEA, and HRA still identified negatives impacts. Those found will be delayed and reassessed to make improvements to the solution being put forward for DWMP29 and to make improvements to our approach to determine if additional upfront decisions can again reduce the number of negatives found during the normal SEA and HRA assessment.

### [6.3.3 Handing off to the business plan and reprofiling 2030 to 2050](#)

The Price Review process was provided with the suite of solutions and undertook a long listing exercise as part of that process. Some solutions were short listed to be put forward as part of the AMP8 investment programme the remaining not selected have been reprofiled for inclusion in the remaining 20 years of DWMP24.

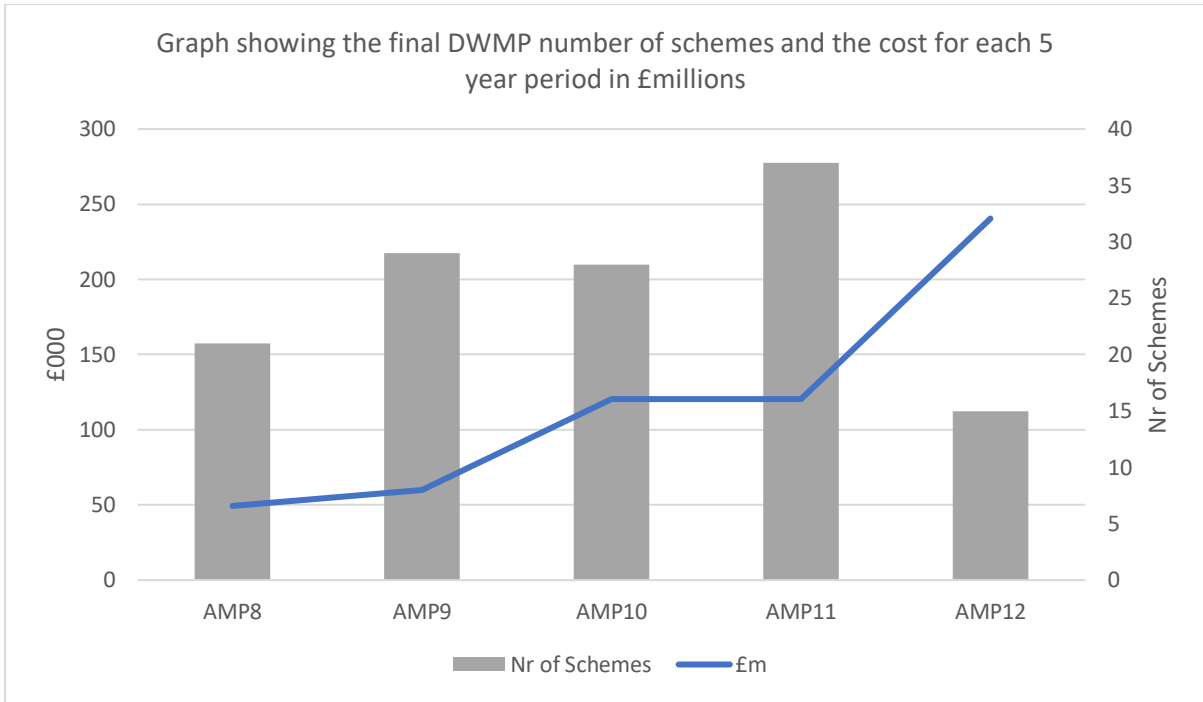


Figure 20 showing the investment profile between 2025 and 2050 with a doubling of investment each decade.

We have taken the suites of solutions created and profiled their investment so that we can resolve the risks identified within the period that the risk was assessed over. What this means is that the solutions prepared included the volume of rain and wastewater forecast between 2025 and 2050. When all the solutions are included and profiled as our customers indicated in the research many schemes were still left to be profiled after 2050. Figure 20 shows the investment for these 44 catchments with still 89 number of schemes at £963m still required after 2050.

The graph in Figure 21 demonstrates that for the same 44 catchments the investment would need to double every 5 years and still a large amount of investment would still be needed between 2045 and 2050.



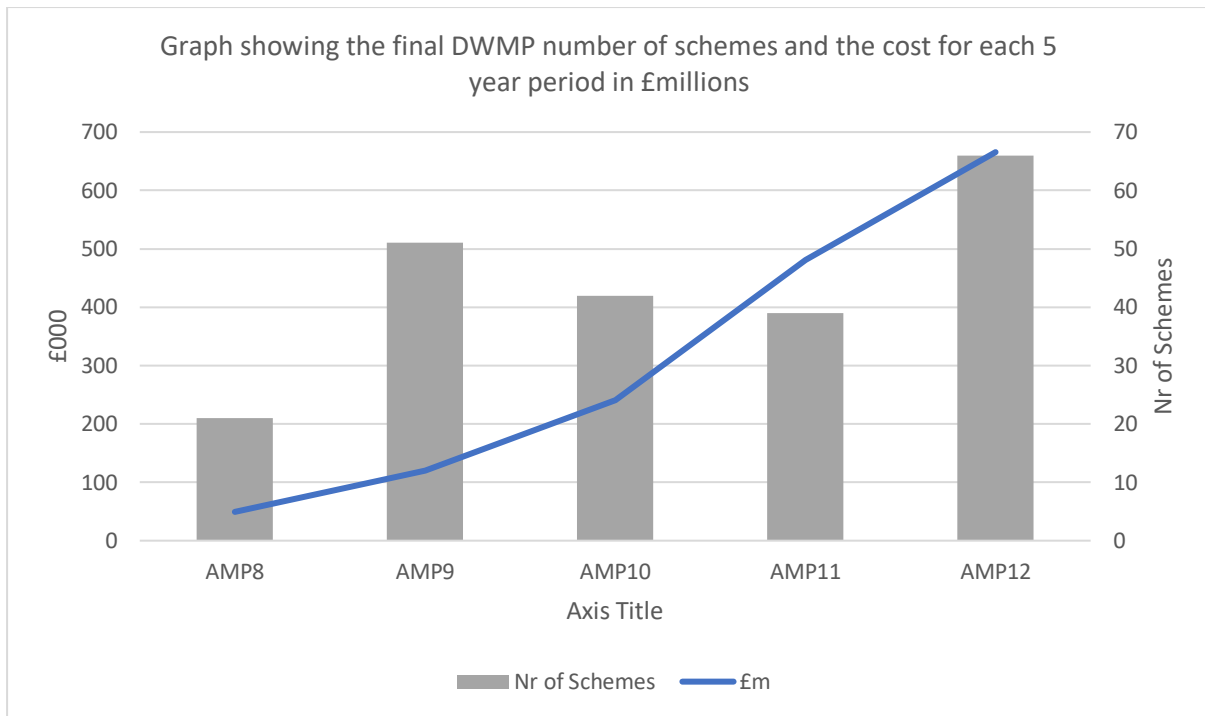


Figure 21 Showing the investment for the 44 catchments with a doubling of investment every 5 years while achieving all solutions by 2050

What does this mean in terms of Cycle 1, the approach to resolve flooding and deliver the full benefit both what's been seen and predicted needs to be changed as the investment profile at a company level indicates the need for increased funds to achieve the objectives at a localised level the development of the solution of suite of solutions for each catchment when added to other catchments shows that solutions would not be driven at all because there would be other requirements to also deliver. This demonstrates the need to break down the solutions into smaller financeable delivery programmes which we will trial again in DWMP29.

#### 6.3.4 Why did we resolve collapses and other cause flooding differently?

##### Collapses

We investigated the company's approach to sewer collapses which is a maintenance programme of work and we were satisfied that the progress being made in this area to react to occurrence when they happen was an appropriate approach. The business plan estimates the expected number of collapses and trend historic occurrences to estimate an allowance expected to resolve them providing the anticipated cost for each planning period.

##### Blockages

We also examined the company's approach to education and working with customers regarding other cause flooding. We costed differing programmes to support our decision making and considered how the approach would be implemented with exploration into vans and staff to drive to hot spots, radio messaging and TV campaigns. The company already runs a campaign called "Stop the Block" and at this point we consider this to be the approach to take for the short term.

Work with predictive software to locate at risk areas prone to blockages and clearing them before they occur while still reactively removing blockages when they occur has been trialled and implemented over the last few years and we will look at the results of this for DWMP29.

For both areas we considered the company current approach to be the right thing to do.

#### 6.4 Breaking down investment into manageable stages

We have looked at the areas with greatest customer and environmental risk and assessed each localised area to identify how much a traditional solution would cost and how much a sustainable solution would cost. We compared the costs and benefits of these solutions to produce a list of preferred best value schemes. We have determined from numerous solutions a preferred best value plan of 219 projects with two programmes of opportunities to work with our stakeholders.

##### 6.4.1 How to undertake an optimisation appraisal

When the Draft was published, the investment allocated for DWMP improvements was not known and the optimisation appraisal had assumed a cap of £60 Million, this has now been clarified and £50 million has been handed to PR24 for inclusion in the business plan. While the process and mechanics of optimisation were acceptable and capable of producing solutions to be taken forward, the solutions put forward were overly achieving the final destination without enough incremental steps to make the solutions deliverable. We will need to adjust how we develop options in the next plan so that the deliverability and affordability of options can be addressed. We will discuss without customers how they wish the interim milestones to be achieved.

For those areas included within the preferred plan, we considered when these solutions can be delivered, and in which order by 2050. We also considered how this would affect customer bills, especially at a time when the cost of living is increasing sharply. We have carefully thought about how much we should invest over the next 5 years, between 2025 to 2030.

The costs included in this plan covering the next 25 years reflect areas where customers already experience repeated internal sewer flooding and or storm overflows that spill to a SAC. These locations are in addition to those being put forward in the NEP. Once the plan is finalised, we will continue to develop solutions to the remaining risk areas as suggested in our preferred approach for inclusion in our next plan.

For those areas we think will be at greatest risk of flooding and pollution over the next 25 years, we need to plan when solutions can be delivered, and in which order. To do this, we carried out an *appraisal* of when we should invest. This considers if it is better to invest sooner (between 2025-2030) or later. It also considers how this would affect customer bills, which is particularly important at a time when the cost of living is increasing.

The appraisal has allowed us to develop several different scenarios to prioritise the investment of around £1.55<sup>5</sup> billion over the coming 25 years or longer and is shown in Table 11:

Scenario	Description	Cost
Scenario 1	Ignore affordability and only consider the risks when they start to affect	<ul style="list-style-type: none"> <li>• Around £49<sup>6</sup> Million by 2030</li> <li>• £376 million every 5 years up to 2050</li> </ul>

<sup>5</sup> These costs are all in today's terms without inflation or other cost increases applied.

<sup>6</sup> These costs are all in today's terms without inflation or other cost increases applied.

	customers and the environment	
Scenario 2	Minimise the cost for customers in the short term	<ul style="list-style-type: none"> <li>• Investment programme of £50 million between 2025-2030 followed by £60 Million every 5 years for 25 years</li> <li>• A further £1.20 billion programmed after 25 years</li> </ul>
Scenario 3	Varying investment over time	<ul style="list-style-type: none"> <li>• £50 million between 2025 and 2030</li> <li>• £361 million between 2031 and 2040</li> <li>• £1.10 billion between 2041 and 2050</li> </ul>
Scenario 3 alternative	Varying investment overtime allowing a slower pace of change	<ul style="list-style-type: none"> <li>• £50 million between 2025 and 2030</li> <li>• £180 million between 2031 and 2040</li> <li>• £361 million between 2041 and 2050</li> <li>• £963 million between 2050 and 2060</li> </ul>
Scenarios 2 and 3 will be more affordable and involves fewer risks compared to Scenario 1.		

Table 11 Investment Scenarios.

We expect that an investment of £1.55 billion would allow us to deliver 219 projects.

We have undertaken a Strategic Environmental Assessment and Habitats Regulations Assessment of our preferred options (see separate report on their findings). Several schemes were assessed that could have minor negative outcome to the environment in the assessment. We are going to delay the proposed start of these options while we investigate the cause of the minor negative assessment however the need for a solution is still there and the investment has been included in years 2030-2050.

Following assessment and comparison of results as part of the DWMP, the final list of options is passed onto the business. Solutions are then incorporated into the 'price review' process to support their funding in future decades. This price review process is regulated by Ofwat, our financial regulator.

We will only know which solutions will be delivered when Ofwat conclude their assessment. We will then re-review our solutions and this will form part of the annual DWMP review, it will also become the starting point for the next plan to be published as draft in 2027.

What does this really mean in terms of investment in 2025 to 2030. The management plan is not a business plan. It can inform and provide evidence for a business plan but during this cycle we must take stock of the conclusions and consider our customers and stakeholders comments on our process. We can conclude that we need to further refine our solutions into smaller shorter term milestone schemes and reflect on the outcome of current research to incorporate customer direction on pace, types of solutions and the final destination. We will

continue to work with our financial regulator Ofwat to learn how to make a streamlined process between management planning, business planning, and the regulators' final determination and support for funding.

#### **Developing opportunities**

Our preferred approach builds on traditional ways of planning to better understand not only our drainage network but how drainage interacts overall. This is so we, as a society, can be more efficient with our investment, as when we work together with other organisations, we can deliver more benefit for society than we can alone.

This means we can work together with others to develop joint funded solutions that meet the needs of both the community and the environment and do the right thing and set us on the right path for future generations to come.

Initially we have identified two programmes that could help green our schools and public spaces such as car parks while at the same time slowing the rainfall allowing it to soak into the ground supporting our environment locally.

#### **6.5 What about the issue of storm overflows?**

For the first version of the Plan, we have considered legislation and policy to put together recommended options and outputs. At the time this Plan is being published, the Welsh Government are gathering evidence to review their policy in relation to storm overflows and publishing their CSO roadmap. DEFRA (Department of Environment, Food and Rural Affairs) is also focusing on the future role of storm overflows.

We have considered the likely outcome of this policy and legislation in advance of government conclusions and produced some alternatives to help inform the debate. We must look at all areas where we need to improve, not just storm overflows.

We consulted our customers and discussed what would be preferred. We have brought into our plan the concept of the end destination for both the environment and for customers and gained support from customers and stakeholders through the consultation for its continued use into DWMP29.

There is discussion to drive change and some subjectivity with regards to milestones and delivery in our plan. We will always have the destination of zero escapes to customers' homes from hydraulic capacity and zero escapes from storm overflows. We will continue to deliver solutions to the government direction early milestones, but we will also continually work towards the end destination, highlighting the choices customers have with regards to their bill. If customers would like to reach the destination earlier, then the bill increases faster if they want to take longer to reach the destination then the bills increase slower.

There are other destinations that we will need to consider going forward. NRW published a report on the *compliance assessment of Welsh river SACS against phosphorus targets*. (2021). This publication has changed the focus on housing developments so that there is more consideration to nutrient management. The Wye Nutrient Management Board is now a leading forum for discussions to manage nutrients. We will need to work with other organisations to develop more of these boards on other SAC Rivers such as the USK, Teifi and so on. The

wetland at Luston mentioned earlier and in Figure 22 is a result of this information. The work to reduce harm from our storm overflows will help to reduce the situation for Nutrients as well as aesthetics.

There are other ways that customer can help too. That is by reducing their unnecessary use of water on tasks where savings can be made. We encourage customer to consider how efficient they can be with their water use and how the use the sewer.

**Managing water consumption is just one of the ways that customers can help.**

Our sewers are designed to take away the 3 P's:

- Pee
- Poo
- Paper (toilet paper)

Unfortunately, some customers flush other things down their toilets such as wet wipes and even nappies. The sewer struggles to keep these non-flushable items moving along the pipes and they often collect, causing blockages.

Welsh Water deals with about 20,000 sewer blockages annually.

You can find out more information at: <https://www.dwrcymru.com/en/stop-the-block>

Sewer blockages can lead to both flooding and pollution to the environment. Like controlling rainfall going into our sewers, we are reliant on customers doing their bit to help us meet our long-term destination in a cost-effective way.

The cost of continually managing our network of pipes and treatment facilities has, in the past, meant that your bill provides approximately £1million every 5-years to make repairs and improvements, as the journey plan shows. The DWMP is showing that even though we still need to carry out the same actions continually, we need to be more flexible in how we deliver each programme, so that we drive more improvements to meet our customers' higher expectations. Our evidence shows that more interventions are required. To make these interventions more affordable, we need to reconsider how we plan those interventions. Our plan is conservative, being mindful of the current cost of living crisis. This allows us to take our time and go back and provide greater detail to each solution created to meet an incremental level of service improvement.

## 6.6 Local Plans

In each localised area we need to prepare the programme of work that will take us from today's level of service all the way to reach the end destinations.

We then develop a scheme for that area to meet today's standards and to also meet the 2050 milestone and the final destination.

We can then look at the next sub divided area and do the same thing. We do this over and over until the whole area includes all the schemes required to achieve the overall areas level of service.

The final stage is to put the schemes in order of delivery date and then those that bring the greatest added benefit.

In our current plan we have produced solutions for 39 catchments where the pie does not meet the current or future level of service and produced schemes to meet the current level of service, and the final destination. We now have interim milestones provided from the Better Rivers Quality Task Force that we can bring in as we further develop solutions for the remaining places in our operating area.

An example showing how a strategic journey plan in action is shown in Figure 22. This example highlights that by working together to obtain multiple benefits to more than one organisation, we can deliver solutions that help the improvement of the river and support future housing development. The wetland is an example where the reduction of phosphorus on the river will improve the river quality and offset the expected additional phosphorus from new housing.



*Figure 22 An example of a Nature Based solution that supplies benefits to multiple organisations.*



## 6.7 The Final DWMP Programme

The consultation response supported the plan Appriaisal Delivery Approach 2, which starts low and doubles each decade. In addition, the price reievw has developed further, taking account of expected bills between 2025 and 2030, and the programme in Figure 23 is the result.

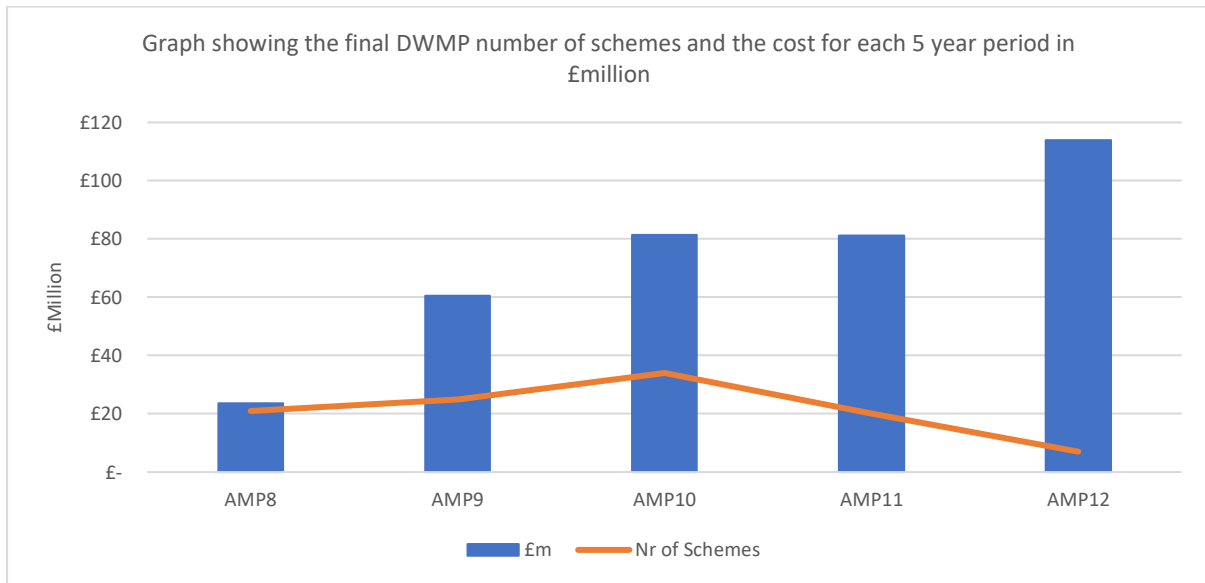


Figure 23 Programme for schemes and their cost over time, post PR24 influence.

This programme includes solutions to resolve worst served customer flooding and CSO spills to SAC designated areas, in the same area. The programme shown here does not include schemes to maintain our service and schemes required to deliver the NEP.

We have created a robust process and completed assessments on the highest priority risk areas. The joint plans that include maintaining our service, the National Environment Plan and plans to reach our end destination for both flooding and pollution will continually be reviewed. The pace of change is dictated by decisions carried out during the price review process. Therefore, once the final determination by Ofwat has been carried out, we will update our DWMP customer programme with detail merged from all three aspects of planning.



## 6.8 Progressing the area summaries

The area summaries now include:

- the supply demand assessment of dry weather flow and rainfall
- the risk-based catchment screening results
- the BRAVA results
- the localised journey plans
- the 44 areas with list of solutions

The area summaries will continue to develop with the final section including the 4 sections of planning as they become known. Ultimately the investment will need to be shown similar to the graph below in Figure 24.

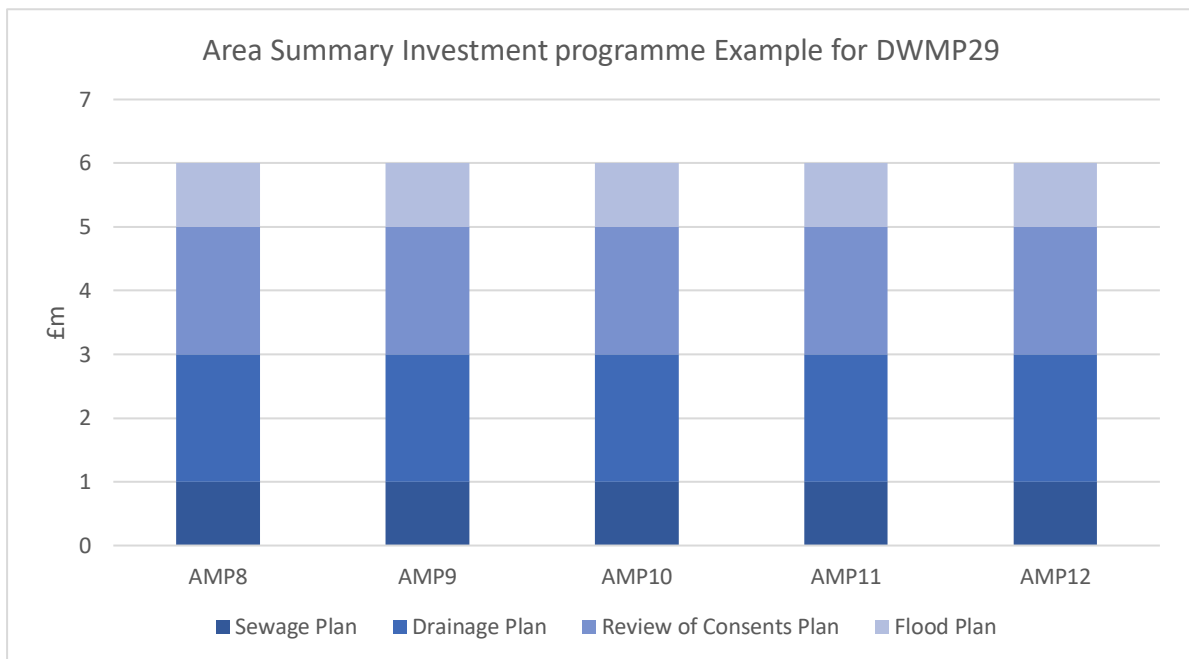


Figure 24 Plan investment graph example for consideration in DWMP29.

## **7 What about the potential impact of our proposals on the environment?**

We were asked to consider how our plans would impact on the environment by carrying out a Strategic Environmental Assessment (SEA) and a Habitats Regulators Assessment (HRA). We incorporated both the Strategic Environmental Assessment (SEA) and Habitat Regulation Assessment (HRA) into our approach. By including these approaches, we evidenced that all solutions put forward would be beneficial to the environment. We applied its principles and by doing so we also ensured that any detrimental options can be found early into the process to allow time to reconsider the option or develop an alternative.

The DWMP consultation during 2022 involved separate formal consultations for the draft Strategic Environmental Assessment (SEA) and Habitat Regulation Assessment (HRA).

We have taken account of the feedback provided and will review some aspects of our processes to allow for more thorough reviews of environmental and heritage impacts.

These assessments are crucial to ensure that the projects prioritised in the Plan do not cause harm to the environment or habitats. If the assessments reveal potential harm, we will thoroughly investigate the reasons behind it. If adjustments cannot be made to mitigate the harm, we ruled out those projects and select alternative options. In cases where no alternatives are available, we highlight this for public comment.

In our approach this time we did not provide customers with the opportunity to comment on the reasons why they were negative or provide additional time to reflect on new solutions created between the draft and final plan. These changes will be updated in our methodology for DWMP29, and the negative solutions removed will be reassessed and put back into the plan and we will consider how to incorporate additional solutions as the development of more solutions occurs between plan production and publication.

This is the first time that these assessments have been carried out on a high-level plan such as this. It was assumed that any wastewater solutions would be beneficial to the environment. However, during our trial period we produced 174 individual end destination solutions, of which 70 showed some negative impact in the assessment. We plan to continue to trial the methodology and learn from these 70 solutions to understand which aspect of the assessment highlighted an assumed negative impact, as we would prefer to delay the start of a solution, until we know more.

We have calculated the additional carbon emissions resulting from the implementation of our proposed solutions and we acknowledge that in some instances there may be no alternative options. To address this, we are developing an additional stage beyond options development to offset or reduce the increase in carbon emissions which will be introduced ready for DWMP29.

The Final SEA and HRA documents and post adoption statement are published alongside this Plan.

Overall, our approach to the DWMP involves careful consideration of environmental impact and adherence to legal requirements through the integration of SEA and HRA principles.

## 8 Adaptive Pathway

### 8.1 What is an adaptive pathway?

Our plan has considered what is most likely to happen over the next 25 years and has created solutions to meet the most likely growth, urban creep and climate change pressures. In management planning, different pathways or possible futures might occur. We must consider what if our most likely forecast differs in the future. The consideration of alternative pathways is important to justify your assumptions in the most likely plan and ensure risk can be met if one of the alternatives becomes most likely, an example illustration of an adaptive pathway can be seen in Figure 25.

While the number of scenarios to be tested is up to water companies, Ofwat has set out common reference scenarios that it suggests all companies should explore as part of their long-term delivery strategies. We have chosen to test three possible scenarios in line with our Long Term Drainage Strategy (LTDS), these are 'low', 'most likely' and 'high' scenarios. The parameters tested are detailed in our DWMP Main Plan.

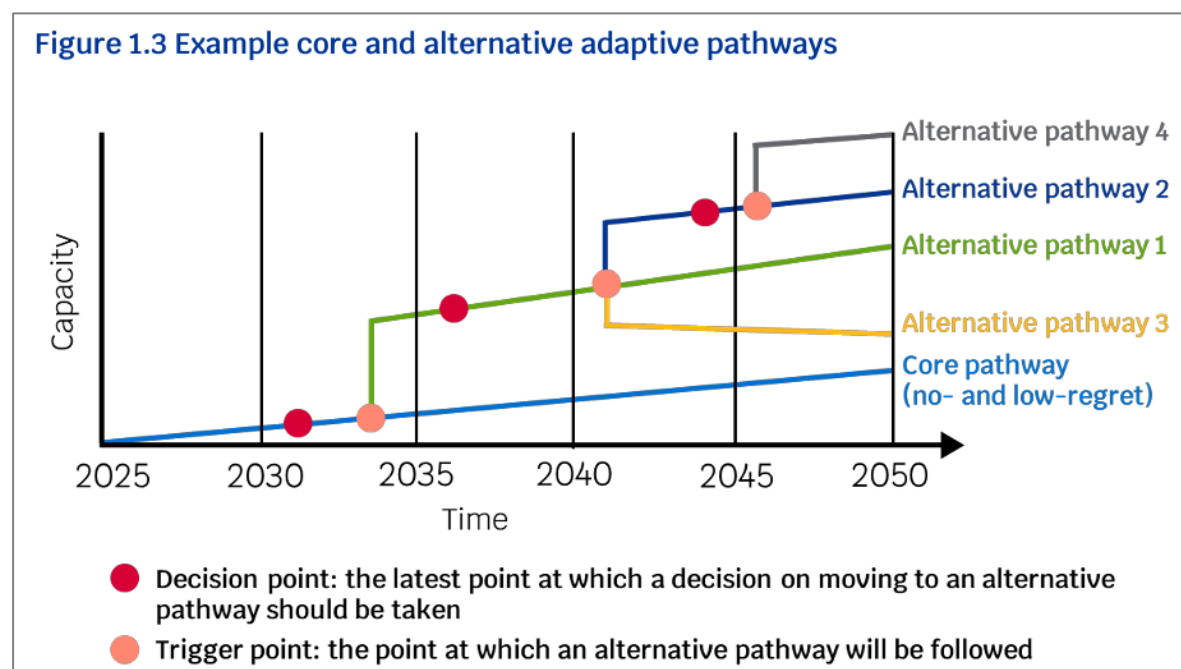


Figure 25 Illustration of adaptive planning from Ofwat's PR24 requirements for long-term delivery strategies.

### 8.2 Results of adaptive planning

Our modelling indicates that currently there are 75,512 properties which could be at risk of internal sewer flooding in the 2020 time horizon across 44 catchments. We have used our models to assess how this could be impacted by the scenarios proposed by the Ofwat Adaptive Pathway possible scenarios.

As would be expected the number of properties predicted to be at risk of internal sewer flooding increases between 2020 and 2050 and varies significantly. Based on these findings, and as illustrated in Figure 25, there is an estimated 41% increase in properties at risk of internal sewer flooding for the 'low' pathway, 68% for most likely pathway and 109% for the 'high' pathway when compared to the 2020 time horizon model.

We have carried out climate change scenarios for flooding and overflow spills using assessment appropriate to hydraulic modelling. Flooding assessments use an uplift approach which the 'low' scenario for 2050 includes a 5% uplift, most likely uses a 35% uplift in the north and 15% uplift in the south based on UKWIR2017 research and 'high' scenario using the same source uses an uplift of 65% in the north and 35% uplift in the south.

Storm overflows are assessed using time series data with information that is obtained or perturbed from the UKWIR RedUp Tool. However, the 'low' scenario is a no perturbation scenario, the 'most likely' scenario uses the 2030 projection for RCP8.5 while the 'high' scenario using the 2050 projection for RCP8.5. This approach has been chosen because of the limitations of the RedUp tool. A proposal to update the tool so that different Representative Concentration Pathways (RCP) values can be obtained has been put forward to UKWIR to resolve this for the next iteration.

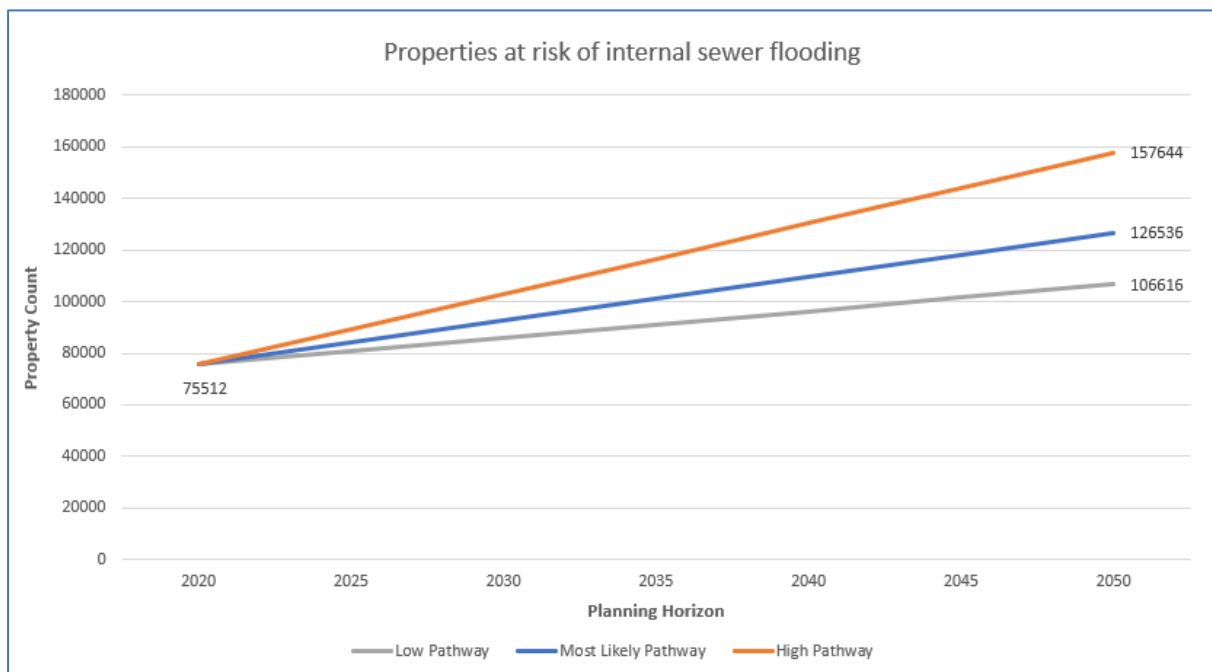


Figure 26 Variation in properties at risk of internal sewer flooding between adaptive pathways.

### 8.2.1 Cost

To assess the potential impact of the proposed 2050 scenarios on the size and therefore cost of potential solutions we have looked at both the 'reference option', as described in the options chapter of the Plan and options developed following the catchment preferred pathways. The reference option is a simplified cost estimate which may realistically resolve the flooding or pollution at a given location. It is not necessarily the most appropriate solution; however it provides a comparable cost across a range of catchments. The potential variation in costs using the Reference Option for the possible scenarios assessed is shown in Figure 27.

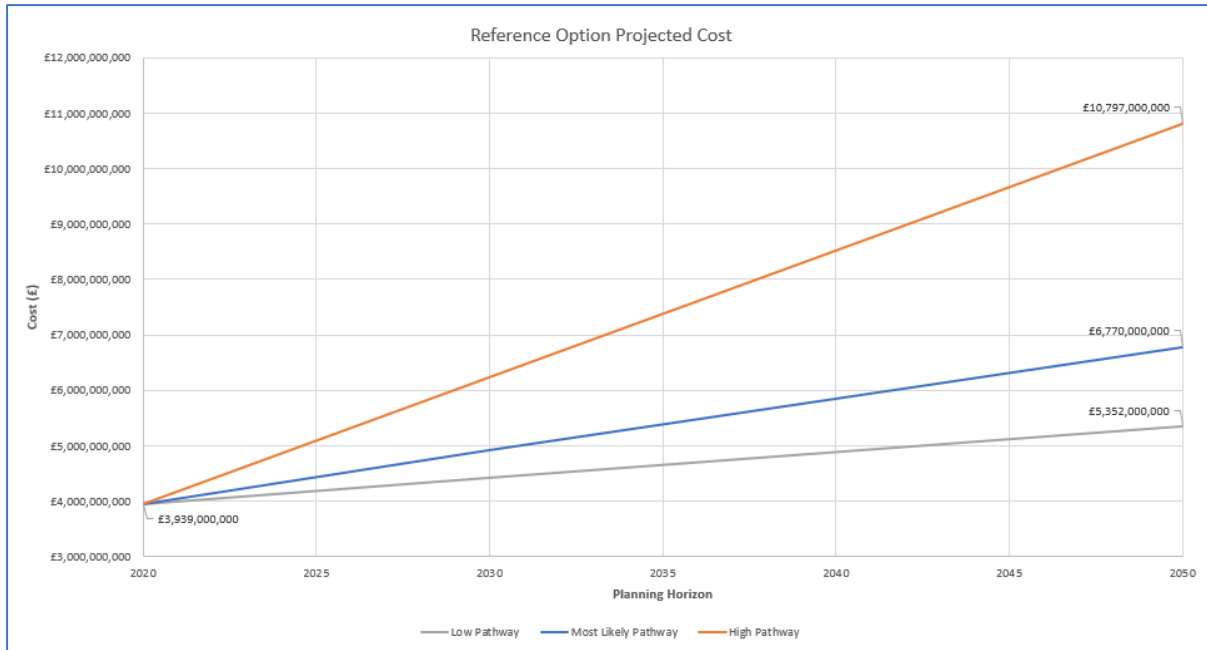


Figure 27 Reference option cost variation for each of the three potential scenarios that includes both Storm overflows and customer flooding with a target of 40 spills

In line with the Journey Plan in Strategic planning Section 5.5 we have developed options for the 2030 Most Likely scenario and then assessed any additional requirements against each of the Ofwats planning scenarios. The Journey Plan was designed to deliver the best hydraulically beneficial schemes for each catchment. The Journey Plan promotes the removal of rainfall runoff from connected impermeable area which could help mitigate against the impacts of climate change and future uncertainties.

The results indicate that when options are developed in line with the Journey Plan the impact of future uncertainties are mitigated to a much greater extent when compared to the reference option, which has been derived using traditional hard engineering solutions. The most significant benefit of the Journey Plan hierarchy is the removal of runoff from impermeable area draining to the foul or combined sewer network. The removal of the connected area mitigates against the impact of increased runoff because of climate change.

### 8.2.2 Tipping Points and Decision Points

The key to adaptive planning is knowing which future scenario is most likely to occur, and when to switch to the appropriate planned pathway. In this plan we have assessed what the likely impact of three scenarios could be, however when we need to switch between each of the scenario pathways is a much more complicated question. We have reviewed possible tipping point and decision points below:

#### *Population Change: A Tipping Point:*

We have undertaken analysis of historical build out rates and considered data available in Local Development Plans in determining whether population change in a region will itself be positive or negative and what the change in population will mean for the performance of our assets. However, this assessment is based on models and is not necessarily what will happen. We will therefore continue to review our population predictions and when developments start

to have an adverse impact on the performance of our assets, which could be used as a means of informing us that population is changing in a negative way, meaning that we need to adjust or switch our management plan.

We will also consider how building in resilience to our systems could help to reduce the impact of this tipping point by developing a more proactive indicator. The introduction of the sewage plan is a way to bring in this adaptation to growth and creep and how scenarios to that plan can be shown

#### *Climate Change: A Tipping Point:*

We will monitor the performance of our assets to determine when we think changing weather patterns are triggering a change in the performance. Through modelling, we will work to determine triggers which could be used as a means of telling us that the climate is changing in such a way that we need to adjust our management plans. The introduction of the drainage plan is a way to bring in this adaptation to future drainage and differing climate change scenarios.

#### *Legislation: A set of Decision Points:*

We are currently committed to delivering investment in our sewer network, over and above our normal levels of maintenance (termed 'base expenditure') primarily through two pieces of existing legislation:

- the Water Industry National Environment Programme (WINEP) and
- the Storm Overflow Assessment Framework (SAOF)

We are also developing our plan to ensure zero environment harm from our assets on the water bodies within our operating region. The impact of these existing and future pieces of legislation will impact when we make investment in our sewerage network.

By reviewing our DWMP every 5-years we will review each of these potential tipping points and decision points on a regular basis and amend the revised plan accordingly.

The introduction of the review of consents plan is a way to bring in this adaptation to future legislation.

### **8.2.3 Development of the Adaptive Plan**

We will continue to review the impact of the change on our sewer network. We will also work to align the DWMP with the LTDS to ensure the requirement of Ofwat are met whilst ensuring our plan remains resilient to external demands and changes to policy and legislation in the future.

### **8.2.4 Ambition for localised adaptive pathways**

While the approach to adaptive planning has focused on the company-level approach, we have also considered how such an approach could be applied to local areas. As a demonstration of what is possible, the graph below shows that with the combination of the 4-plans approach and overlaying the scenarios for growth and climate change, where we could make informed decisions about adjustments to pace and benefit.

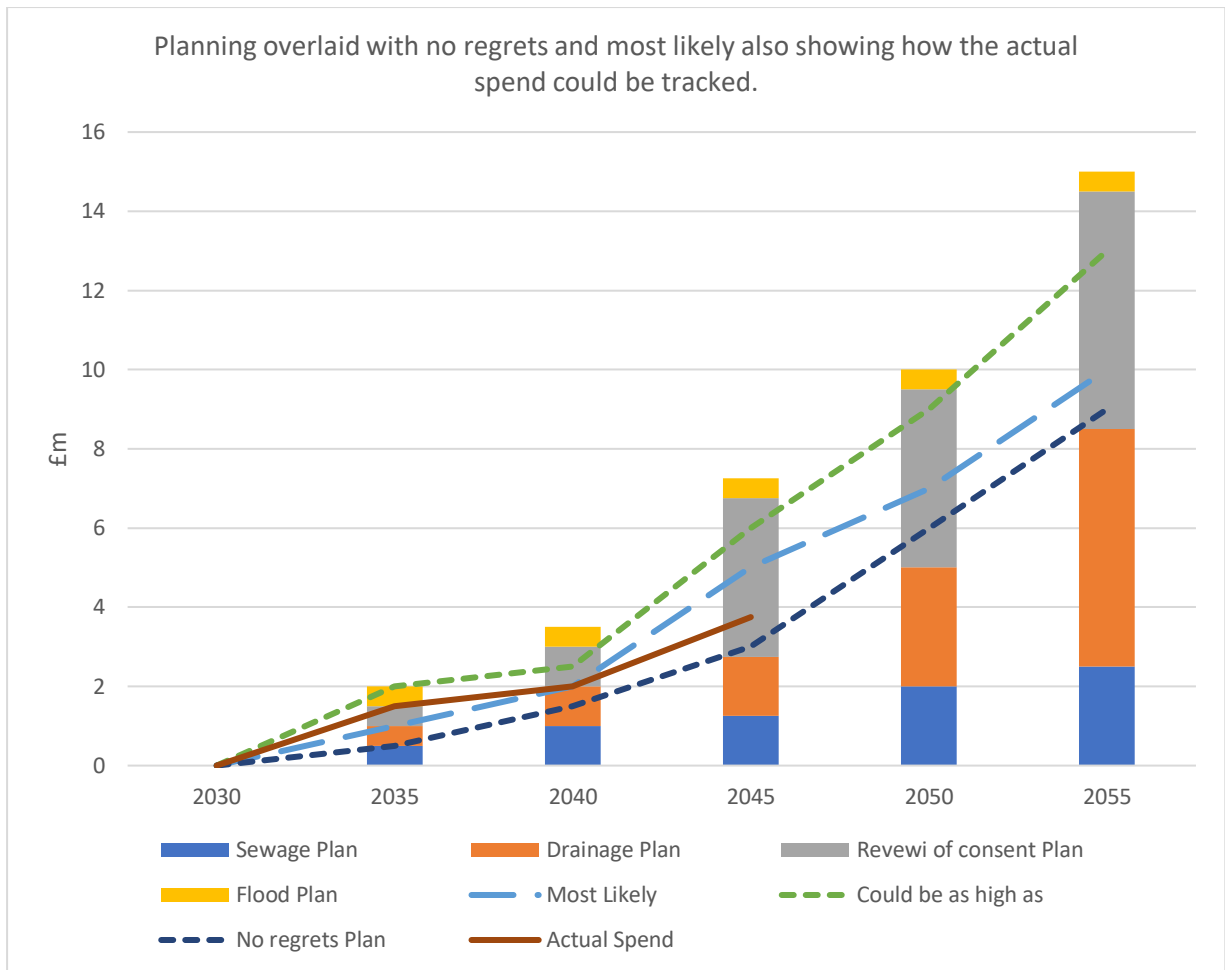


Figure 28 A graphical representation of a localised investment adaptive plan.

The above Figure 28 has been produced to demonstrate how the future investment of the 4-staged plan can be tracked against delivery. It is showing that the expected total investment to achieve all the goals from the journey plan would cost each 5-year period, the approach shows how the minimum and maximum required to achieve all plans would need to be. The anticipated most likely progress can be shown on the same graph along with the investment spent as actual over time.

When coupled with the localised journey plan Figure 29 and reproduced below and as shown in Figure 16.

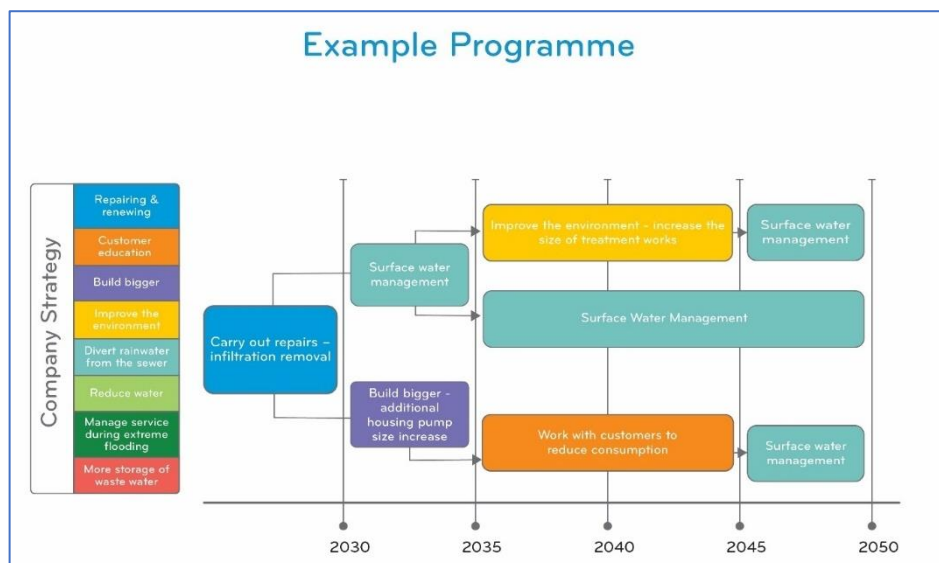


Figure 29 reproduced from Figure 16.

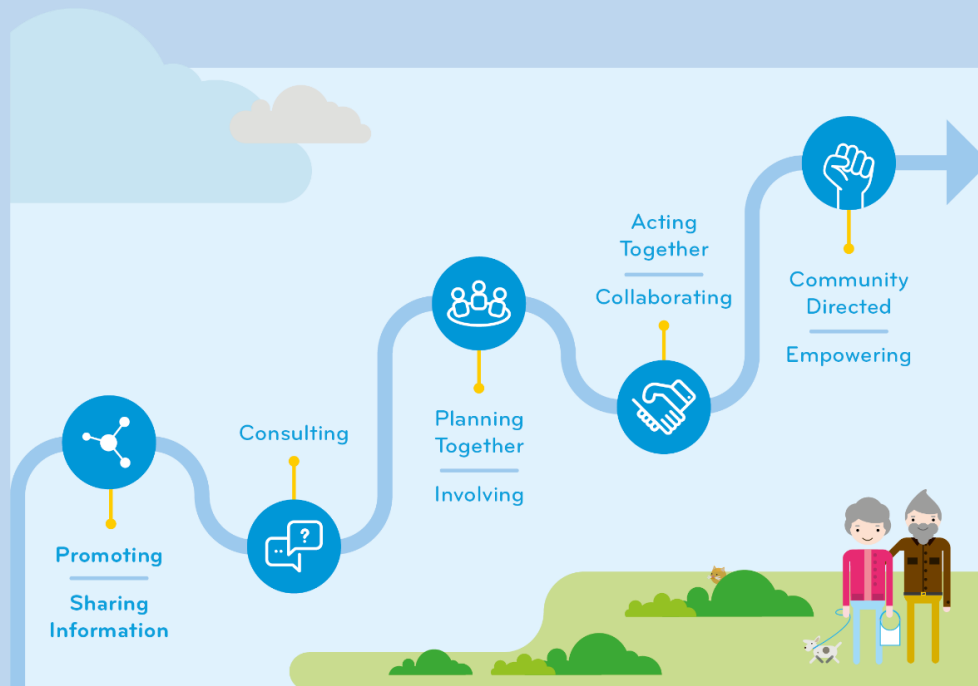
## 9 Engagement

From the outset, the views of government, stakeholders, regulators, and customers have been an important component of the Plan. We have been talking to all these groups and we have carried out research with our customers to ensure their views have been reflected in the Plan.

The engagement process does not stop with the publication of this first DWMP. We are working with government, regulators, local authorities, and community groups, at a level and pace that works for them.

In management planning there are two types of work with stakeholders' engagement and consultation.

### What is engagement?



By engagement, we mean a broad and ongoing process of sharing information and updates with all our stakeholders, getting their feedback, and acting together. Stakeholders are individuals and organisations that have an interest in what we are doing and where we have an interest in what they are and intending to do.

The purpose of engaging with our stakeholders is to create opportunities for joint solutions, maximising the benefits of our proposals to local communities, and to inform the decision-making process and development of Plans.

### What is Consultation?

By Consultation we mean a formal approach to provide evidence for comment presented by experts in their profession in order to obtain the consultees opinion in a way that their response can be recorded formally.



## 9.1 How we will engage with stakeholders

As we move from engagement to looking at co-investment opportunities, we will need a more developed and detailed planning structure to support the process. We expect this governance to be provided through a network of strategic management forums, programme boards, and community projects, as shown in the image below.



*Figure 30 image showing joint working structure to support the engagement process.*

We are continuing to broaden the programme boards by introducing new stakeholders over time. We have achieved at least one consistent meeting in each Level 2 area so far where discussions have been to develop opportunities. Operationally, opportunities and being discussed on an ad hoc basis, it is our intention to improve the planning forum to bring both the ad hoc and planning sessions together recording the opportunities and taking the priority opportunities forward for joint option development.

The company works with other strategic forums such as the Nutrient Management Board and the Price Review 2024 forum, these group provide coordination with other organisations and a discussion forum to decide the next milestones to achieve.

We have also met regularly with our Independent Environmental Advisory Panel (IEAP). This is an independent group of organisations who provide scrutiny of our plans, from an environmental perspective.

## 9.2 How have we engaged with our customers?

We are committed to bringing the voice of customers into the heart of our business and the DWMP. We want to understand customer views of the Plan, particularly in terms of how quickly we make improvements, as this will have an impact on water bills.

To support this, we carried out research to gain a representative picture of our customer views and help them to help shape the development and speed of changes outlined within the Plan.

We have also met regularly with our Customer Challenge Group. This is an independent group of organisations who provide scrutiny of our plans, from a customer perspective.

### **Working with our customers**

Throughout the development of the Plan, we have worked closely with our customers through a series of research sessions. These sessions have allowed us to assess customer awareness, expectations, and levels of support for different options.

This has fed into the development of the Plan, ensuring that the outcomes are in the best interests of both existing customers and future generations who will benefit.

Our findings show a strong link between customer priorities and our objectives for the Plan; these include planning for the long term, acting in an environmentally friendly way and providing good value for money.

### **A customer's view from the research**

Feedback from one customer taking part in the research highlights the theme of cost to the end user. The feedback, included below, noted that whoever is responsible for the work, the customer pays and wants to see value for money. The customer also wants to see Welsh Water working closely together with other organisations to deliver more efficient solutions.

*"We pay the water company. We pay tax. We pay council tax. Can you just be efficient with the money?"*

(This quote has been edited and shortened for inclusion in this document).

## 9.3 How we will engage with our regulators and government

We would recommend that the Wales DWMP Steering Group is continued throughout DWMP29 alongside the UK Government forums. This engagement is requested to ensure efficient engagement with regards direction and application of guidance while driving innovation. We learnt so much in this cycle by considering innovative methods alongside the prescribed framework methodology. While understanding what government requires and answering their questions, it is also important to understand how to engage with customers and stakeholders to ensure they understand where we are now and where we are going and how long it will take to get there.

## 9.4 What will engagement look like going forwards

Our aim going forward is to work more closely and directly with customers through information and educational campaigns and through community projects. We are currently working with local authorities to identify areas we can work together to improve the drainage issues locally.

Once these areas have been identified, we plan to set up programme boards to put joint proposal to the strategic management forums to obtain the funds to work with communities to develop and implement solutions to local pollution, drainage and flooding issues.

We will continue to engage with customers and stakeholders, to gather views and feedback in order to create affordable incremental plans based on our research into customer priorities. We will also create and maintain a hierarchy of decision committees that will support us in the preparation of joint solutions and provide the governance and funding required by each party to gain a successful end result.

## **10 What Our Plan Has Established**

In developing our Plan, in accordance with directions from Welsh Government, we have engaged with our customers and other stakeholders, so that their views were considered. This included regulators, local authorities, our Independent Environment Advisory Panel (IEAP) and Independent Challenge Group (ICG), and the Consumer Council for Water - all to seek their views on what they see as the important priorities and choices to consider within the Plan.

Our Plan has two key long-term outcomes, developed from our extensive consultation with stakeholders:

- No customers should experience flooding from sewage inside their homes due to a lack of sewer network capacity.
- Our rivers and coastal waters should only ever receive treated flows from the sewerage system to protect their biodiversity and ecology.

In achieving these we have sought to:

- Identify solutions that are the most sustainable and best value for customers, having regard to the carbon costs of schemes, and wider environmental issues identified through Strategic Environmental and Habitats Regulations Assessments
- Contribute to the achievement of 'Good' ecological status as required by the UK Water Framework Regulations
- Protect habitats and species of international importance as defined by the UK Habitats and Birds Regulations
- Meet our statutory duties for urban flooding and promote water efficiency, biodiversity and net-carbon reduction planning.
- Deliver against our national obligation to support continued maintenance of community flood defences.

We recognise that our DWMP has to be designed to be deliverable, and financeable, and to strike the right balance of ambition and affordability. Given that this first cycle is purely showing the scale of investment required and not an implementable plan, it will be necessary for these criteria to be applied to the outputs of the second cycle, based on complete catchment modelling and integrating storm overflow investment assessed based on ecological harm. Although we have a large geography and a substantial number of discrete wastewater catchments, we have a relatively small customer base, who ultimately pay for the service and improvements through their water bills.

### **Indicative investment required by Cycle 1**

Based purely on the methodology we have had to adopt for this first DWMP cycle, and recognising the extent of extrapolation and assumption that has been necessary from the detailed work in the 44 priority catchments, our plan indicates that investment in the region of £13bn will be required to enable the drainage system to handle the projected flows within the central climate change scenario adopted by Welsh Government without causing customer flooding and storm overflows only operating in very exceptional circumstances.

This drops to £11.6bn with overflows operating around 10 times a year. Included in those sums is £5.5bn which is associated with eliminating the risk of sewer flooding on homes and businesses. At the current level of investment in AMP 7 this would not be achieved until after 2100. To achieve these outcomes sooner, by 2075 for example, we need to increase our environmental performance enhancement investment over the next 25 years from circa £1bn

per AMP to circa £2bn per AMP and maintain this level of investment thereafter. In AMP8 we are proposing to invest £1.16bn on such enhancement.

Given the impact on bills of such investment and the societal impact of the engineering associated with such proposals, between now and finalising our second cycle DWMP we will need to continue with important consultation with customers, government bodies and other stakeholders. This engagement will then determine what outcomes and engineering standards should be used as they will be critical to setting the direction, pace and costs of delivery going forward, as well as the pace of progress to ensure that our future plans are deliverable, affordable, and financeable. We will continue to seek to use nature-based solutions and “green infrastructure” to manage flows within our network and to also reduce the impact on the environment if the network cannot contain all the flow. Such outcomes and standards will ultimately be a matter for Welsh Government and will need the support of multiple stakeholders in their delivery, particularly local authorities.

With such a transformation required to both reduce flooding but also the operation of storm overflows in one of the wettest parts of the UK, this has to be developed across multiple 5-year investment cycles. Indeed, with so many of the sewers in Wales being combined foul and surface water, work will be required in every community, urban and rural, large and small. We will prioritise this based on tackling the places where our operations are having the greatest impact on the environment, following Welsh Government policy.

### **Informing Future Investment**

Given the extent of the required future investment indicated by this first cycle we will seek to initiate discussions with government, regulators and stakeholders so that by the completion of Cycle 2 in 2028, we will have developed the programme of work that is affordable, deliverable and financeable to form a long-term integrated sewerage and drainage investment programme covering the whole of our operational area. In our PR24 submission, the Long-Term Delivery Strategy (LTDS) sets out an estimate of the scale of future investment, particularly around SOs and network improvements to contain flows, that may be able to be contained within such a programme to meet those criteria. The completion of the SOAF assessments, improved model coverage in our DWMP, and feedback from the range of “grey” and “blue-green” solutions we are delivering in early AMP8, together with the adoption of innovative approaches and interaction with other stakeholders, in particular local authorities, to reduce flow entering the drainage system will allow us to refine further the cost estimates in the current LTDS for the future investment cycles.

As part of our engagement with customers during the consultation period, we explored the potential impact on affordability and customer bills. Customers were provided a range of scenarios and provided feedback on these. Generally, customers advocated an incremental rise in bills to avoid any sudden increases, supporting our long term programme. We have since reflected this feedback in the profile of the indicative investment in our Plan alongside the outputs of our work on the company’s LTDS. Welsh Government’s draft report from Stantec has also provided useful validation of our cost estimates.

## **11 What happens next**

We have achieved so much in terms of new planning approaches, considered how to drive national level requirements for flooding, drainage and the environment while also ensuring that we demonstrate what we must do to maintain compliance with our operating licence. For the DWMP framework, we have gone beyond its approach but continued with the original concept and innovated during the non-statutory phase to highlight to government, areas where we need further clarification to the framework and to the guiding principles.

Our customers supported our approach to planning and through the customers research and the draft consultation have shown where and how we are applying the process.

To summarise the approach, we will:

- Develop the 4 planning areas – The Sewer, Drainage, Review of Consents, and Flood plans.
- Develop investment to address increasing storm intensity and frequency.
- Develop investment to address Network, treatment and pump capacity risks related to new housing and increasing population.
- Develop investment to address deteriorating water quality risks in the catchment.
- Develop investment to provide improvements to water quality risks in the catchment.
- Expand our coverage so that more detailed solutions are presented.

In addition to the areas presented in the draft plan for customers and stakeholders to support, we will also discuss with government, regulators and stakeholders the directions for the next cycle, and expand the number of objectives our customers would like us to address. Contributing to the achievement of 'good' ecological status as required by the UK Water Framework Regulations.

We will continue to assess our progress against Welsh Water 2050 targets, Ofwat's performance commitments and the destinations from this plan to discuss pace to achieve each destination by 2075 or 2100.

We will compile a 25-year programme of work that incorporates the company's asset improvement plans and if time allows also includes the National environment programme. We will work with NRW and the EA to improve the timescales for delivery, as this time the NEP was not available in time for the draft plan to be published.

We will also engage with customers and local communities through the set-up of Community Projects via Project Boards and provide strategic forums proposals to implement solutions to local pollution and flooding issues.

We will continue to keep stakeholders and customers updated at key milestones of Management Planning, through emails, the production of documents, website updates and the e-learning platform.

We will continue to incorporate more detail using the additional monitoring of our network and the environment to prepare our plans. With the added information we will also review our strategic direction and reconfirm customers aspirations. Further to this, we will continue our approach to produce detailed catchment by catchment plans.

### 11.1 Our Approach to Cycle 2 of the Plan

Cycle 2, which we will develop over 2024 to 2028 with an aim to reach publication in 2028, will focus on widening model coverage and developing greater confidence in our plans. By complementing and enhancing our Planning Objectives established in Cycle 1, our aspiration is to deliver a Plan for a 25-year programme of work, which will inform the scale our future investment in our wastewater systems. Funding for this further development of our DWMP is built into our PR24 submission and we will seek to achieve this by:

- Enhancing our strategic decision tools, such as developing our integrated catchment modelling approach. This will include forecasting of Wastewater Treatment Works capability, sewerage pumping stations and network capacity, river water quality, and risk management of 3<sup>rd</sup> party assets. We will also update to the latest climate change scenarios.
- Developing smart networks for management planning, which will provide recorded information on sewage flow and sewer water quality. This will assist in our future forecasting of the risks and impacts as we strive to upgrade our networks to meet customer and regulator expectations.
- Embedding the principles of sustainable management of our natural resources into our planning process by using sustainable approaches to surface water management, such as the SuDS hierarchy.
- Supporting the delivery of Nature Based Solutions, such as wetlands, to improve discharges from wastewater treatment works and SO's.
- Enhancing (thorough increased co-ordination) our collaborative working with other stakeholders, with the aspiration to create and develop a National Drainage and Environment Programme, supported by Welsh Government.
- Continuing to work collaboratively with colleagues across the industry to enhance best-practice approaches to the development of Business and Management Planning.

By continuing to develop and enhance our Drainage and Wastewater Management Plan in our next cycle, we will deliver a Plan which provides definitive evidence of the need to continue to invest in our wastewater systems, ensuring that all our stakeholders and customers remain well informed of progress, as well as supportive of the policy positions underpinning our investments. This will mean the PR29 process will, to a greater extent than PR24, be shaped by the outputs from the DWMP.

### 11.2 The Annual Review of the Plan

Twelve months after the plan is published, the first annual review of the Plan will be required, and annually on the same date each year until the next DWMP plan is published. The annual review steps, which are outlined in the Water UK DWMP Framework 2018 and summarised below, ensure that any new information is reviewed and assessed in a timely manner. Any new information that alters the direction of the DWMP sufficiently, to alter the policies or direction from government will trigger the production of a new plan.

An annual review includes a review of work carried out over the previous 12-months asking three main questions.

1. Did what we say we were going to do happen?
2. If it did was the benefit achieved?
3. If not, what was carried out instead and why?



We will continue to monitor what progress is made and annually we will review our delivery plans and assess our progress using the principles of *check, plan, do* and *act*.

**Key Message:**

When shown the risk summary and risk map, customers really realised the extent of the work we have to carry out. We not only have to address years of under-investment, driven by standards that considered appropriate exceedances, but we are now also managing a sudden step change in expectations regarding CSO's. This will require a reversal of engineering principles as fast as possible.



*Figure 31 New development Natural flood management.*