United Utilities Water

Drainage and Wastewater Management Plan 2023

Non-Technical Summary

Document Reference: NTC

May 2023

United Utilities

Water for the North West

Executive Summary

- **The Drainage and Wastewater Management Plan (DWMP) is a long-term plan, which sets out how United Utilities Water (UUW) proposes to ensure robust and resilient drainage and wastewater services for the North West.**
- **UUW has engaged with stakeholders and customers to develop a best value plan, which delivers a step change in performance against the backdrop of climate change.**
- **UUW's DWMP forecasts just over £29 billion of investment is required between 2025 and 2030 to ensure we can achieve the planning objectives set out in this plan, with just over £21 billion of this investment required to meet the government's Storm Overflows Discharge Reduction Plan (SODRP) requirements.**
- **Changes to surface water management will be key to ensuring long-term resilience. Along with drainage regulatory reform and the partnerships needed to address drainage on a catchment basis.**
- **The plan will continue to adapt as targets and requirements evolve.**

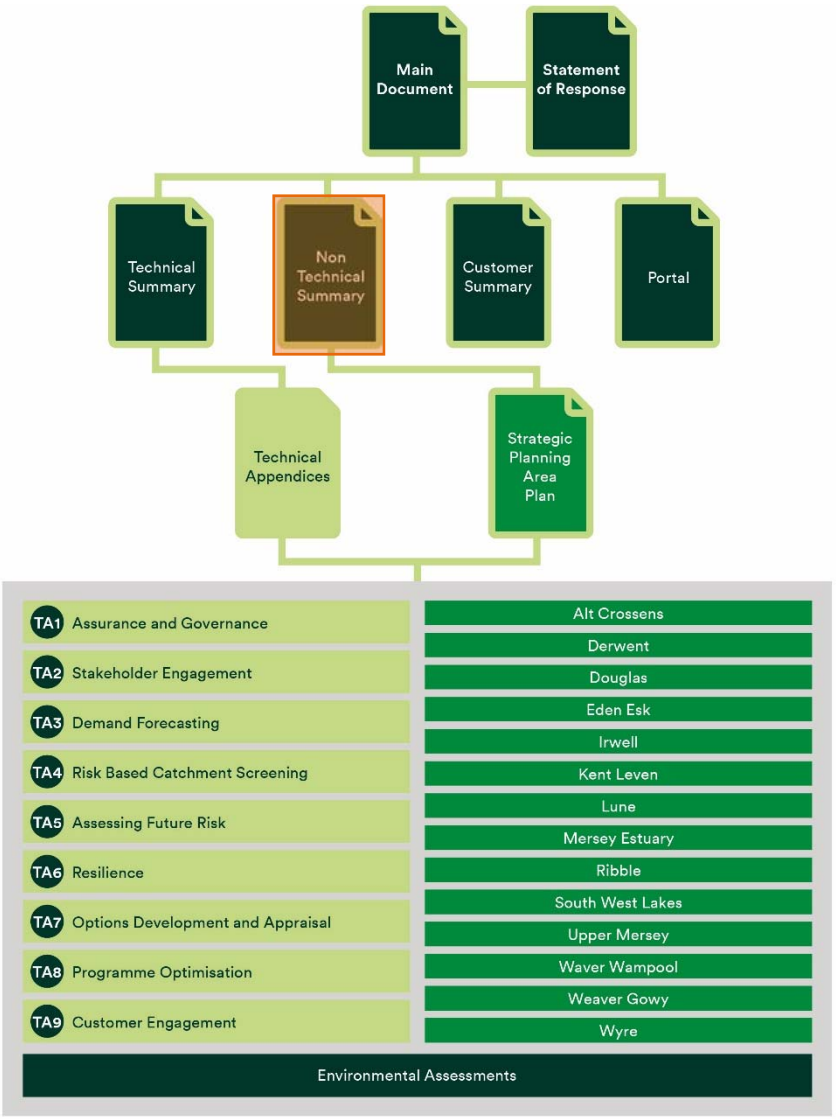
This document sets out United Utilities Water's (UUW) approach to achieving a long-term drainage and wastewater plan, which delivers robust and resilient wastewater services to the North West at the best value for UUW customers. The plan accounts for key challenges facing North West England over the next 25 years, including climate change and a growing population. This is UUW's first Drainage and Wastewater Management Plan (DWMP) and the first time such plans have been produced by the whole sector. Under the guidance of the DWMP Framework, UUW has developed a range of approaches and tools in order to build the plan – these tools will continue to be refined, developed and re-run as new or better information becomes available. These tools include approaches to forecasting demand, application of climate change uplifts, optimisation of solution blends, and modelling of the wastewater network, wastewater treatment works and the environment.

This Non-Technical Summary is derived from the DWMP's Main Document (DP1) and aims to provide a high level overview of the approaches taken in developing and producing the plan. This includes approaches to uncertainty, scenario planning and adaptive pathways. The Non-Technical Summary mirrors the contents of the Technical Summary, which can be referred to for more detailed information. For even further detail there are nine standalone Technical Appendix (TA) documents and 14 strategic planning area (SPA) plans (SPA_01 – SPA_14, Figure 1). The TAs will provide more detail on the outputs of the assessments and the mechanisms used to derive the final preferred near, medium and long-term plan, while the SPA plans will provide more location-specific details of the plan.

UUW has developed the DWMP with support from stakeholders, regulators and customers from across the North West. In addition, Strategic Planning Groups (SPGs) have supported a collaborative approach to planning and UUW recognises that the interconnected nature of drainage means that partnership and collaboration are fundamental in delivering long-term targets.

Figure 1 summarises the full suite of documents published as part of the DWMP.

Figure 1 DWMP document structure



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For the glossary, refer to document C003.

1. Introduction

1.1 Purpose and importance of the DWMP

Drainage and wastewater management planning has been an evolving process since water industry privatisation in the 1990's. However with a changing climate, a growing population and increases in the areas drained, the future is uncertain and the pressures on our drainage and wastewater assets are magnifying. The industry and regulators identified that in order to mitigate the impacts of these changes on wastewater services and the experience customers have, a step change was required. The industry has therefore developed a framework to enable a more consistent and collaborative approach to long-term management and planning of risks. Under this framework, United Utilities Water (UUW) has developed their first Drainage and Wastewater Management Plan (DWMP). Following the government's publication of the Environment Act (2021), there is now a statutory duty on water and sewerage companies to create DWMPs and to update them every five years.

UUW have developed the DWMP in collaboration with a broad range of stakeholders, and aims to maintain and improve resilient wastewater and drainage systems, now and in the future. UUW will lead on this plan, but we will continue to work closely with other risk management organisations, such as the Environment Agency and local councils, to encompass all activities relating to drainage, flooding and protecting the environment.

The success of the DWMP will rely upon early, continued and effective engagement, for the partnership working and collaboration which are at the heart of the plan. By working together, we have an opportunity across the North West to understand how future challenges might impact the region, and what steps we and others need to take to adapt and mitigate against them.

1.2 Our approach to the DWMP

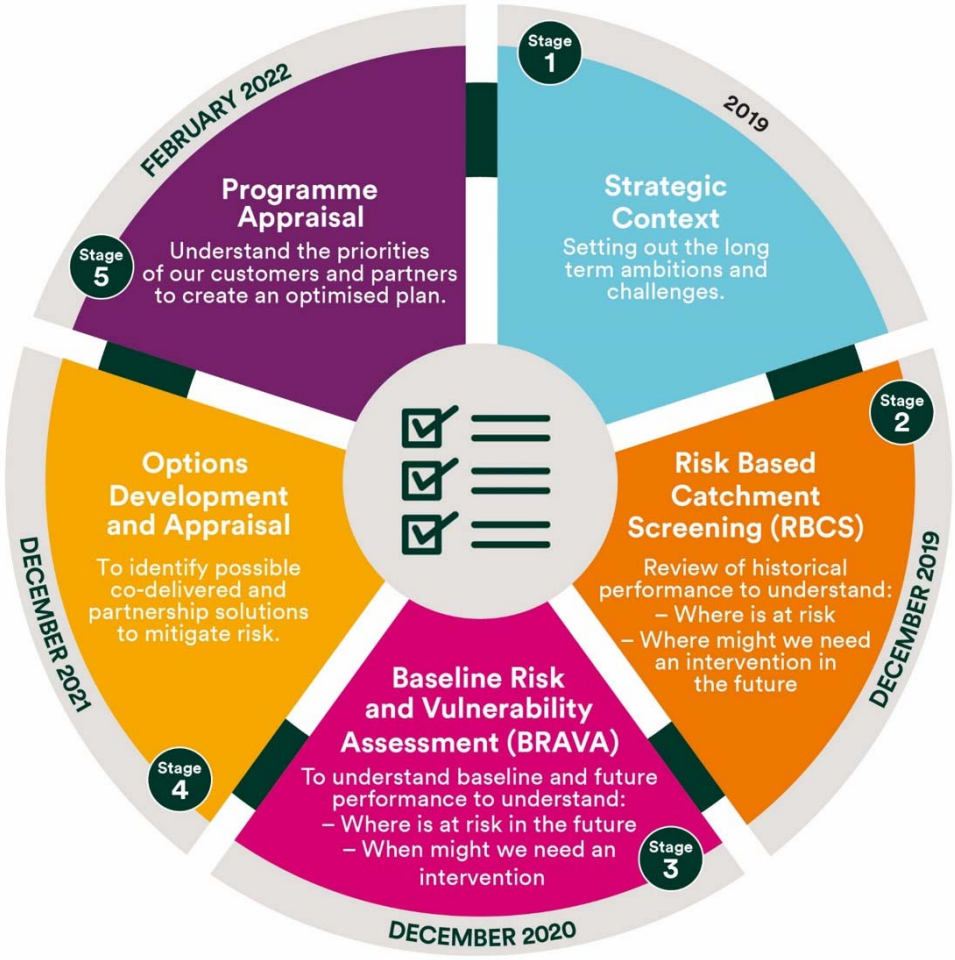
We have taken a comprehensive approach to our first DWMP because we recognise the importance of long-term planning if we are to adequately adapt to climate change and meet the demands that a growing population will place on our existing drainage and wastewater systems, as well as the environment. A dedicated team has been established that is accountable for developing the plan.

Across our region, there are already numerous strategic management plans owned by various other organisations (Figure 2) with a focus on managing particular risks. Our DWMP aims to collaborate, share best practice and align with the other strategic plans where possible. This will help to highlight common challenges, ambitions and goals where there are shared or interconnected risks.

Figure 2 Strategic management plans

There are five stages in developing this plan, which will help to develop the best future for the North West by identifying risks and appropriate co-developed and co-delivered solutions to mitigate against them. This approach closely follows the DWMP framework and is illustrated in Figure 3.

Figure 3 Five stages of a DWMP

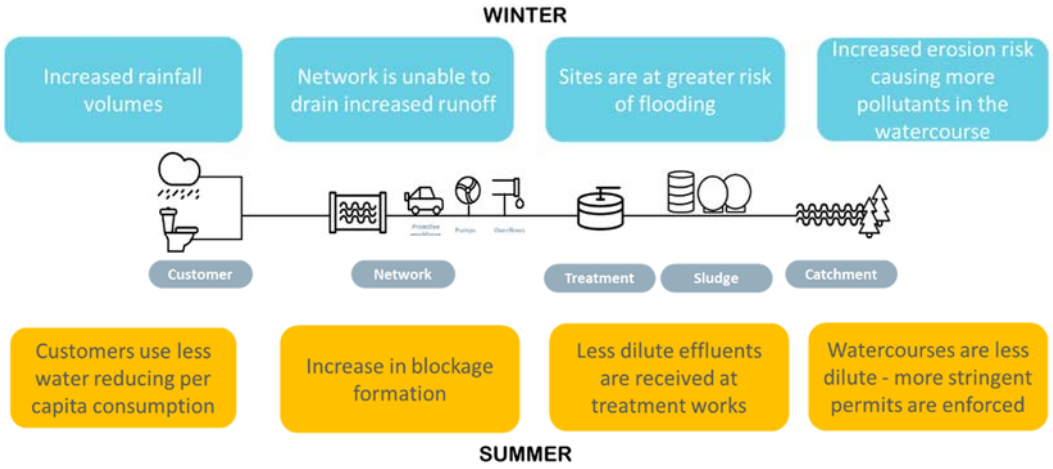


2. Background

UUW currently provides wastewater services to just over seven million customers, but by 2050, this is expected to increase to well over eight million. In order to serve these customers we maintain over 78,000 kilometres of wastewater pipes and nearly 600 wastewater treatment works. With population increasing, and climate change resulting in wetter winters and drier summers, our drainage and wastewater assets will be under increasing stress unless we enhance our planning for the future (Figure 4).

The outcomes of our plan will be demonstrated by our performance against a series of planning objectives. It is against these planning objectives that current and future performance is measured at a company and local planning level. Further details on our planning objectives are given in Section 4.

Figure 4 How could climate change impact the wastewater production line?



3. Planning areas

As defined within the DWMP framework, we have set out our plan at three levels to maximise the potential for partnership working and for effective engagement between regulators and stakeholders at both company-wide level and more locally. These levels are described in Figure 5.

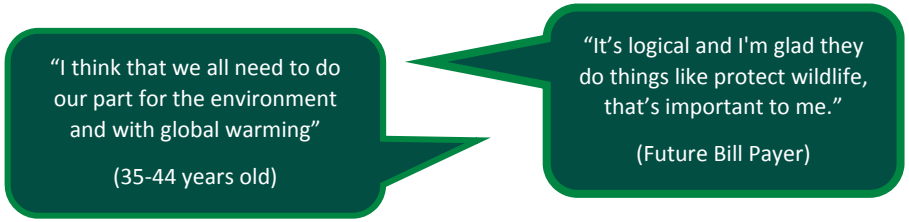
Figure 5 Geographical scales applied for planning and collaboration within DWMP

4. Levels of service

Through a series of workshops, we have worked collaboratively with customers and stakeholders to produce a set of objectives that are fit for the future whilst also recognising the need to manage customer bills. Further details on the workshops we held can be found in Section 5.

As part of our customer research, we engaged with over 3,000 customers to explore their priorities in terms of the service we provide. Preventing sewer failure, sewer flooding and pollution incidents were flagged as being most important. Figure 6 highlights feedback from the customer research.

Figure 6 Feedback from customer research



Following this consultation process, the original objectives were adapted to include an objective focused on flooding of open spaces, and more ambitious targets. Figure 7 outlines our final planning objectives.

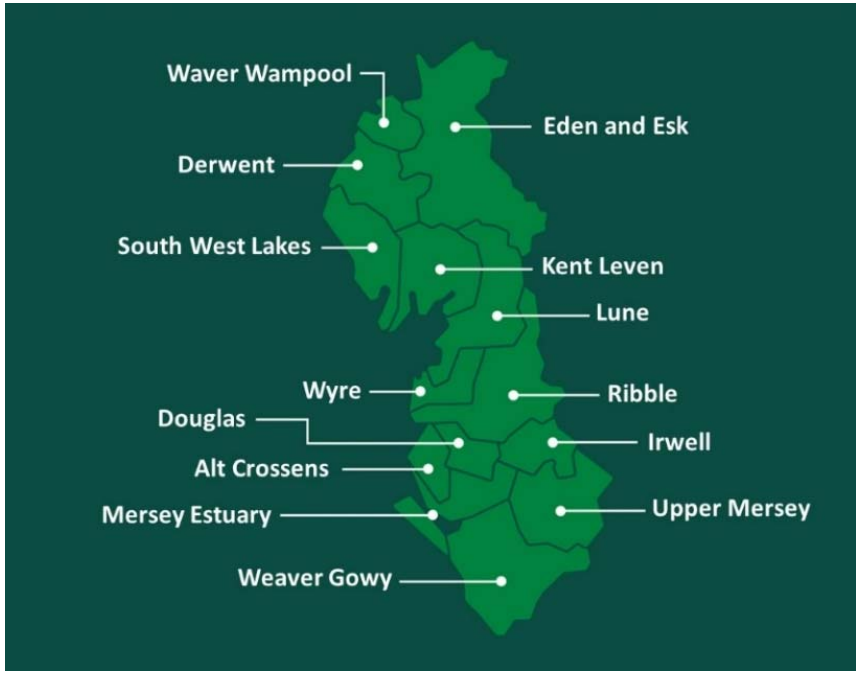
Figure 7 Final DWMP planning objectives

Planning objective	We will provide excellent wastewater services, reducing our impact on the environment	We will protect, restore and improve the natural environment of the North West through our actions	We will sustainably reduce the risk of sewer flooding in the North West
Metric	Wastewater Quality Compliance Pollution Incidents	Storm Overflow Performance Environmental Obligations (WINEP)	Internal Flooding External Flooding Flooding of Open Spaces Sewer Collapses Risk of 1:50 Year Storm

5. Customer and stakeholder engagement

Due to the interconnected nature of drainage, we think it's vital that collaboration and partnership are central to the plan development. Therefore, we've worked hard to engage with other stakeholders and customers to ensure the plan developed is in the best interests of the North West. Many existing partnerships focus on water quality or water quantity, but don't tie all drainage and wastewater risks together. This, therefore, became the objective of the DWMP's Strategic Planning Groups (SPG), which align with the 14 SPAs. Figure 8 shows the 14 SPAs across the region.

Figure 8 UUW Strategic Planning Areas



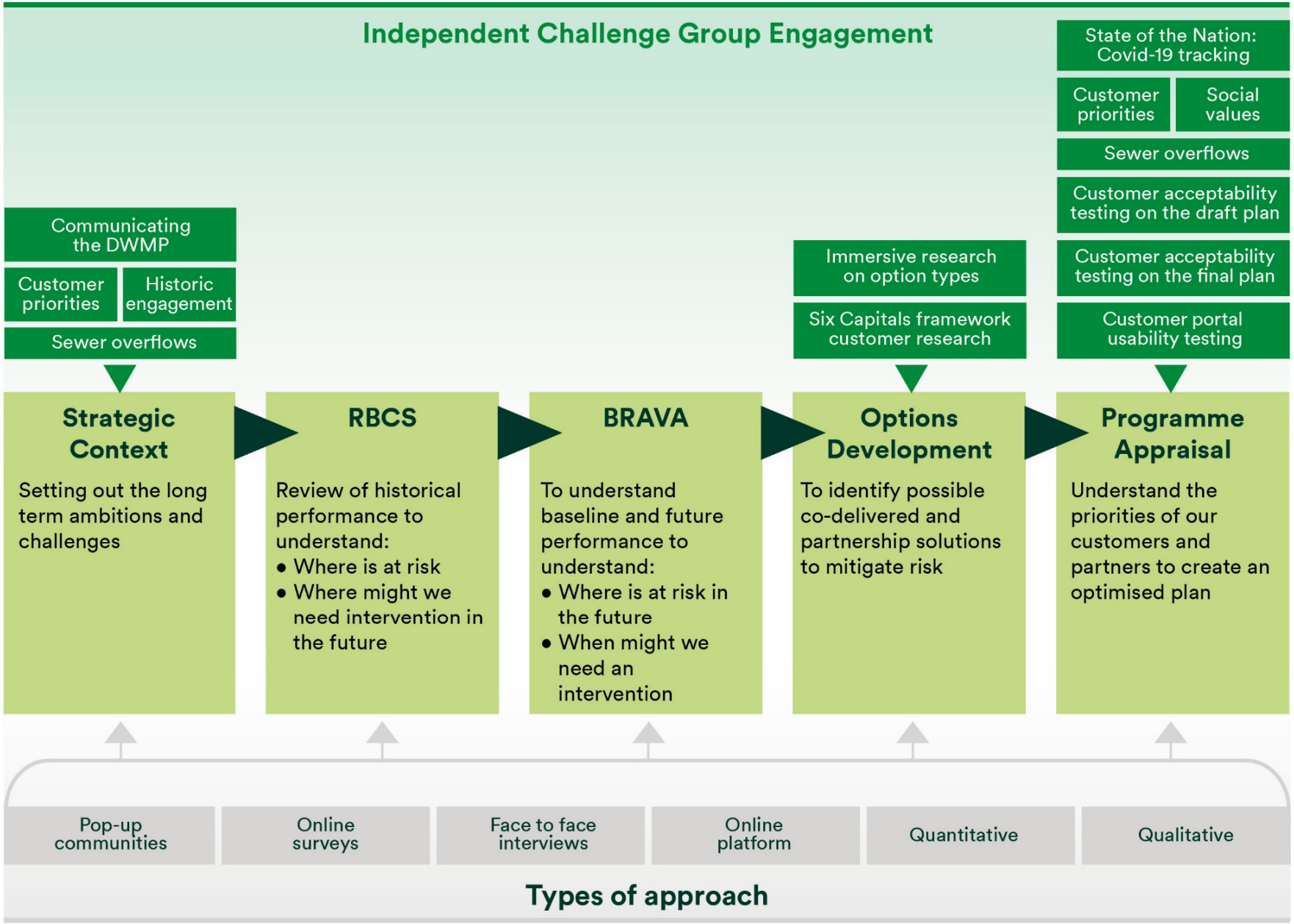
There has been a continuing cycle of engagement for the DWMP; this has been delivered through meetings, conferences, reports, workshops and through our online collaboration portal. To help structure the delivery of our engagement with stakeholders, a framework was established, which is outlined in Figure 9.

Figure 9 DWMP framework of engagement

By working collaboratively with other organisations there is an opportunity to more fully understand the risks and issues, and work together to resolve issues at the root cause. Some examples of current partnerships which are delivering great outcomes include Natural Course, Groundwork and Moors for the Future.

Additionally, bespoke customer research has been undertaken to ensure that customers' view and priorities have been reflected throughout the development of the DWMP to ensure that we produce a co-designed and co-developed plan as highlighted in Figure 10.

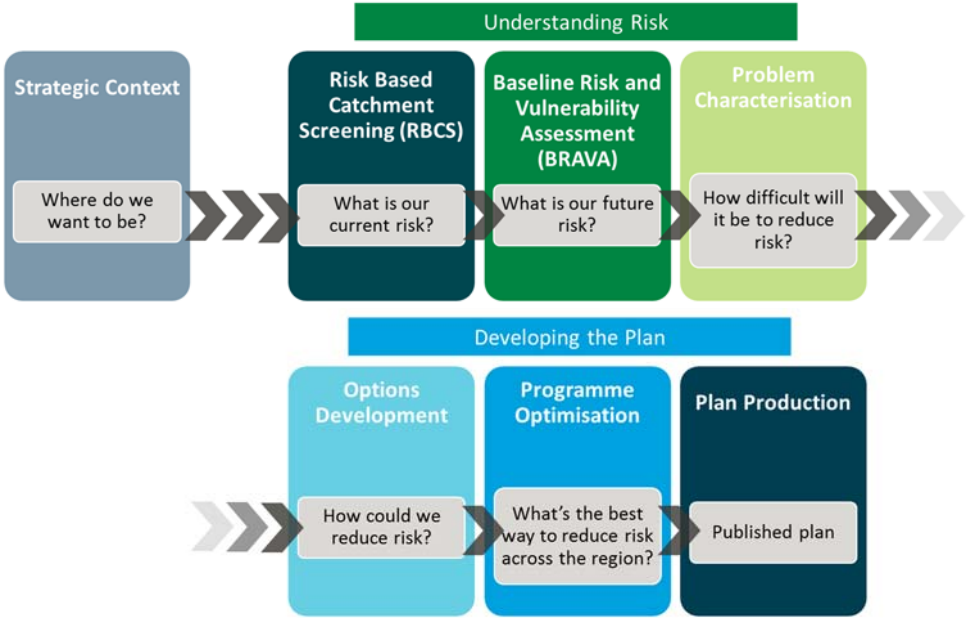
Figure 10 Summary of customer engagement



6. Plan development

The key steps taken through the DWMP process are shown in Figure 11.

Figure 11 DWMP process



6.1 Forecasting demand

In order to undertake any analysis, we need to understand the future demand. We have, therefore, prepared a demand forecast to cover the planning period for 2020 to 2050. The demand forecast considers potential changes to drainage and wastewater flows, which could impact on our network, our treatment works and/or the environment. It includes population growth, changes to per capita consumption (PCC), trade effluent forecasts, infiltration assumptions, impacts of urban creep, and impacts of climate change. The demand forecast is used for Risk Based Catchment Screening (RBCS), Baseline Risk and Vulnerability Assessments (BRAVA) and Options Development.

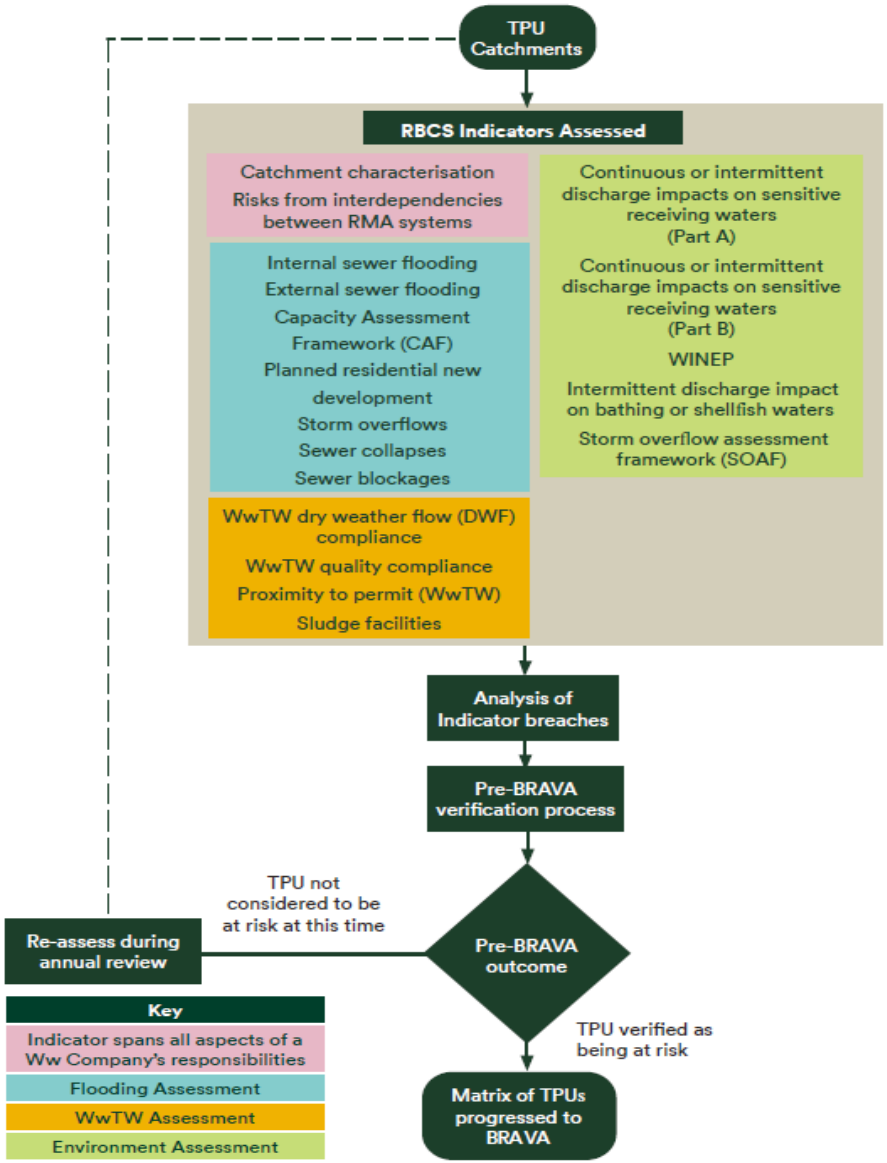
6.2 Risk Based Catchment Screening

The RBCS process was developed as a means of quickly identifying which tactical planning units (TPU) are currently experiencing issues relating to the performance of its drainage and wastewater assets, and therefore require a detailed risk assessment to understand long-term performance (BRAVA).

6.2.1 RBCS methodology

Each TPU area was subject to a high-level risk-based review for 17 standard indicators. The indicators were designed to span the key aspects of a wastewater company's responsibilities. UUW also included two bespoke indicators to account for the sewage sludge management/disposal, and to account for wastewater treatment works (WwTW) at risk of potentially failing in the future. The results from these assessments were reviewed with operational colleagues in a series of pre-BRAVA meetings, before being used to inform which TPUs require a more detailed risk assessment via the BRAVA process. Our full list of RBCS indicators (along with an overview of the RBCS process) is given in Figure 12.

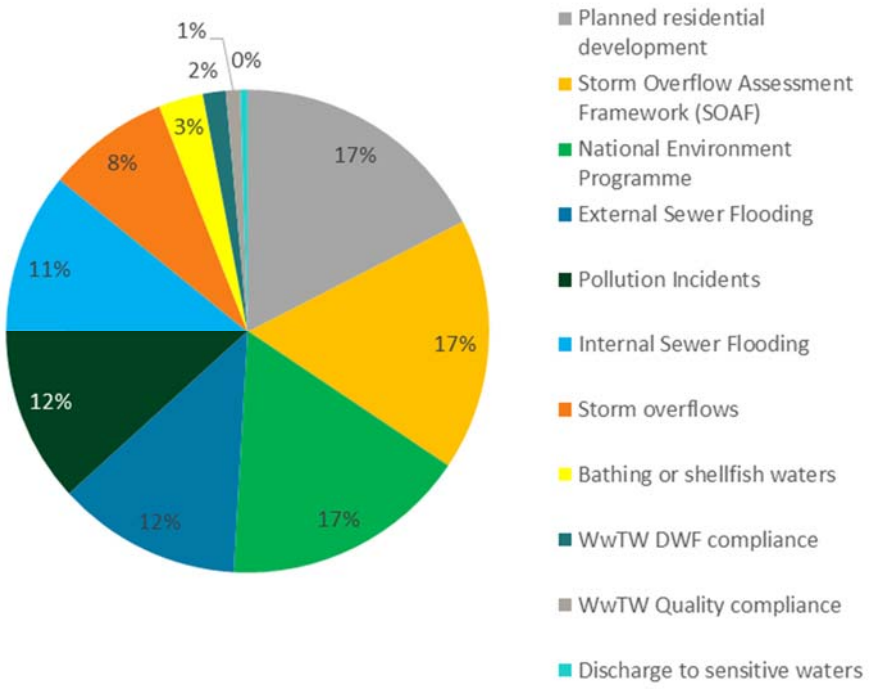
Figure 12 The process from RBCS to BRAVA



6.2.2 RBCS results

Figure 13 indicates the percentage of RBCS breaches amongst the standard indicators.

Figure 13 Percentage of RBCS breaches for the standard indicators (all UUW)



Following analysis of the indicator breaches and the pre-BRAVA verification process, we confirmed that 99% of the population in our company area live in a TPU requiring a more detailed assessment during the Baseline Risk and Vulnerability (BRAVA) stage of the DWMP process.

6.3 Baseline Risk and Vulnerability Assessments

A BRAVA is undertaken to assess the baseline (and future) position of system performance and to understand wider resilience issues within the catchment. In addition to BRAVA, we conducted a horizon scan to identify any potentially significant external threats or opportunities that could impact our analysis and future decision making.

6.3.1 Risk assessments

Six common and eight bespoke assessments were developed to help us understand the risks of not achieving our planning objectives (Table 1). For TPUs identified to be at risk following RBCS but where no models were available, new models were generated to support the relevant assessments. Assessments were conducted to understand baseline (2020), short-term (2030) and long-term (2050) levels of risk.

Outputs from these assessments are defined as: no concern; potential area of focus; or area of focus, with the latter two included in option development once they had been verified through a post-BRAVA review process. Additional horizon scans supplemented the understanding of each catchment to enable a full assessment of potential risk to be undertaken and inform options development.

Table 1 Risk assessments

Common assessments	Bespoke assessments
Internal sewer flooding	WwTW Dry Weather Flow (DWF)
Risk of sewer flooding in a storm	WwTW multiples of flow treated
Sewer collapse	External (curtilage) sewer flooding
WwTW compliance	Sewer flooding of open spaces
Pollution	Sewer blockage
Storm overflow performance	Sludge treatment capacity
	Deterioration of watercourses
	Bathing and shellfish water spill

6.3.2 BRAVA results

Detailed results from BRAVA can be found in Technical Appendix 5 – Assessing Future Risk (TA5). Within the same document are detailed descriptions of the individual 'supply' assessments undertaken and the thresholds used for assessing whether a TPU were deemed to be at low, moderate or severe risk. The supply risk was combined with the demand risk to define the size of the problem. This score was then assessed against demand uncertainty to determine whether additional assessment scenarios were required. TPUs requiring an 'Extended' BRAVA involved additional assessments on growth uncertainty. TPUs requiring a 'Complex' BRAVA involved additional assessments on climate change uncertainty. The outputs from the assessments were used to understand the range of potential risk before progression to solution development.

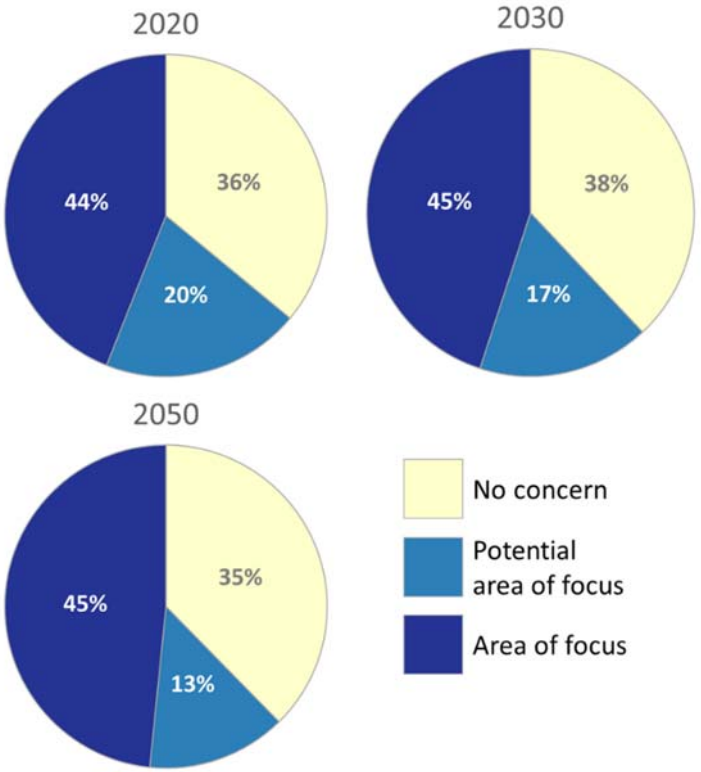
Significant findings from BRAVA included:

1. Due to climate change, the amount of rainfall is due to increase over the next 25 years. This contributes to an increase in surface water that enters the drainage network and, in turn, increases flood risk;
2. Over the next 25 years, risk of internal flooding will increase as well as the number of properties at risk of flooding in an extreme weather event;
3. The frequency and volume that overflows activate is forecast to increase; and
4. Sewer outfalls are a critical flood risk asset for a wastewater company. For example, combined sewer outfalls (CSOs) operate only when sewers are full and need to drain to minimise flood risk to property and our customers. Our modelling has shown that over the next 25 years rising river levels will submerge our outfalls more frequently, reducing their ability to offer flood relief to properties in the North West.

Figure 14 shows the proportion of BRAVA scores from all assessments falling into each risk category for each time horizon. They show the proportion of assessments scoring the highest risk (dark blue), increasing from 2020 and 2030

to 2050. The proportion of assessments deemed to be of 'no concern' or a 'potential area of focus' is shown to fluctuate over the 25 year time horizon.

Figure 14 Proportion of BRAVA scores from all assessments falling into each risk category across the time horizon (all UUW)



6.3.3 Resilience

We need to ensure that we are resilient to future challenges such as population growth and climate change. Through the DWMP, we have therefore run a comprehensive suite of assessments across the whole of the North West to develop a robust understanding of wider catchment resilience issues that are not directly linked to systems characteristics.

Our results showed that the region is least resilient to the risk posed from third-party power outage and is most resilient to the risk of remote communications outages.

The results from the assessment have been incorporated into the options development and programme appraisal stage of the DWMP. These assessments will inform the next business plan for 2025-2030, and our long-term delivery strategies, to ensure that the North West is as best prepared for the future as possible. Further details of our approach to understanding resilience can be found in Technical Appendix 6 – Resilience (TA6).

6.3.4 Horizon scanning

Alongside BRAVA, a number of horizon scans were completed to understand additional risk or opportunities that were not already captured as part of individual BRAVAs, but felt could inform future investment. The results were then reviewed alongside BRAVA results to develop options. They were useful in identifying locations where specific options types would be required or are beneficial, such as surface water removal at locations with high constant infiltration. A full list of the horizon scans can be found in TA5.

6.3.5 Problem characterisation and identification of catchments which require strategic optioneering

Problem Characterisation (PC) assessed the level of risk as well as wider issues associated with the risks within individual TPUs. The results from PC determined the likely complexity of potential solution types in options development. The PC stage identified complex and extended TPUs and was also supplemented by a review of potential growth. TPUs where there was significantly complex growth (e.g. garden villages and large developments), and where an adaptive and integrated approach to solution development would be required, were further categorised as 'strategic' sites in the PC process.

6.4 Options development and appraisal

The options development phase of the process takes the needs identified through BRAVA and develops appropriate options that could be implemented to mitigate those risks over time. The process aims to ensure that shorter-term decisions are made within the context of long-term challenges and needs. Figure 15 illustrates the approach we've taken to developing options.

6.5 Option identification

6.5.1 Preferred options

Following the options development process, a set of preferred options were identified. These were then put forward for use in an optimisation process that identified possible solution scenarios across the different planning areas of the UUW region in order to meet our short and long-term planning objectives.

The preferred options included:

1. Surface water source control measures
2. Enhanced sewer maintenance
3. Intelligent network operation
4. Increase treatment capacity
5. Increase the capacity of existing foul/combined sewers
6. Domestic and business customer education
7. Modification of consent/permits
8. Treatment works rationalisation
9. Enhanced operational maintenance
10. Catchment management initiatives
11. Sewer rehabilitation

7. Programme appraisal

In order to determine the best programme, an innovative decision support tool, known as the 'optimiser', was used to select the preferred options for the prevention of pollution, flooding and sewer collapse events. The cost, benefit and six capital assessment data from options development were used as inputs into the optimiser and a range of scenarios and constraints applied. Using the applicable rules, the optimiser determined what the best combination of interventions is for the region for a number of scenarios. The resulting costs and benefits of each scenario vary according to the outputs of the decision support tool. However, there are some clear activities that appear in all scenarios and these are the 'no regrets' activities that will be the focus of the 2025-2030 investment cycle.

7.1 Best value vs lowest whole life cost

Two main approaches to how the optimiser would select options at a programme level were considered. These were best value and lowest whole life cost.

The best value approach follows the options hierarchy approach (Figure 15), which was developed based on customer research and endorsed as the best value approach by the 'Your Voice Environmental and Social Capital Sub Group' (Customer Challenge Group sub-group).

In the lowest whole life cost approach, the optimiser selects the lowest whole life cost option from the available option list. The six capital benefits of options were considered in the creation of this option list with a lower screening threshold for secondary screening for options with additional benefits.

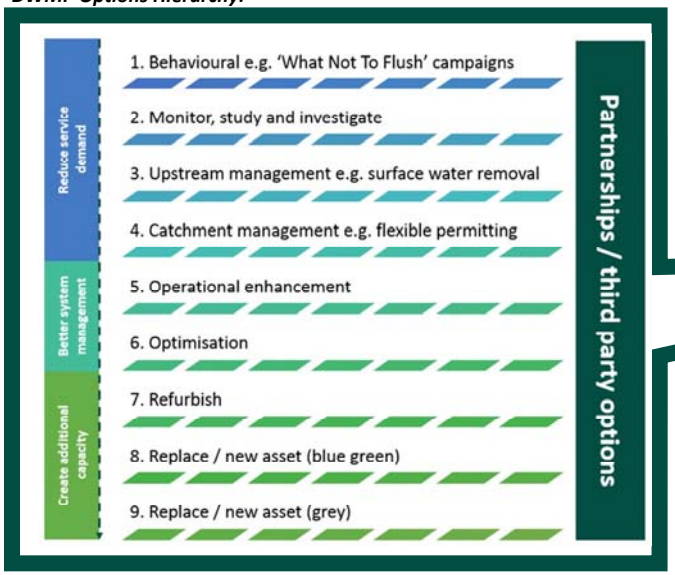
A high-level comparison of these two approaches demonstrates that both scenarios project a significant improvement in performance against UUW's planning objectives. The best value approach is more expensive, however, it offers greater opportunity for additional benefits. A wide scale monitoring programme would be required, whichever scenario, to enable the delivery of an adaptive approach.

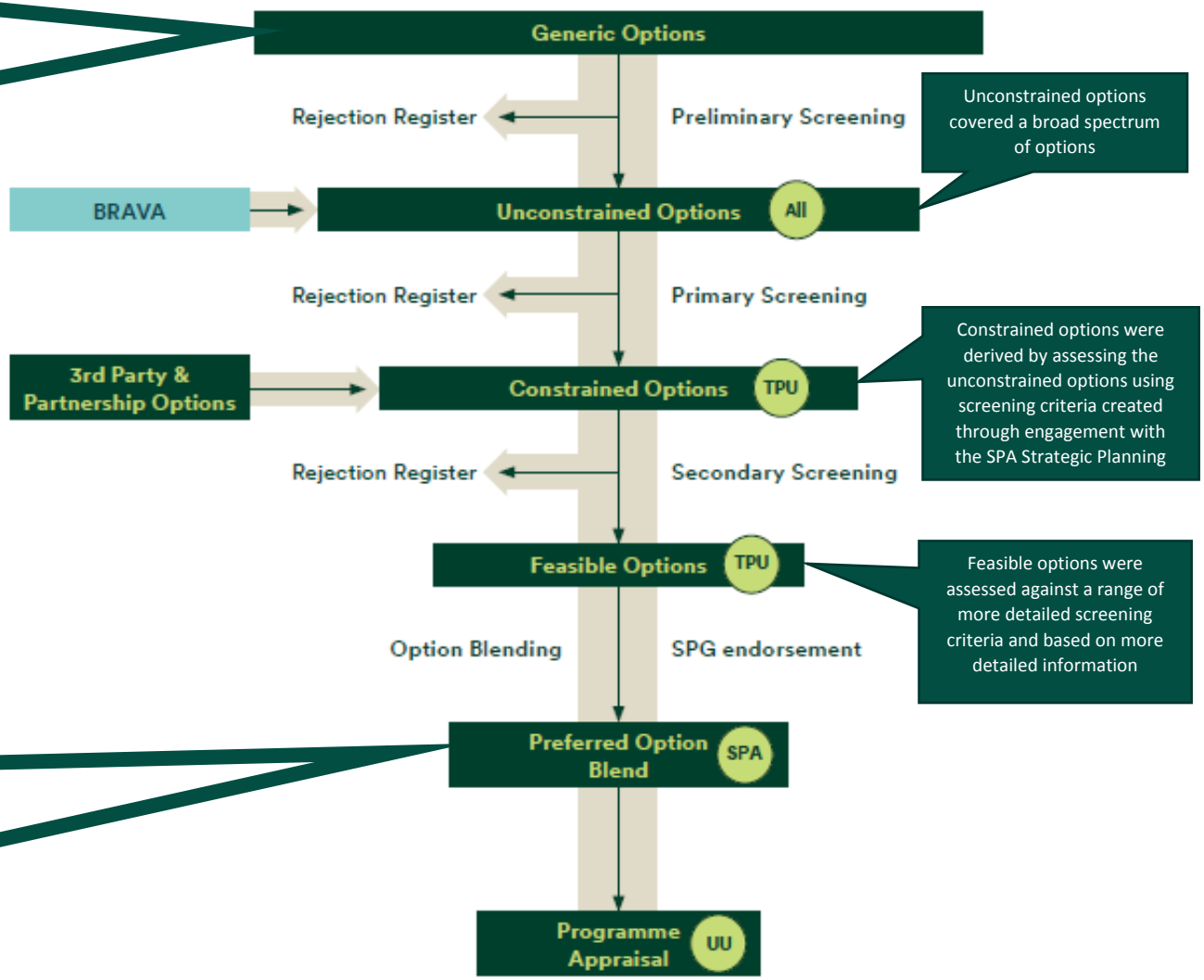
Ultimately the best value approach was selected as the preferred scenario to determine the preferred plan.

Figure 15 Options development process

Approach to sourcing options for the generic options list:

DWMP Options Hierarchy:





8. Summary of programme outputs

We have tested a range of scenarios and, whilst we have accommodated uncertainty, the preferred plan detailed is unlikely to be a complete picture of the potential long-term investment required. To provide a more complete picture of the potential long-term investment requirements we considered a range of components including those which are more uncertain. As such, we are setting out our plan through three core components reflecting three different levels of certainty:

- Wastewater treatment – activities that are mandated by legislation or are required to maintain compliance with discharge permits;
- Storm overflows – investment associated with meeting the targets within the government's Storm Overflows Discharge Reduction Plan (SODRP); and
- Performance improvements – optimised outputs of the non-mandated aspects of the plan e.g. to meet internal flooding planning objective.

Each of these components helps to ensure performance improvements and the delivery of the planning objectives (Figure 16). This is done by mitigating the long-term risks identified through the BRAVA.

Figure 16 How activities in the plan ensure achievement of planning objectives

Planning objective	We will provide excellent wastewater services, reducing our impact on the environment	We will protect, restore and improve the natural environment of the North West through our actions	We will sustainably reduce the risk of sewer flooding in the North West
Metric	Wastewater Quality Compliance Pollution Incidents	Storm Overflow Performance Environmental Obligations (WINEP)	Internal Flooding External Flooding Flooding of Open Spaces Sewer Collapses Risk of 1:50 Year Storm
Addressed by	Legal Obligations: Permit Compliance Performance Improvements	Legal Obligations: WINEP	Performance Improvements

Since the development of this plan began in September 2018, there have been a number of changes in government requirements and other areas of considerable uncertainty. The most substantial of these is the SODRP which was published in August 2022. This requires a significant step change in ambition and performance across the water industry to address the legacy of storm overflows.

As part of the Water Industry National Environment Programme (WINEP) submission in January 2023, UUW undertook an extensive analysis based on the work carried out by Stantec for the Storm Overflows Evidence Project (SOEP).

This enabled UUW to categorise all 2,182 of our permitted storm overflows in line with the criteria in the SODRP and review this with the Environment Agency and Natural England. The WINEP and DWMP storm overflow plans have both been designed to meet the Defra trajectory targets stated within the SODRP.

In total, we forecast £26 billion of total investment (totex) is required for our planning objectives from 2025–2050. As shown in Figure 17, this is comprised of:

- £18.1 billion required to meet the SODRP requirements;
- £6.1 billion for wastewater treatment works upgrades to meet statutory WINEP drivers, and maintain 100% compliance where growth triggers new permits; and
- £1.7 billion for the DWMP planning objectives, such as reducing the number of flooding incidents and pollutions.

This plan reflects our commitment to innovation by considering the benefits that new approaches and technologies could deliver. For example, we are proposing over £3.5 billion of investment in green infrastructure and other nature-based solutions over the 25 years of the DWMP.

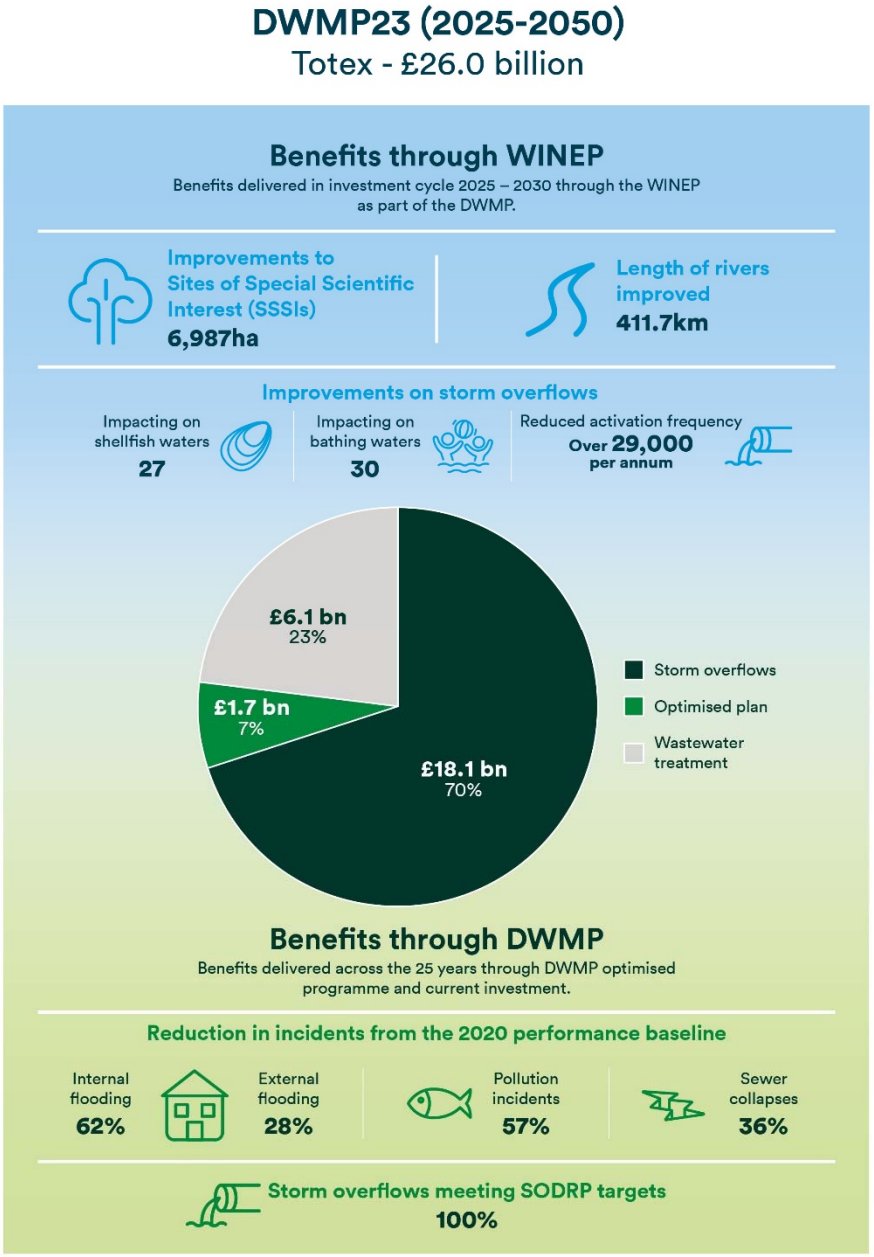
Another key option selected in this plan is a wider role out of our Dynamic Network Management (DNM) strategy, which was highlighted as a key initiative in the business plan submission for investment cycle 2020–2025. This uses artificial intelligence across the sewer network to enable proactive targeting and performance improvements; something which would not have been possible just ten years ago.

The potential bill impact of the plan is estimated to be £61.87 per year by 2030 for the average household, excluding the impact of inflation. The anticipated 2050 bill impact is estimated to be £239.46 for the average household, excluding the impact of inflation.

A more detailed breakdown of the investments and benefits that can be delivered through the DWMP across the 25 years can be found within the Main Document (DP1).

Accompanying documents are also available for each SPA (SPA_01 to SPA_14) which detail the background of the SPA, the risk assessments undertaken and the preferred options in the short, medium and long-term.

Figure 17 Forecasted 25 year investment (totex) for the DWMP



8.1 Managing uncertainty

UUW is supportive of the ambition to more explicitly embed long-term planning into business planning cycles. The key principles of adaptive planning have been considered within the first DWMP and this is an area we will build on.

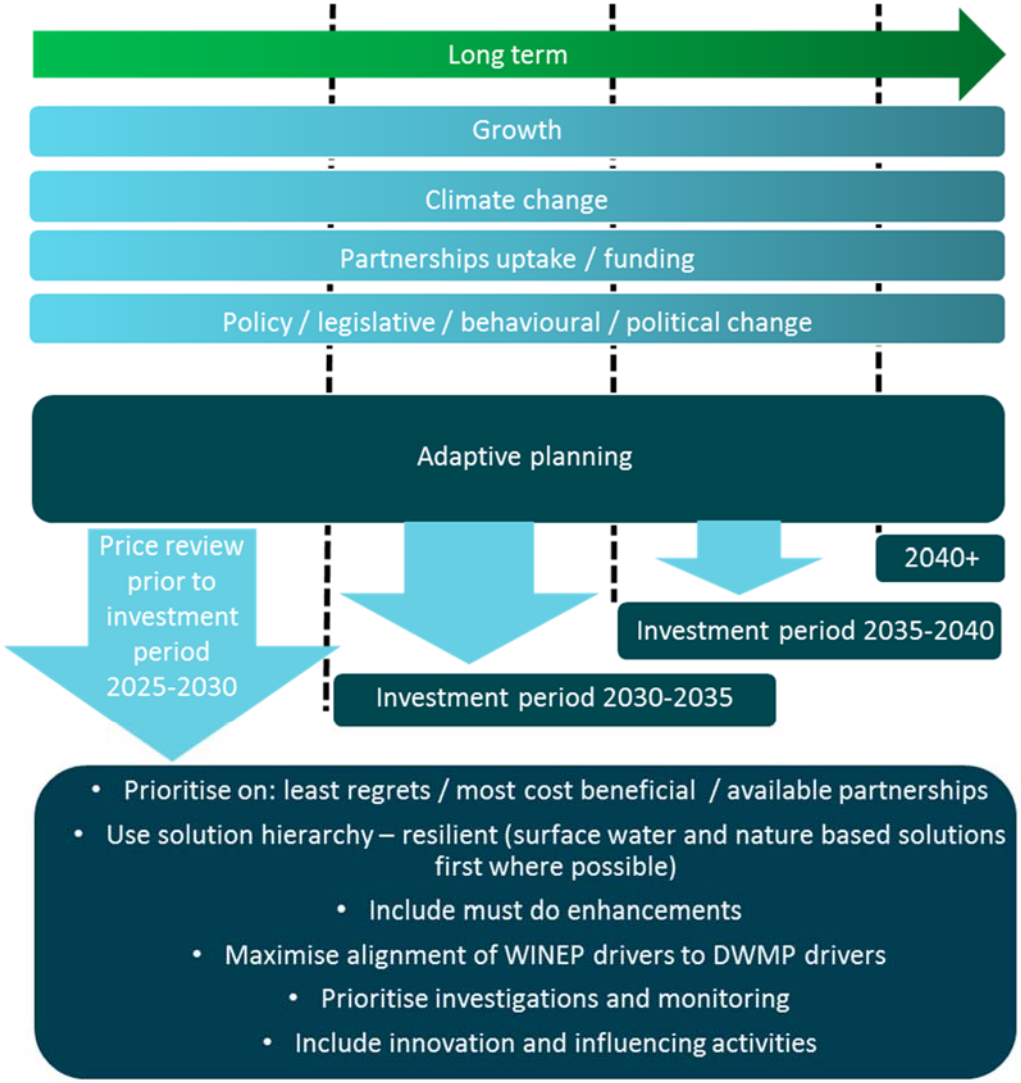
Within the DWMP, we have:

- Considered ambitions over the next 25 years;
- Developed potential future scenarios and applied these within risk forecasts; and
- Built an options development process which enables a strategy to be developed, is flexible to cope with changes over time and optimises the timing of key interventions.

In order to deliver resilient and improved services over the long term we need to optimise the delivery of interventions in a timely and affordable way. Over time, understanding of changes will be better understood and become more certain. Additionally, the understanding of the costs, benefits and timescales of delivered interventions will improve. It is, therefore, essential that the DWMP is iterative and continues to evolve through later planning plans. The DWMP is a key tool in developing the 2025–2030 and future business plan submissions.

As part of business as usual activities within future cycles of the DWMP, regular reviews will be undertaken of performance and benefits realisation to allow for assessment of the impact of interventions as and when they are implemented but also the changing picture of risk within the region as growth and climate change occur. Figure 18 is an example of how adaptive planning can be used for the long term.

Figure 18 Example adaptive approach for long term planning



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