The Wessex area
Drainage and wastewater management plan (DWMP) – Technical summary

May 2023

Wessex Water
YTL GROUP

Contents

1. Introduction

Wessex Water plays an integral role in lives and the environment across the Wessex Area. We recognise our privileged status as a provider of essential services – and the responsibilities that come with that. We are aware that the water industry in the UK faces real challenges if it is to secure public trust and to demonstrate its critical role as a custodian of the environment in the face of climate change. Though we are proud of our sustained industry-leading performance for customers, our communities and the environment, we believe we should be an exemplar to the industry of the future, trusted to leave the environment in a better condition for future generations, while keeping our services affordable and satisfying for customers.

The opening paragraph is taken from our ambitious Strategic Direction Statement (SDS)[95]. The SDS gives an ambitious direction to achieve our long-term outcomes, which include:

- An effective sewerage system
- Great river and coastal water quality
- Net zero carbon
- Increased biodiversity

We will achieve those outcomes by:

- halving the impact of sewer flooding
- eliminating the discharge of untreated sewage from storm overflows, starting with those that harm the environment and discharge most frequently
- being a net zero carbon business by 2040
- using nature-based solutions or sustainable solutions where best value

This report includes how we aim to achieve this for the sewerage side of our business, except for carbon which is documented in our route map to net zero carbon[92]. This is the first time we have produced a drainage and wastewater management plan (DWMP). It is the sewerage equivalent to the water resources management plan (WRMP) which reports the long-term plans on the water supply side of the business.

1.1 What is a DWMP

Climate change, population growth, increases in awareness of storm overflows (SO) as detailed on our website[93] and changes in customer behaviours are putting increased pressures on the water sector.

The DWMP framework[74] was developed by the water industry and key stakeholders to provide a consistent approach across water companies in England and Wales for a consistent approach on how we can tackle existing and future pressures. A summary of the framework ambitions can be found in the document Working together to improve drainage and environmental water quality – an overview of DWMP[77].

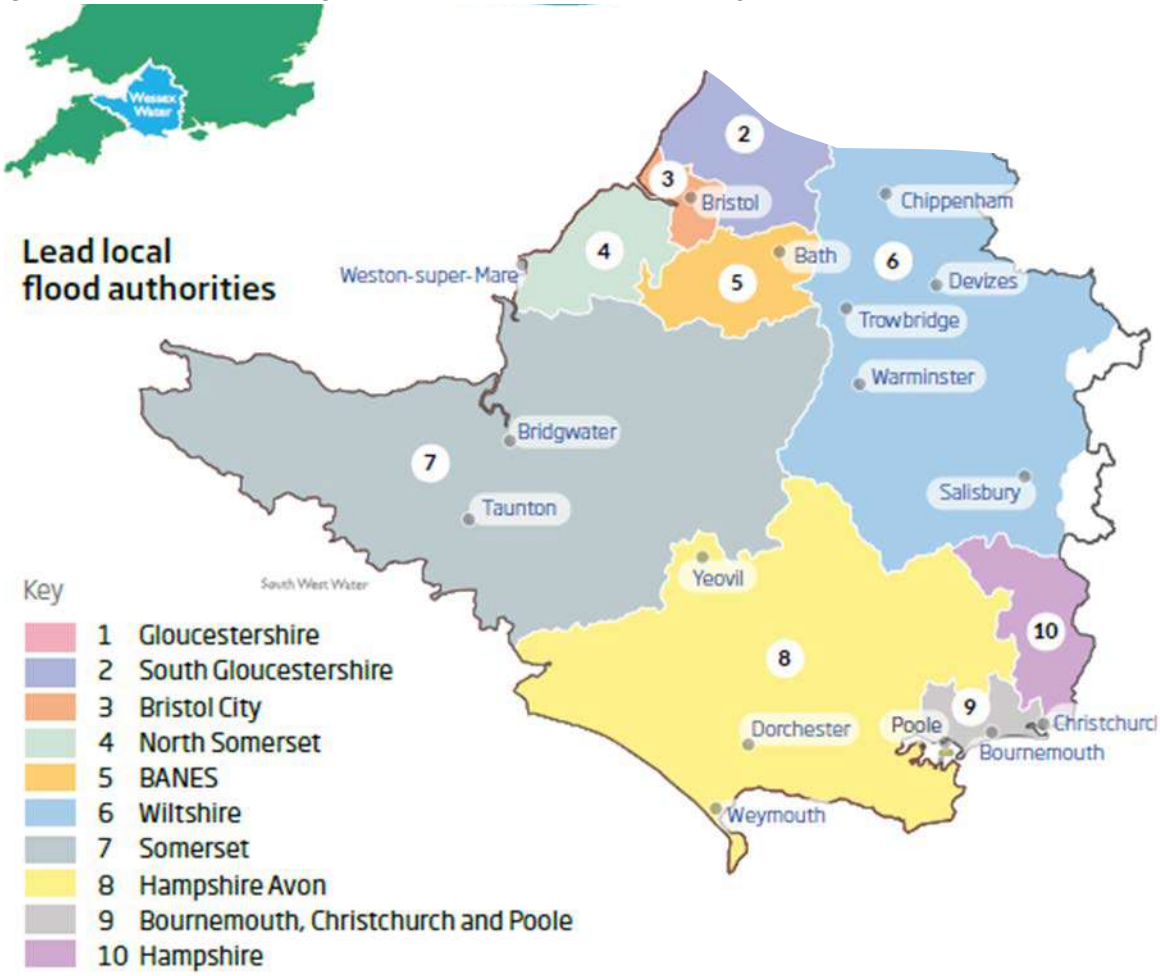
We are publishing our strategic drainage and wastewater management plan (DWMP) for the first time to give visibility on how we are addressing these pressures for current and future risks.

The vision for the DWMP was developed in collaboration with more than 40 organisations from across the UK (including governments, regulators, local authorities, environmental charities, academics, and community groups) who formed part of the 21st Century Drainage Programme[73]. The vision aspired to enable the UK water industry, working in partnership with others, to make plans for the future that will ensure the sustainability of our drainage infrastructure, and the services it provides to customers and the environment.

The DWMP will set out plans to enhance Wessex Water assets to ensure we continue to deliver for our customers and the environment in a sustainable and affordable way - especially in the face of future challenges, like population growth and climate change.

Throughout the development of the DWMP, we have been working and engaging with numerous stakeholders, including customers, regulators (e.g., the Environment Agency and Ofwat) and flood risk management authorities (RMA). Engagement with other RMAs is essential as flooding responsibilities are complex, as described in Figure 13.

Figure 1: Wessex Water region and lead local flood authority areas



1.2 Changes made in response to the consultation

We have made a lot of changes following feedback from the consultation and other new obligations. This list is not exhaustive, but contain the more significant changes:

- Updated plan and reports as a result of the consultation
- Included new nutrient neutrality obligations
- Ensured we achieve the governments Storm overflow discharge reduction plan Ambition for nature based solution
- Nature based approach
- Adaptive planning
- Partnership working
- Customer and stakeholder engagement
- Great environment and biodiversity

2. Background

Wessex Water is the regional sewerage business serving 2.8 million customers in the Wessex area, shown in Figure 1. This includes parts of Dorset, Hampshire, Somerset and Wiltshire and large conurbations including Bristol, Bath, Bournemouth, and Poole.

We have 48 designated bathing waters on our two coastlines; on our northern coast Weston-Super-Mare is the largest coastal tourism town and on our southern coast we have more including Bournemouth, Poole and Weymouth.

Our purpose is to protect public health and enhance the environment, creating value for the people we serve. Our aim is to give all customers excellent standards of service by providing environmental services that protects health, improves the environment and provides customers good value for money.

We are recognised by our regulators as one of the leading water and sewerage companies in England and Wales.

We have developed outcomes for our next business plan submission Figure 2; serving people and places and enhancing the environment. The DWMP and Water Resource Management Plan (WRMP) are both strategic plans considering the long-term investment needs of the wastewater and water-supply parts of the business respectively. They both will contribute to the outcomes in the top half of the circle shown in Figure 2.

Figure 2: Wessex Water PR24 Outcomes

2.1 Alignment with other plans

This plan has not been produced in isolation. Its development is fully integrated with both the company's strategic direction statement[95] that documents our 25-year vision, the development of our business plan for the 2024 Price Review (PR24) and other strategies and plans.

There are a number of other frameworks, plans and strategies which we have considered during the development of our DWMP:

- *Wessex Water: Water resource management plans*
- *government: 25 Year environment plan*
- *Environment Agency: Water industry national environmental programme (WINEP) roadmap*
- *Environment Agency: River basin management plans (RBMP)*
- *Environment Agency: Flood risk management plans*
- *Environment Agency: Shoreline management plans (SMP)*
- *Councils: Local plans*

2.2 Structure of the DWMP

The draft DWMP documents can be found on our website[83]. There are four reports (which increase in complexity and level of detail) and several appendices:

- a customer-facing document
- a non-technical summary
- a **technical summary**
- the plan which also contains short technical appendices, referred to as Annexes
- technical appendices

The Wessex Water DWMP website hosts these reports and a geospatial portal[82] that contains a wealth of information, including storm overflow performance and almost 200 drainage and wastewater strategy summaries. Drainage and wastewater strategies summarise our plans for the short, medium and long-term for each of the major towns and cities.
Our website contains drainage and wastewater strategy reports that summarise what we are planning in each major conurbation.

2.3 Wessex area and outcomes

Wessex Water is the regional sewerage business serving 2.8 million customers in the Wessex area, as shown in Figure 1. This includes parts of Dorset, Hampshire, Somerset and Wiltshire and large conurbations including Bath, Bristol, Bournemouth, Christchurch and Poole. We have 48 designated bathing waters on our two coastlines; on our northern coast Weston-Super-Mare is the largest coastal tourism town and on our southern coast we have more including Bournemouth, Poole and Weymouth. Our purpose is to protect public health and enhance the environment, creating value for the people we serve. Our aim is to give all customers excellent standards of service by providing environmental services that protects health, improves the environment and provides customers with good value for money.

We are developing our Outcomes for our next business plan submission[1]. The DWMP and Water Resource Management Plan (WRMP) are both strategic plans considering the long-term investment needs of the wastewater and water-supply parts of the business respectively. They both will contribute to the outcomes in the top half of the circle shown in Figure 2, serving people and places and enhancing the environment. The DWMP will focus on achieving our outcome-based objectives, while also promoting options that focus on the impact to our customers and communities to deliver best value solutions.

Figure 2: Wessex Water PR24 Outcomes

We recognise the significant role that we and the wider water industry play in improving our local environment. Traditional 'grey' civil hard engineering solutions are becoming increasingly unsustainable and are also becoming increasingly inefficient with small marginal gains for high marginal cost. To become a net zero carbon industry and build the resilience of our catchments at an affordable price, we need to invest in nature-based solutions and collaborative approaches. We have developed a strategy named Outcomes based environmental regulation[90] (OBER), that we believe will revolutionise regulation of the industry. At its heart, the OBER concept gives water companies the opportunity to make greater environmental improvements using markets, so the burden is not passed on to bill-payers. More details on OBER can be found on our website[90].

[1] Our next business plan covering 2025 to 2030 is known as the Periodic Review 2024 or PR24.

2.4 Wessex Water's drainage and wastewater assets

Figure 3 is a schematic providing statistics of our wastewater assets, which include 35,000km of sewers and 398 water recycling centres (WRC). The sewers take wastewater from our customers' homes and businesses and conveys the flow by gravity to the WRC, where the wastewater is purified before being discharged back to the environment. We also have sewage pumping stations (SPS) which lift flows over hills using pressurised pipes called rising mains.

Figure 3: Wessex Water wastewater asset statistics

2.4.1 Water recycling centres

There are 398 Water Recycling Centres (WRCs) in the Wessex area. The area that each WRC serves (i.e all the sewers that flow to the treatment works) fall within the WRC catchment area.

Our largest WRC catchment is that of the Avonmouth WRC, Bristol and contains a population of some 850,000, with 3,100km of sewers and 161 pumping stations. At the other end of scale, some of our smaller WRC catchements only serve a couple of houses.

Error! Reference source not found. shows the distribution of our WRCs, as per Ofwat a nnual reporting guidelines. The scale and nature of treatment processes present at each WRC is very much dependent on the impact of the discharge on the receiving environment and the associated discharge permit limits that we are required to achieve, as determined by the Environment Agency.

WRC catchments with risks identified now or in the future have drainage and wastewater strategies summary reports available on our website. These set out our plans for the short, medium and long term.

2.4.2 Sewers

Wessex Water are responsible for 35,000,000 metres of public sewers. Sewers convey flow by gravity and can be:

- foul only (water from toilets, sinks and baths),
- surface water only (rainfall runoff from roofs, driveways and roads, or
- combined (both foul and surface water in one combined pipe).

Public sewers vary in size from 100mm diameter to over 2m in diameter. About half of sewers are made of vitrified clay material, but more recently plastic pipes have been installed as these are less expensive, lighter (so less health and safety issues) and the sewer lengths are longer so there are fewer joints (which can fail over time). The average age of public sewers is around 50 years.

2.4.3 Storm overflows

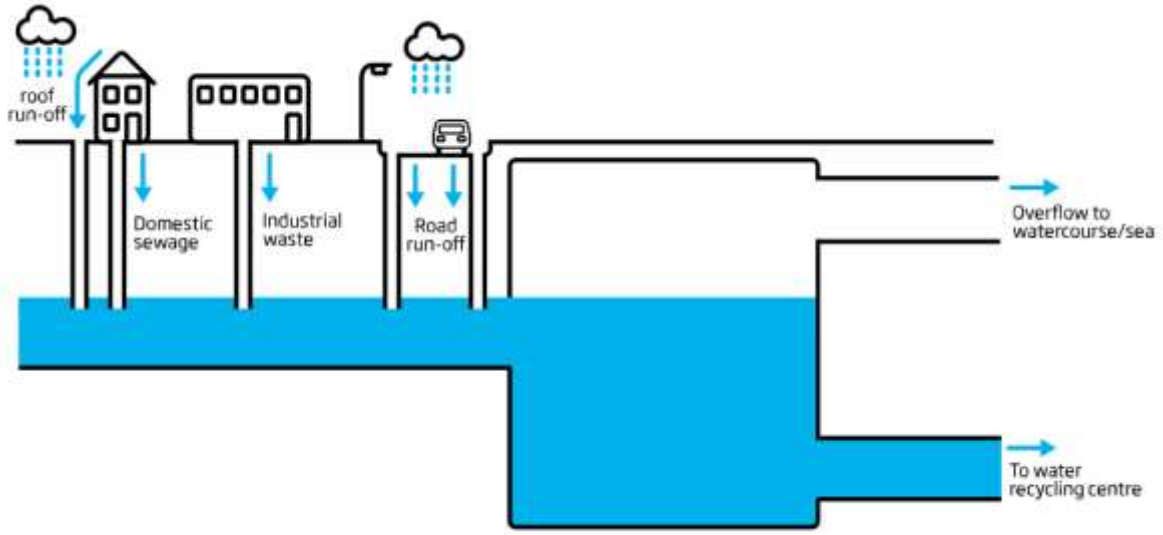
Storm overflows, formerly known as combined sewer overflows, are an important part of our drainage system. Severe wet weather can increase the flow in a combined sewer, which conveys both wastewater from homes and businesses and storm water from roofs and driveways or paved areas. See our website for more information on storm overflows[93].

Figure 4 is a schematic of how most sewerage flows to treatment at a WRC, but when it rains heavily flow can discharge in watercourses or the sea.

Storm overflows act as relief valves, allowing excess storm water to be released to the river or sea, to protect properties from sewer flooding during heavy rainfall. Flows from the storm overflows into the environment are very diluted due to the large volumes of rainwater in the sewer and by the receiving river or sea which will also be swollen by the wet weather.

Storm overflows are licenced (permitted) by the Environment Agency. We have a programme to ensure all storm overflow events are monitored by the end of 2023.

Figure 4: Illustration of water sources that contribute to storm overflows



The current data linking storm overflow operation to river water quality as measured by the Water Framework Directive (WFD) and the requirements for waterbodies to meet Good Ecological Status can be found on the EA's Catchment Data Explorer[9].

The data, as of March 2022, indicates that 12 of the 1080 reasons why waterbodies in Wessex Water's area do not meet WFD standards are confirmed or probably due to storm overflow operation. These 12 reasons affect 8 out of the 444 waterbodies in Wessex Water's operational area.

However, it is worth noting that the data collection points for determining WFD status are not common. Additional environmental monitoring will be required to determine whether storm overflows have any local adverse ecological impact.

With the increasing awareness of the existence and operation of storm overflows and the increase in wild swimming, there has become a greater desire to understand what river water quality is like. See our video Wild swimming – what you need to know[103].

Public health risk metrics are different from metrics used to assess protection of the environment. This is because human beings have a much lower tolerance to microbiological activity than wild animals. The key parameters that are used to measure public health risk are faecal indicator organisms (FIOs) – these are types of bacteria found in mammal intestines that are both common, easy to cultivate and survive well outside of their natural environment.

There are various sources of FIOs. It is important to note that storm overflows are just one of these sources. River water quality can still be poor from a public health perspective even when no storm overflows exist or operate.

Sources of FIOs include:

- treated sewage from WRCs – treated sewage does not normally have a treatment process that kills bacteria. Additional disinfection processes are required
- wildlife and domestic animals – bacteria from faecal matter from birds and mammals
- storm overflow discharges
- agricultural run-off – faecal matter from cattle, sheep, poultry, piggeries etc.

We are working with various swimming and water sports groups to improve both the knowledge of water quality and provide better real-time information, to help users make risk-based decisions about using the water as well as to help inform investment decisions to improve water quality. Where improvements are required, identifying both the source of the problem and the solutions are key outputs from the monitoring.

The case study in **Error! Reference source not found.** shows a pragmatic solution to storm o verflows that are heavily influenced by groundwater – to treat the flow through a reedbed. This nature-based solution is a low embodied carbon solution that also brings wider benefits such as increased biodiversity. We are negotiating with the Environment Agency to get this permitted as treated effluent, so it is no longer considered a storm overflow.

For more background information and what storm overflow improvements we are delivering by 2025, please see this Storm overflow improvement plan 2022-2025[94].

2.4.4 Sewage pumping stations and rising mains

Sewers flow downhill using gravity to sustainably convey sewage from houses to WRCs. We have 2,146 sewage pumping stations (SPS) that lift flows over hills either to a gravity sewer or directly to the WRC. The pumped flows are conveyed through pressurised pipes, called rising mains. Rising mains are more vulnerable than gravity sewers because of the cyclic pressures and when failure occurs their impact is often more serious than when gravity pipes fail.

2.5 Long term planning

Long term drainage and wastewater planning is not new. We have been carrying out this for decades under our drainage area plans (DAP). In 2013 the drainage strategy framework was published to encourage companies to make their DAPs more live and visible. In 2018 storm overflow assessment framework[107] (SOAF) began to recognise that frequent spilling overflows needed addressing. The DWMP framework[74] has combined all the previous drainage planning best practice together into one framework.

The DWMP Framework requires us to re-evaluate risks and report in a manner consistent across water companies in England and Wales. This is a long and complicated process that has taken 4 years to deliver. This was an enormous effort to achieve what we have done in such a short timescale.

Our journey to deliver this first cycle DWMP framework is summarised below:

- Risk based catchment screening (RBCS) completed by 2019
- 85% coverage of 1D computer hydraulic models of foul/combined sewers by 2020
- 1D computer models (verified) of surface water sewers with known issues by 2021
- worked with 2 LLFAs to develop 2D computer models with overland flood risks
- Baseline risk and vulnerability assessments (BRAVA) by 2021
- optioneering and programme appraisal by April 2022

- reporting the first cycle draft DWMP by July 2022
- consulting on the draft DWMP until 1 October 2022
- updating the DWMP to produce a final DWMP by May 2023

This final DWMP will influence our next steps to:

- Develop our PR24 business plan by 2024
- continue working with our partners to build integrated models for a few key catchments where we have complex flooding issues by 2025.
- updating our DWMP every 5 years

The DWMP investment needs will inform our business plans that we submit to Ofwat every 5 years. We submit our next business plan in 2024 (PR24) covering 2025 to 2030. The DWMP will not only inform PR24 but also many future business plans to beyond 2045.
We have also been encouraging collaborative and co-creation of partnership schemes where Wessex Water, flood risk management authorities and others can work together to deliver improved performance more efficiently for over a decade.

Sewerage long term planning is not new. For example, a few years ago we completed the final stage of the long-term strategy for north Bristol 20 years after the first phases were built. It was known as the 'missing link' and was only needed when development in Yate exceeded a trigger point. We have evolved the original strategy and extended it to include more relief sewers that are now required to enable new development and growth. See Figure 5 and the North Bristol relief sewer – a tunnelling breakthrough[87] video for more details.
We installed automated penstocks along this tunnel so the storage can be fully mobilised. We are looking to see if by using predictive rainfall and 'live' simulations, we can optimise the performance of this in near-real time.

Figure 5: North Bristol – Trym sewer under construction

The DWMP framework is however new in that it is encouraging companies to give visibility to our current and future risks and our long-term plans to address those risks.

We know that other conurbations will require major strategies in the medium to long term. These include Bath, Bristol, Bournemouth, Poole and Weymouth. We have started preparing these strategies, but do not have the evidence to justify investment by 2030. We have added these onto the DWMP data tables as requiring future significant investment. We will detail these strategies in our Cycle 2 DWMP in a few years.

We have tried to align our DWMP with what we anticipate will be our long term delivery strategy- a new long term planning framework[37] that Ofwat has introduced for PR24. This includes sensitivity testing using common reference scenarios, such as climate change, growth and technology, as described in Section 9.

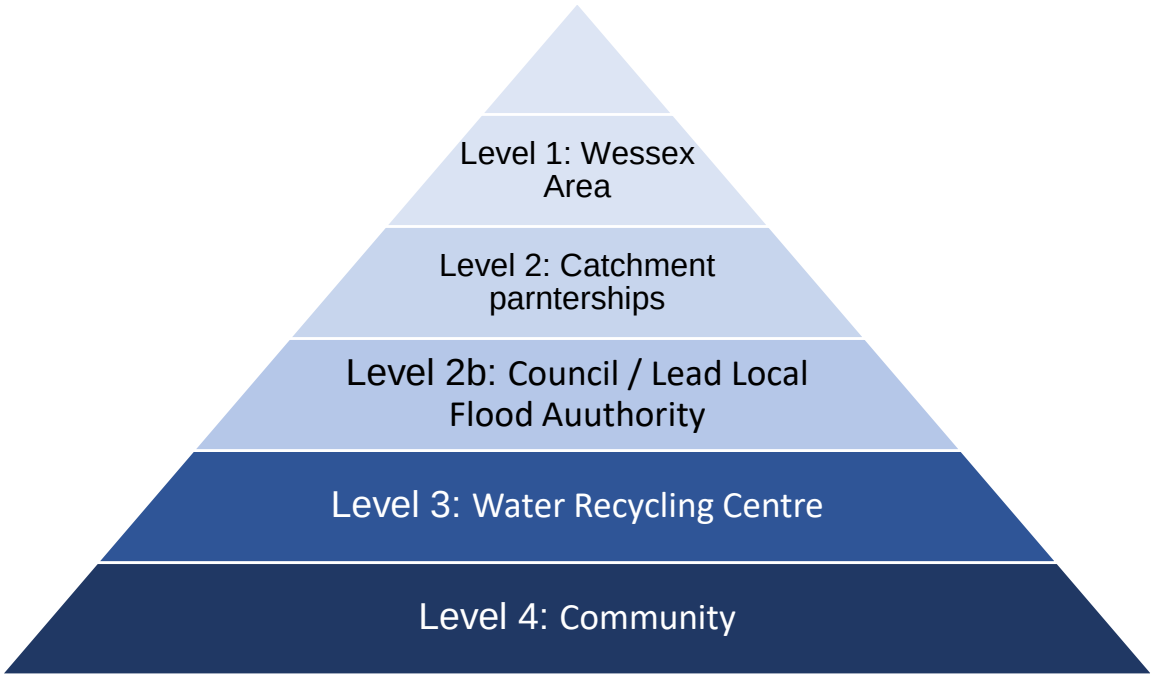
3. Planning areas

Planning areas and catchments are terms we use to describe areas of interest at different levels of detail; it can be a village, several villages, towns, cities, or all the towns and cities on a major river basin, or our entire region (Figure 6).

We already work with partners and stakeholders at various levels of planning areas:

- Level 1: Wessex regional area (Figure 7)
- Level 2: Catchment partnership areas (Figure 8)
- Level 2b: Lead Local Flood Authority areas (Figure 9)
- Level 3: Water Recycling Centre catchments (Figure 10)
- Level 4: Customers / community / parish council / town council areas.

Figure 6: Planning areas within the Wessex area



3.1 Level 1: Wessex regional area

The Wessex regional administrative area aligns with the area serviced by Wessex Water for drainage and wastewater. The Wessex area is shown in Figure 7, and contains 2.8 million customers in the South West of England. It includes parts of Dorset, Hampshire, Somerset and Wiltshire and large conurbations including Bath, Bristol, Bournemouth, Christchurch and Poole.

At regional level we attend the Wessex regional flood and coastal committee[104] (WRFCC) and the South west flood risk group. We have used the WRFC Strategy to influence our DWMP.

We also attend many national meetings to influence policy and share best practice, as described in section 6.

Figure 7: Level 1 DWMP planning area - Wessex

3.2 Level 2: Catchment partnerships

We have well established relationships with our strategic catchment partners at a river basin catchment level. The Level 2 areas identified within the DWMP are split into 4 different strategic catchments as shown in Figure 8.

We're working in partnership with organisations and individuals across our region to protect and restore the water environment as a part of the catchment-based approach (CaBA). The catchment based approach[106] is a way of working at a river catchment scale to improve the water environment for wildlife and people. By working together, the catchment partnerships aim to:

- share local knowledge and expertise
- identify the local challenges
- deliver cost effective solutions with multiple benefits.

There are five catchment partnerships, or catchment initiatives, in the Wessex Water region: Bristol Avon, Hampshire Avon, Somerset and under Dorset, Poole Harbour and the Stour. At the time we did our strategic context we decided to have 4 catchment areas, so we have combined the 2 catchment initiatives in Dorset into one Level 2 area, as shown in Figure 8.

We work with all the catchment partnerships in the region and host two catchment partnerships, Bristol Avon and Poole Harbour, and co-host the Stour catchment initiative with the Dorset Wildlife Trust. Within West Dorset, there is no formal partnership for the West Dorset Rivers and Coastal Streams Catchment. However, there is a working group that are tackling issues that are of importance to local people covering this area which is hosted by the Dorset Area of Outstanding Natural Beauty who we also work with.

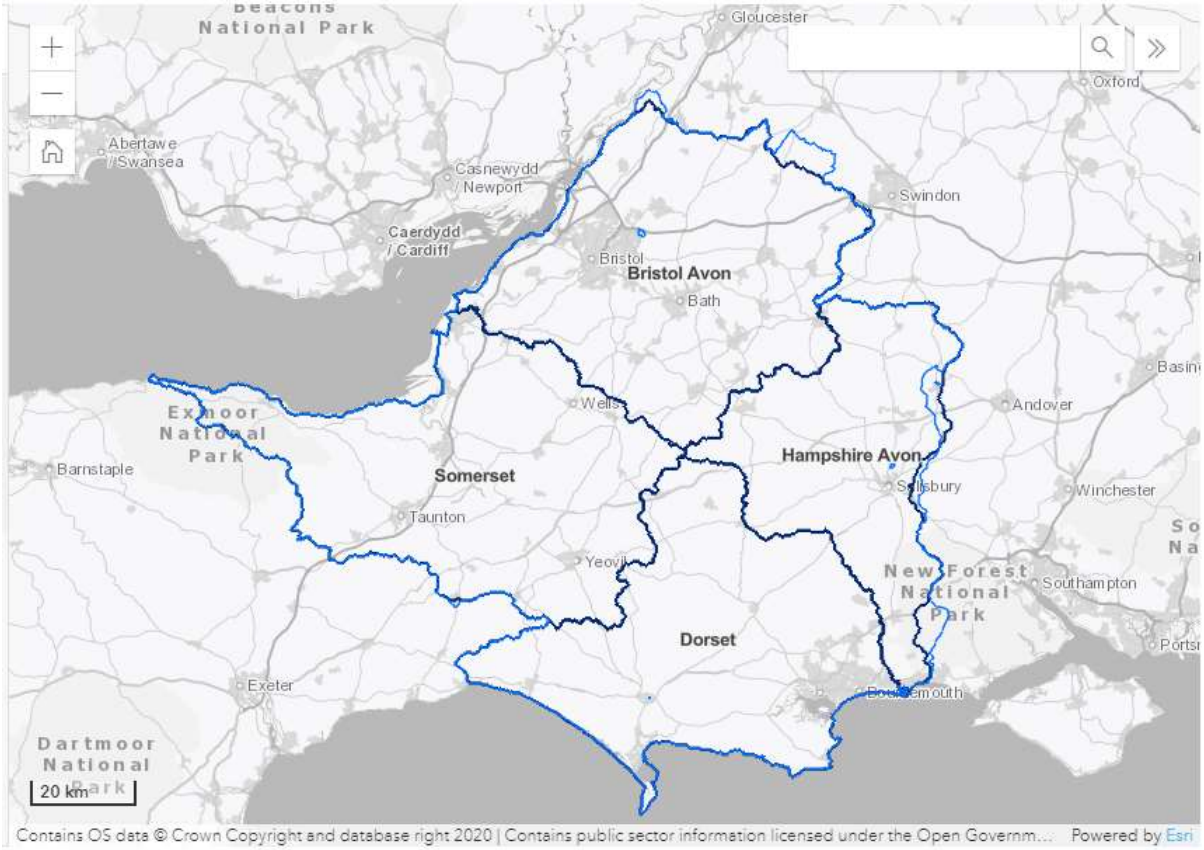
Below are the links to the catchment partnership websites, where more details can be found:

Bristol Avon partnership[51]
Somerset partnership[65]
Hampshire Avon partnership[59]
Dorset partnerships:[56]

- Stour Catchment Initiative[57]
- Poole Harbour Catchment Initiative[60]

We welcome the opportunity to explore partnership working with the Catchment Partnerships to deliver nature-based solutions that complement the required engineered solutions. Further detail about how we are working with our catchment partners and stakeholders to develop the DWMP can be found in section 6. Annex A to D contains a technical appendix for each of these catchment areas giving statistics and work already in progress and potentail areas for future collaboration.

Figure 8: Level 2 DWMP planning area - catchment partnerships



3.2.1 Level 2b: Council areas

There are ten council areas that are within the Wessex Water area, as shown in Figure 9. We have well established relationships with numerous teams within the councils who take a lead in managing local flood risks (i.e. risks of flooding from surface water, groundwater and ordinary watercourses) in accordance with the responsibilities defined in the Flood and Water Management Act 2010[22]. Further details about our engagement with the councils are provided in section 5.

Figure 9: Level 2b DWMP planning area - Council areas

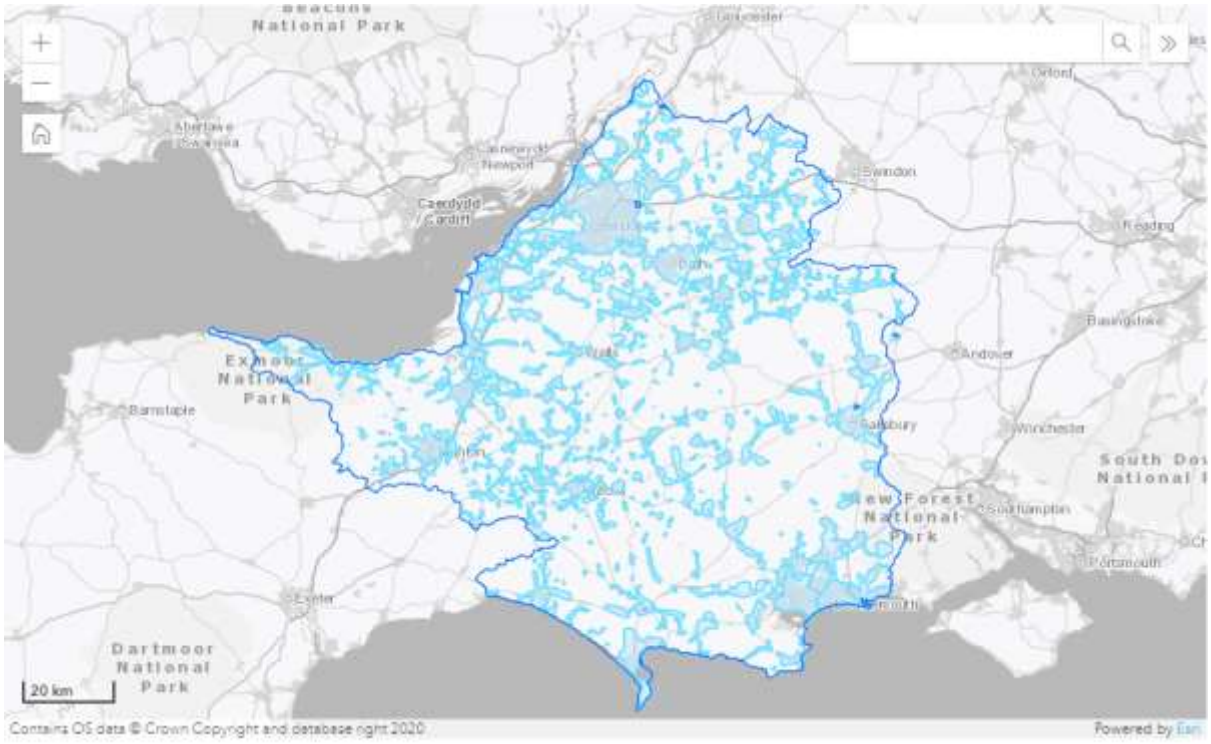
3.3 Level 3: Water recycling centre catchments

There are 398 WRCs in the Wessex area. The area that each WRC serves (i.e all the sewers that flow to the treatment works) is known as the WRC catchment area.

The largest WRC is at Avonmouth, Bristol. The catchment it serves has a population of 850,000 has 3,100km of sewers and 161 pumping stations. At the other end of scale, some of our smaller WRC are septic tanks and only serve a couple of houses.

WRC catchments with risks identified now or in the future have Drainage Strategies summary reports available on our website[83]. These set out our plans for the short, medium and long term, shown in Figure 10.

Figure 10: Level 3 DWMP planning area - water recycling centre (WRC) boundaries



3.4 Level 4: Local engagement

Flooding doesn't affect many customers, but where it does it is one of our worst service failures. Local engagement in those areas affected is essential, to engage with customers affected and develop solutions and mitigations measures. This level of detail is too much for this strategic DWMP, but we have included examples in section 6.5.

4. Planning objectives and levels of service

Levels of service that our customers, stakeholders and regulators want, expect and deserve are changing.

There has been a significant increase in political pressure regarding storm overflows in the last year, following all UK Water Companies publishing storm overflow performance on their websites for the first time in 2021. Campaign groups and the press are reporting that storm overflows are 'dumping raw sewage' into the environment. Some say rivers should be fit to swim in – even though river water is not fit to drink due to many sources of pollutants including agriculture, wildlife, continuous treated effluent from WRCs and intermittently from storm overflows.

The DWMP sets out to identify the investment required against indicators, known as planning objectives, that represent the performance of the drainage and wastewater infrastructure.

Six planning objectives were agreed to be investigated by all water companies, known as common planning objectives. The common planning objectives are detailed on the WaterUK website[75]. The six common (national) planning objectives are as follows:

- internal sewer flood risk
- pollution risk
- sewer collapse risk
- risk of sewer flooding in a 1 in 50-year storm
- storm overflow performance
- risk of water recycling centre quality compliance

Wessex Water involved key stakeholders (including LLFA officers catchment coordinators and the EA officers) in the selection of additional bespoke planning objectives at our Wessex Water DWMP workshop held in March 2020.

The planning objectives for our DWMP are listed in Figure 11, which maps the benefits of them against our PR24 outcomes for an unconstrained plan (i.e., money is unconstrained) and also groups them into three themes. These themes are summarised in the following sections and followed by more descriptions of the planning objectives. More detail for the planning objectives can be found in Annex E.

Figure 11: PR24 outcomes and DWMP planning objectives

Unconstrained mapping of DWMP planning objectives to outcomes	An effective sewerage system	Greater customer experience	Good envirnomental water quality	Incresed biodiversity	Water resource benefits	Net zero carbon	Affordable bills	Theme
	Outcomes							
WRC quality compliance	✓✓	✓	✓✓	✓	✓			Environmental
WRC flow compliance	✓✓	✓	✓✓	✓	✓			
Environment improved	✓✓	✓✓	✓✓	✓				
Storm Overflows	✓✓	✓✓	✓✓	✓	✓			
Internal flooding	✓✓	✓✓	✓	✓	✓			Effective sewerage
Flooding in a storm	✓✓	✓✓	✓	✓				
Blockages	✓✓	✓✓	✓			✓		
Pollutions	✓✓	✓✓	✓✓			✓		
Sustainable drainage	✓✓	✓✓	✓✓	✓✓	✓	✓✓		
Partnership working	✓✓	✓	✓✓	✓✓	✓	✓	✓	
Collapses	✓✓	✓✓	✓			✓		Asset health
Groundwater inundation	✓✓	✓	✓		✓			

Note: Bold planning objectives are common (national) planning objectives.
Two ticks show a lot of benefit, one tick shows some benefit, no tick shows no or negative benefit.

The planning objectives are calculated in granular level of detail (typically Level 3). The calculations are converted into three scores (0, 1 or 2) to indicate the risk or activity in each catchment - a methodology developed by WaterUK for the common objectives to simplify presentation of findings to stakeholders. We have applied similar scoring to the common and bespoke planning objectives.

We developed our bespoke planning objectives and thresholds through consultation with our stakeholder workshops. These and the Ofwat performance commitment thresholds (where appropriate) were used to gain an understanding of what levels of risk are acceptable.

Planning objectives are either risk based, or activity based.
Planning objectives that are ‘risk based’ (e.g. flood risk) have the following scores:

- 0 indicates ‘no significant risk’ in the catchment
- 1 indicates some risk in the catchment
- 2 indicates likely ‘significant risk’ in the catchment.

Planning objectives that are ‘activity based’ (e.g. how much separation has been undertaken) have the following scores:

- 0 indicates low or no activity
- 1 indicate medium activity
- 2 indicates high activity.

To distinguish the two types, risk based planning objectives are coloured blue and activity based planning objectives green. Light colours indicate low risk or activity, whereas dark colours highlights a lot of risk or a lot of activity.
More detail of the planning objectives is provided in the full plan.

4.1.1 Environmental theme

The environmental theme aims to restore the quality of our rivers and coastal waters to achieve great water quality. Our environmental ambition matches that of the Water Industry Strategic Environmental Requirements (WISER)[17].

The WISER[17] describes the environmental expectations of water companies for PR24 (and beyond), categorised as:

- **Statutory obligations** – These arise from legislative requirements and the need to comply with obligations imposed directly by statute or by permits, licences and authorisations granted by the Secretary of State, the Environment Agency or other body of competent jurisdiction. While it is important to understand the costs and benefits of measures needed, these statutory obligations must still be achieved.
- **Statutory plus obligations** – These are categorised as legal requirements where economic evidence forms part of the decision-making process that is the balance of costs and benefits, and affordability considerations. In cases where action is considered disproportionately expensive to meet statutory plus obligations, alternative objectives, or timescales to meet them may be set.

- **Non-statutory requirements** – Some expectations are not driven by statutory requirements. There may be a public need which may not be underpinned by a specific Act or piece of legislation. Water companies should demonstrate that there is an environmental requirement and customer support and that such investments provide best value for customers over the long term. Effective customer engagement should reveal whether customers (and which type of customer) want to see further environmental improvements, and over what timescale.

The WISER will need to update this DWMP for the final to incorporate any new requirements. We will include the statutory obligations and regulators' expectations in the outcomes, performance commitments and investment decisions in our PR24 business plan.

The role of the Water Industry National Environment Programme (WINEP) is to turn the obligations and requirements into required actions. It covers three principal areas of:

- water quality,
- water resources and agriculture and
- fisheries and the natural environment

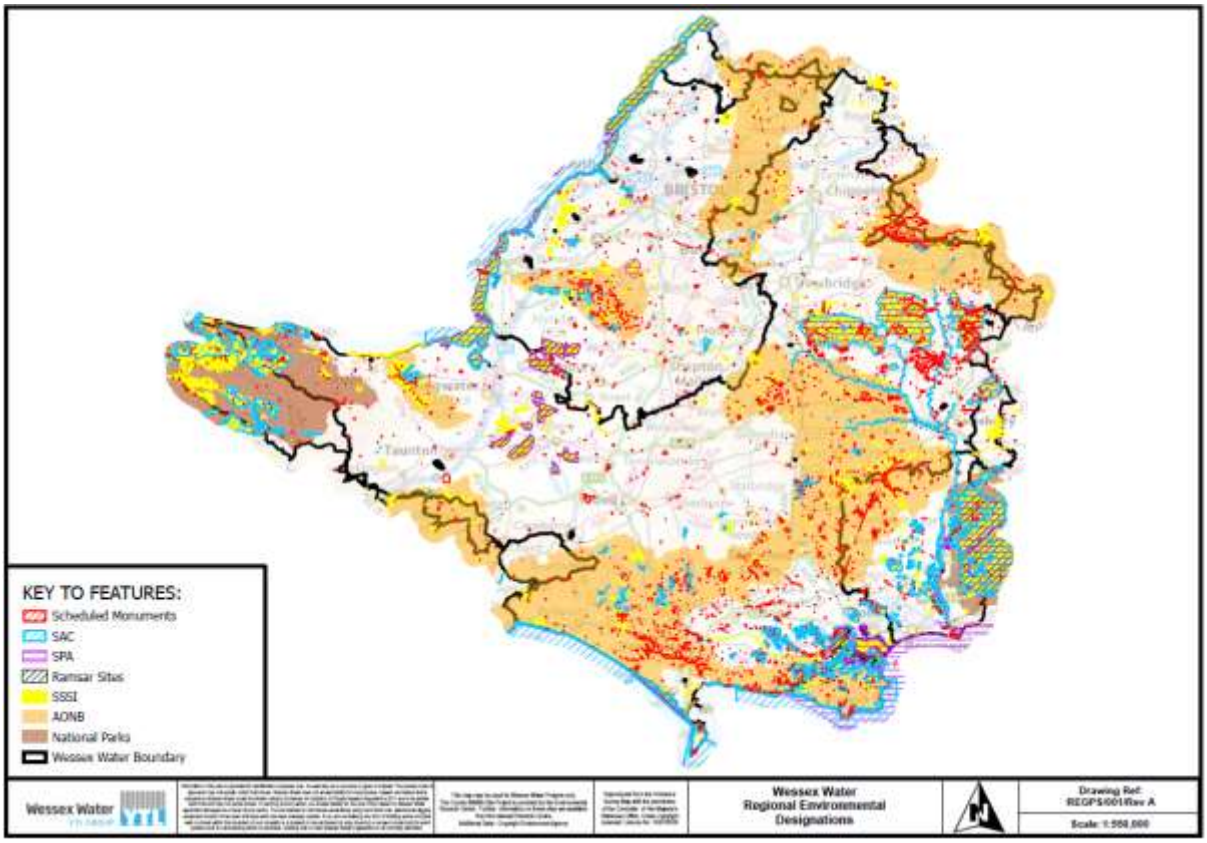
The WINEP has significant overlaps with both the water resources management plan (WRMP) and drainage and wastewater management plan (DWMP), along with capacity enhancement and capital maintenance needs.

The WINEP process is key to ensure outputs are delivered to achieve our outcomes. We have had and are in detailed discussions with the Environment Agency and Natural England to agree the scale of WRC and storm overflow improvements that will be included on the WINEP for PR24 investment (2025-2030). The WINEP gives information to water companies on the agreed actions we need to take to meet our environmental legislative requirements and related government priorities (as set out in WISER).

The government has recently issued its policy on storm overflow discharge reduction plan. Storm overflows are relief valves on the sewerage network to prevent properties flooding and have been in existence for decades as an integral part of the combined sewerage system design. It is going to take a lot of investment, effort, and time to significantly improve their performance. Nationally, according to the SOEP[25] it is estimated that £300 billion to £600 billion pounds would be needed to remove all storm overflows.

The Wessex region has a very high number of environmentally sensitive areas, as shown in Figure 12.

Figure 12: Environmental sensitivity of the Wessex area



Locals and campaigners for wild swimming have a desire for more inland bathing waters. See our video on advice for wild swimming[103].

In Bristol, there is a designated inland bathing water, at Henleaze Lake. The lake is groundwater fed, and there are no rivers discharging into it. There are also no Wessex Water assets that discharge into the lake, so there are no DWMP implications.

Just outside of Bath on the river Avon is an unofficial area where people use the stretch of river for recreation, including swimming. We anticipate that Warleigh Weir may become a designated Inland Bathing Water in the next few years, so we are monitoring the water quality in the area as part of an investigation. Our Warleigh Weir website[100] contains more information, including the trial of real-time water quality monitoring in the river.

There are many other waterbodies that we are aware of that are used for recreational use (e.g . We are aware of these and have included the ones we know of in our storm overflow improvement prioritisation matrix, so that we investigate and improve these before less sensitive inland water bodies.

We have extended our Coastwatch notification system to include when 3 storm overflows that are upstream from Warleigh Weir are discharging. This information is sent to the landowner and anyone who uses either our Coast and rivers watch system or the Surfers Against Sewage SaferSeas (and Rivers) app.

4.1.2 Effective sewerage theme

Flooding is one of the worst service failures our customers can experience, so we have invested millions to ensure we are industry leading – we have the lowest number of flooding incidents inside people's houses compared to other water companies. We want to continue to be industry leading for internal flooding and we set ourselves some challenging targets.

Ofwat and CCWater's recent research on Customer experiences of sewer flooding highlight how distressing sewer flooding is. The report suggests that water companies should make improvements in how we respond and deal with customers that flood. We are surprised at the findings within the report, as we aim to provide the best customer experience and highest levels of service, including giving no-quibble automatic compensation (guaranteed standards scheme) payments when internal flooding occurs. Our promise to customers[89] sets out our aims, response and clean-up times and levels of compensation.

Flooding is challenging because when it rains heavily, the flood water can be from several sources for which different flood risk management authorities are responsible. Wessex Water is responsible for flooding from public sewers. We work closely with other authorities to reduce flooding risks because flooding responsibilities are complex, as shown in Figure 13.

But when it rains very heavily flooding is likely to occur to some extent. This could be flooding from gutters (householders' responsibility), flooding of roads (highways

responsibility), or flooding of public sewers (water company responsibility). Figure 13 shows who is responsible for different types of flooding, including overland flow and river flooding.

When this rainfall runoff enters the sewerage system, the finite capacity of the sewer pipes or pumping stations can be overwhelmed and sewer flooding can occur. This is known as hydraulic flooding.

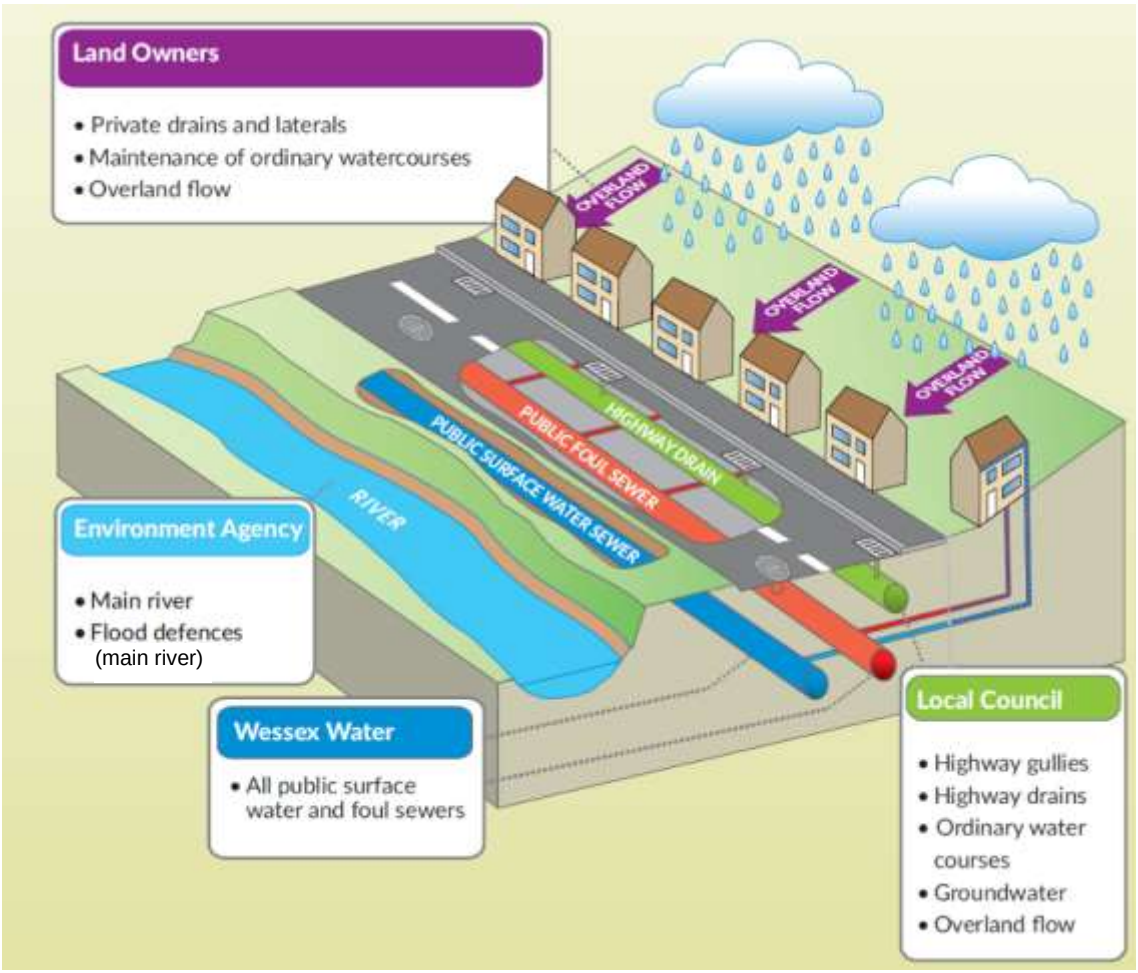
Hydraulic flooding only accounts for about 10% of flooding incidents.

90% of flooding incidents are caused by 'other causes', such as blockages or roots. This is why we set ourselves a bespoke planning objective for blockages. This is to do more to change customers behaviours, so they don't flush wet wipes or put fat down sinks, as described in section 5.8.

Flooding is also one of the main reasons for incidents that cause pollution to rivers and waterbodies.

For all these reasons, we have set ourselves a target to halve the impact of flooding by 2050.

Figure 13: Flooding responsibilities



4.1.3 Asset health theme

We have 35,000,000 metres of public sewers. We do not know the structural condition that all of these are in, especially those transferred to us in 2011 under the section 105a private sewer transfer. Fortunately, sewers are long assets that deteriorate slowly, so most will not need to be replaced for a very long time.

Sewer collapses can occur when sewers reach the end of their long life. This is an asset health common planning objective for the DWMP aimed at increasing investment in these long-term assets now rather than burdening the investment for future generations. We have a relatively low number of collapses compared with other WaSCs. However, we know we are not replacing assets at the rate of deterioration, so are building up a burden for future generations. We should be investing more now for a more sustainable future.

Groundwater inundation of foul sewers in the Wessex region is problematic because we have chalk geology in the southeast half of our region and mudstone geology and the flood prone Somerset levels and Moors in the north west of our region.

During times of prolonged rainfall and high groundwater table (e.g., wet winters when the ground becomes saturated) anything below the water table will become saturated, unless perfectly watertight. Small cracks, holes, displaced joints on the pipes or manholes can allow groundwater to inundate the sewer systems. There are lots more sewers that are privately owned (e.g., homeowner) that are connected to the public sewerage system making this a shared problem to resolve.

Our video[85] explains the chalk geology phenomenon that causes some customers to not be able to flush their downstairs toilet for several weeks during wet winters.

4.2 WRC quality compliance

This common planning objective defines the risk of WRC quality compliance failure.
The definition of compliance failure is set out in the EPA methodology[10] and only includes WRCs.

The baseline performance is an assessment of modelled WRC treatment capacity, which has been calibrated to current site performance. Where a suitable WRC model is not available this is generally because the site has not experienced any compliance issues to necessitate a more thorough review. We used historic performance data to produce a projection of compliance using the last 3 years of performance data.
This baseline assessment considers compliance with current discharge permit limits only.

Our target is to have all WRCs 100% compliant.

We set this planning objective to ensure we investigate catchments in advance of the WRC becoming non-compliant. For example, when significant development is planned, we can plan to expand the WRC proactively. This planning objective indicates risk, not failure.
The WRC quality calculations for each WRC have been updated using the latest information of current and future demand requirement, these include:

- population equivalent projections based on potential development

- flow and load projections
- permit conditions where there is committed permit changes anticipated by 2025

A score of 2 highlights the WRCs that are most at risk of becoming non-compliant if no action is taken. This is calculated at Level 3 (WRC catchment) and has also been aggregated to Level 2 and Level 1. The calculation excludes seasonal groundwater induced infiltration.

4.3 WRC flow compliance

This bespoke planning objective defines the risk of WRC flow compliance failure. It is currently based on dry weather flow (DWF) compliance, for WRCs that have a DWF permit.

DWF is the average daily flow to a WRC during a period without rain. The EA sets limits on the quality and quantity of treated effluent from WRCs to ensure discharges from WRCs do not cause an unacceptable impact on the environmental. The flow that may be discharged in dry weather is one of these limits

Our target is to have all WRCs 100% compliant.

We set this planning objective to ensure we investigate catchments in advance of the WRC becoming non-compliant, for example when significant development is planned, we can plan to expand the WRC proactively. This planning objective indicates risk, not failure.

The WRC flow calculations for each WRC have been updated using the latest information of current and future demand (see Annex F) requirement. This includes:

- population equivalent projections based on potential development
- flow and load projections
- permit conditions where there is committed permit changes anticipated by 2025

A score of 2 highlights the WRC that are most at risk of becoming non-compliant if no action is taken. This is calculated at Level 3 (WRC catchment) and has also been aggregated to Level 2 and Level 1. The calculation excludes seasonal groundwater induced infiltration.

4.4 Waterbodies improved

This bespoke planning objective is defined as the number of waterbodies improved through investment and improvements at continuous and intermittent discharges. Where we make improvements to water quality, including rivers, lakes, transitional (tracs) and coastal water bodies, we will include the scheme in this metric.

Baseline performance is based on the investment programme in the period 2020 to 2025. It is the number of improvement schemes that we deliver, relative to those contained on the WINEP.

This is being reported at level 1 and 2 only. The thresholds are a zero if we do not deliver the WINEP schemes, a score of 1 if we achieve the WINEP schemes and a score of 2 is

achieved if we achieve the WINEP schemes and deliver more schemes than was on the WINEP.

The purpose of this is to show the improvements to the environment we are making. This is calculated at Level 3 (WRC catchment) and has also been aggregated to Level 2 and Level 1.

4.5 Storm overflows

The purpose of this planning objective is to assess baseline (2025) storm overflow performance and provide an indication of future vulnerability by 2050 under a ‘do nothing’ scenario due to climate change, new development, and impermeable area creep.

The annual average discharges have been calculated using the EA criteria of '12/24 discharge counting'. Computer hydraulic modelling assessments used 10-year StormPac time series rainfall to determine the average annual discharges.

For the future predictions, the 2017 UKWIR Red-Up rainfall perturbation tool for 2050, using the central epoch, was used.

Each individual storm overflow was scored based on its performance depending on inland, bathing or shellfish status. These individual scores were aggregated to Level 3, 2 and 1.

Our future target for storm overflows will be to achieve 10 discharges per year and no ecological harm by 2050, as proposed in Defra’s storm overflow reduction plan consultation. The thresholds for this common planning objective may need to be tightened from the first cycle DWMP.

4.6 Flooding in a storm

This common planning objective uses computer hydraulic models to predict properties near to manholes predicted to flood in a major storm – those properties are considered ‘at risk’ of flooding. It can be applied to the baseline, intermediate and future scenarios of growth, development and climate change. The planning objective is based on the PR19 performance commitment definition risk of sewer flooding in a storm[42].

As part of this first cycle DWMP, Wessex Water has completed building computer models that can replicate the sewerage systems hydraulic performance (storm overflow and hydraulic flooding performance) of the foul and combined sewers. The models can predict how much more flooding will occur if climate change increases rainfall intensity.

The metric provides a conservative estimate of properties at risk of flooding in a 1 in 50-year storm. This follows the stretching target of Ofwat’s PR19 performance commitment definition. A 1 in 50 year storm is a very intense storm that has a 0.02 probability of occurring. We use our dynamic hydraulic computer model to the predicted flooding results from a 1 in 50 years return period storm from the models (1-D) of the BRAVA catchments. Houses near manholes that are predicted to flood are deemed to be at risk of flooding.

Larger buffer zones are applied to larger predicted flood volumes (15m radius for small volumes of predicted flooding, 30m radius for volumes between 25m^3 and 100m^3 and 50m radius circles for flooding greater than 100m^3).

This does not give a true representation of flood risk, as some of the properties identified could be higher than the flooded manhole, or there may be an overland flow path which would take the flood water down the road rather than into houses.

To have a more accurate result, it would be necessary to have more detailed (2-D) computer models. However, the cost of building 2-D models is considered not an investment that we should be making, just to inform a statistic. We will however be building 2-D models where it is worthwhile (e.g., complex flooding investigations).

For each level 3 catchment the population at risk is calculated as a percentage and aggregated into level 2 and 1.

This metric is affected by an increase rainfall intensity associated with climate change. The current target of 8.37% will increase to 12% by 2050.

4.7 Internal flooding

This common planning objective is to report the internal sewer flooding risk (i.e., inside customers' homes or commercial buildings) which is the worst service failure. It is reported to the Ofwat definition[114].

Wessex Water are industry leading and have very low numbers of internal flooding. Internal flooding in this metric is any sewer flooding inside an occupied building from any cause (hydraulic, blockage, collapse etc.) that the water company is responsible for. It excludes non-sewer related flooding such as privately owned sewerage, fluvial, pluvial (except were linked to the incapacity of a sewer), land drainage, highway drainage and private drains.

We have created a model based on the average of last 3 years of annual performance for this planning objective.

We strive for no internal flooding incidents.

4.8 Blockages (primarily external flooding)

Most flooding incidents are caused by inappropriate materials being flushed down toilets (for example wet wipes) and put down sinks (fats and oils) which cause blockages. Statistics of the root cause of flooding are provided in Figure 14. We will continue our targeted campaigns to promote customers only flushing 3-Ps (pee, poo and toilet paper) as well as other local campaigns, such as Bag it and Bin it leaflets and social media footage, like our videos are promoting:

- Call to ban 'flushable' wet wipes[79]

- How to avoid blockages in your home[86]
- The journey of your poo: how sewage is treated[98]
- Understanding your sewer network and pipework[99]
- What to do if you have a blockage?[102]

Figure 14: Root causes of blockages (2018-2021)

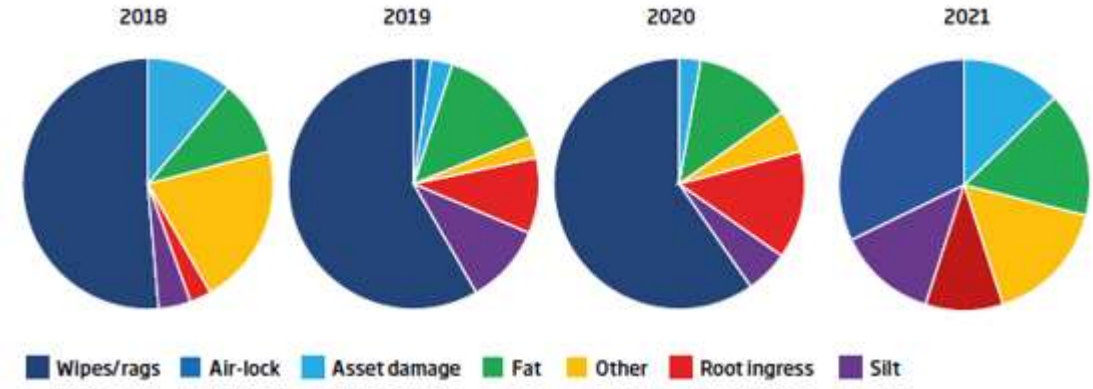


Figure 15 shows a video clip[86] explaining that wet wipes should not be flushed, even if they are being promoted by the manufacturers as being 'flushable'. They may flush, but they are the major cause of sewer blockages because they do not degrade like toilet paper does. The video also promotes gunk pots for preventing oil and fat being put down the sink.

Figure 15: Publicity campaign

To incentivise undertaking more activities in this area we have set a bespoke planning objective on blockage risk. The definition of the measure is in accordance with the Ofwat reporting guidance for blockages.

The baseline will be the average of most recent 3 years of annual performance to calculate this planning objective, normalised to number of incidents per 1,000km of sewer.

Our level of service that we are aiming for by 2050 will be to halve the baseline from this first cycle DWMP.

4.9 Pollutions

When an escape of sewage occurs[2] next to a river or stream, then the watercourse can become polluted. Pollution events can also occur from WRCs if they are not operating correctly. In severe cases, pollution incidents can cause fish kill. Fortunately, we have few

[2] Escape of sewage can be due to: blockages causing flooding, too much rainfall causing flooding, rising main burst, sewer collapses or due to the operation of storm overflows.

pollution incidents, and when we do, most pollutions have minimal impact. We are aiming for zero pollutions by 2050.

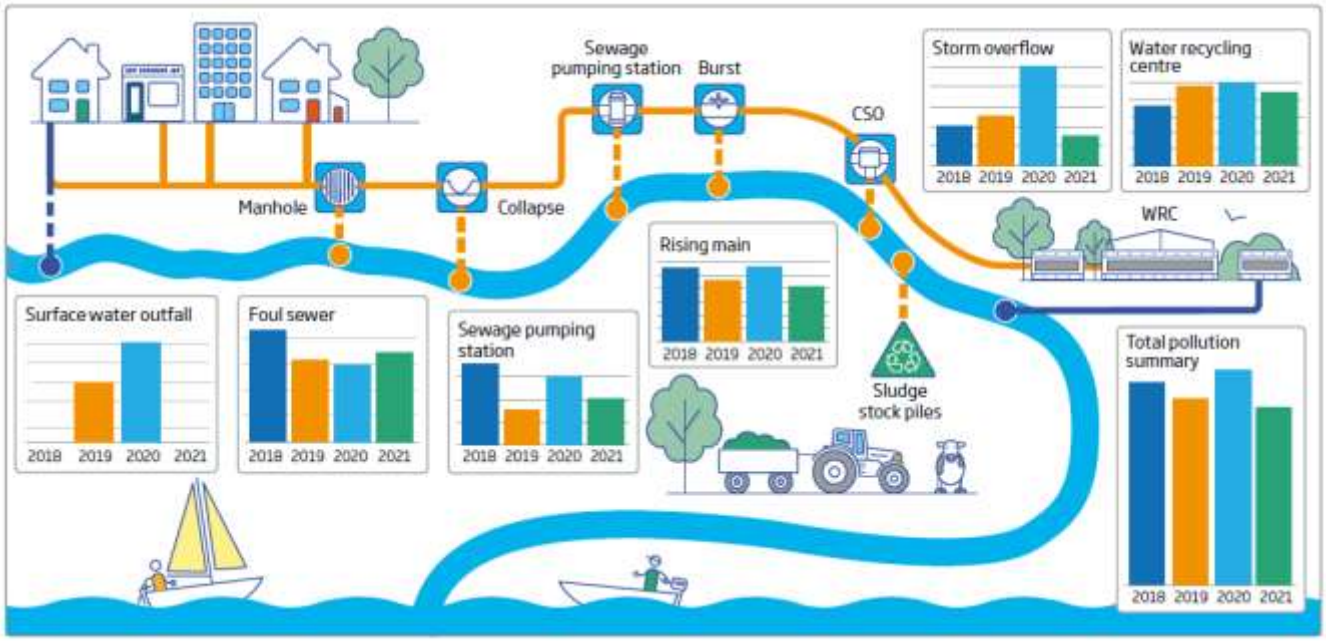
Please see our Pollution incident reduction plan (PIRP)[91], which explains what our plans are to minimise pollution incidents.

This common planning objective reports the pollution risk. It reports pollution incidents as set out in Environmental Performance Assessment (EPA) relating to wastewater assets only and thus this measure will exclude non-sewer related pollutions such as water treatment/supply assets, third party private assets. It is normalised by sewer length.

It includes category 1, 2 and 3 pollution incidents from sewerage infrastructure, pumping stations, WRC and Sludge/Biosolids incidents. It includes incidents caused by hydraulic overload (i.e., sewer overflows operating outside permit conditions or due to overland rainfall induced pollution) and other causes (i.e., blockages, collapses and equipment failure).

The baseline position is the average of the last 3 years. Figure 16 (an extract from our PIRP[91]) and shows what caused pollutions between 2018 and 2021.

Figure 16: Cause of pollutions in the Wessex area (2018-2021)



4.10 Sustainable drainage

Sustainable drainage (SuDs) is the practice to keep rainwater runoff locally rather than connecting the flow to sewerage systems or other waterbodies, as this will increase downstream flood and pollution risk.

For new developments is essential to make sure new roofs, roads, impervious areas don't create more runoff and increase flood risk. We have set a bespoke planning objective to encourage SuDs to happen, despite water companies not having powers to enforce this. Implementation of Schedule 3 of the Flood and Water Management Act 2010 should help ensure that developers apply sustainable drainage, by formally appointing the LLFAs as the SuDS approval body.

This planning objective is to ensure that we work together with local planning authorities to make sure that surface water is kept out of our foul and combined sewers.

The planning objective considers where developers do not apply SuDs and connect unattenuated surface water to our foul or combined sewers.

This measure is also to encourage retrofitting sustainable drainage in existing catchments, to reduce flood and storm overflow risks, where opportunities prove to be beneficial. The SuDS in schools project provides an example of where we can remove large amounts of surface water from the sewer network by installing SuDS, but also deliver multiple benefits including educational, wellbeing, water quality and biodiversity benefits by involvement of students (Figure 17).

This bespoke planning objective reflects the impermeable area (i.e., roof and driveways) removed from the foul/ combined network and the impact of unattenuated flow from new developments that is connected to the foul/ combined network.

The area reported (m^2) is the area of impermeable area being removed from the foul/ combined network (e.g., using SuDS) minus any impermeable area connected to the foul or combined system from new developments.

The baseline is an average of the impermeable area (m^2) removed (or compensated) averaged over the past 5 years, minus the impermeable area of new development added into the foul/combined sewer in the last year.

This metric is currently negative in some level 3 catchments because developers are connecting more impermeable area than we are currently removing. This is because we don’t currently have a policy to proactively separate flows, other than the small hydraulic flooding programme. This needs to change, but we recognise that it takes time to retrofit sustainable schemes, so our PR24 levels will be lower than future aspirations.

This is reported at Level 1 and Level 2 only.

Figure 17: Case Study - partnership SuDS in schools

Wessex Water have worked with a number of Lead Local Flood Authorities and the Department for Education to set up some pilot projects to deliver SuDS in schools.

The schools selected as part of the pilots were identified as being able to provide benefits to reduce surface water flood risk from overland flow and to reduce volumes of surface water from entering the sewer network, reducing downstream sewer flooding or frequency of storm overflow discharge. The SuDS in schools project provides an example of where we can remove large amounts of surface water from the sewer network by installing SuDS, but also deliver multiple benefits including educational, wellbeing, water quality and biodiversity benefits by involvement of students

Work has been undertaken to develop a flexible framework where additional schools can be added to the programme of work where partnership funding, opportunities and mutual benefits are identified.

Wessex Water offering

- Co-creation of SuDS designs with school
- Use of education teams to teach about the water cycle, climate change and inspire the next generation of drainage engineers
- Offer of the education team returning on a yearly basis
- Water efficiency survey and installation of free water saving measures

authorities to work together to reduce the risk of flooding. Wessex Water has been encouraging working collaboratively with partners for more than a decade. Partnership working is described in section 6.

The planning objective is calculated from the number partnership projects where joint funding or contribution is being progressed. It is calculated based on the average number of schemes delivered over the past 3 years.

The baseline is calculated using the known number of partnership projects from 2019/20 to 2021/22.

The activity level is assessed at Level 2 catchments, with scores of 2 if greater or equal to than 2 schemes are worked on in partnership, and 0 if there are no schemes over the last 3 years.

4.12 Collapses

Collapses occur when sewers reach the end of their long life. This is a common asset health common planning objective aimed at increasing investment in these long-term assets rather than burdening the investment for future generations. We measure this planning objective in line with the AMP7 Ofwat guidance for collapses.

Our historical approach to sewer collapses and rising main bursts was to keep them stable. But this was to keep stable over the next 5 years, not over the next 25 years or beyond. That is because we weren't expecting a sudden 'cliff edge' of failing assets because sewers are long life assets. We are more concerned about rising mains, due to their pressurised nature (having cyclic positive and negative pressures) and septicity issues that can cause corrosion through H_2S attack (which is caused by aggressive nature of sewage creating an acidic environment in the sewerage system).

The average age of our 35,000 km of sewers is 60 years for sewers we owned before 2011 and 45 years for the sewers that were transferred to us in 2011 (under section 105a). Some sewers are much older, even Victorian. If the sewers were made of vitrified clay in rock, then they should last a long time. If they were made of pitch fibre in poor ground conditions, then their life expectancy would be much less. We have risk models and deterioration models to analyse the risks, consequences and indicate investment needs.

Our risk model is a geospatial model that includes all relevant data and information that we have, including environmental, geological, asset age, asset inspection information, operational issues. We are also looking at incorporating newly available ground movement information. It points us to where to proactively inspect sewers. We can then rehabilitate the problems that we find.

Our sewer deterioration modelling was developed a decade ago and is regularly updated to include recent data and information. It continues to suggest we should be having a step change in proactive sewer rehabilitation to match the deterioration rate, so that we do not pass legacy assets on to future generations.

We will again aim to be stable within the next 5 years for the collapse planning objective, with a step change to reach a more sustainable intergenerational solution. Otherwise, we will be passing future generations a financial burden. However, even if we have a step change now, our deterioration modelling shows that we will not see the benefits for many decades.

The deterioration models for collapses and rising mains are discussed further in the programme appraisal (section 10.9).

4.13 Groundwater inundation

Crack or holes in sewers can allow groundwater to enter the sewers when the groundwater table is high, such as during wet winters or prolonged times of rainfall. Groundwater inundation of foul sewers in the Wessex region is problematic because we have chalk geology in the southeast half of our region and mudstone geology in the north west of our region and the Somerset levels and Moors fluvial flood risk. Our video[85] explains the chalk geology phenomenon that causes some our customers are not able to flush their downstairs toilet for several weeks during wet winters.

This bespoke planning objective reflect Wessex Water's programme of infiltration reduction work to prevent groundwater inundation.

This planning objective reflects the length of sewers inspected for infiltration (km), the length of sewer sealing completed (km), number of chambers (manholes, overflow chambers, SPS chambers) sealed.

The length reported is calculated by summing the length sealed (km) with 10% of length inspected (km) and the number chambers sealed times by 0.002km (equivalent length).
A Level 2 catchment with no activity scores a zero.

5. Stakeholder and customer engagement

This section summarises the framework that we have used to influence and inform stakeholder and customer engagement for our Wessex Water DWMP, considering:

- the Environment Agency's working with others approach
- responsibilities assigned through the Flood and Water Management Act (2010)
- DWMP guiding principles
- OFWAT Customer Engagement Policy[40], Feb 2022

We already work with stakeholders across the DWMP planning areas:

- Level 1: Wessex regional area (see Figure 7)
- Level 2: Catchment partnership areas (see Figure 8)
- Level 2b: Lead Local Flood Authority areas (see Figure 9)
- Level 3: Water Recycling Centre catchments (see Figure 10)
- Level 4: Customers / community / parish council / town council areas.

We recognise that stakeholder engagement and collaborative working with teams across Wessex Water and external partners is a fundamental component to a successful DWMP.

We have well-established relationships with stakeholders across the Wessex area through partnership working initiated from the introduction of the Flood and Water Management Act (2010)[21] and through our involvement with catchment partnerships across the area. We have worked with our stakeholders throughout the development of our first DWMP to understand:

- level of interest in the DWMP
- time and staff resources to co-create
- financial resources to contribute to partnership projects
- level of interest in the planning objectives
- generic options that have the greatest potential for future partnership working and collaboration.

Our approach to stakeholder engagement has been influenced through the insight we have gained about our stakeholders' views and capacity to be involved in the DWMP. This has been established through updates at regular meetings we attend (hosted by LLFAs or catchment partnerships) and our annual DWMP stakeholder meetings.

This regular dialogue regarding DWMP has enabled stakeholders to ask questions about the information that has been presented to them and request further clarification (either at the time the information is shared with them or at subsequent meetings). We have adapted our responses according to the level of technical capability and interest. There are a wide range of internal and external stakeholders who we have involved in the development of the DWMP at different levels of seniority. There are synergies with various strategies and plans produced by stakeholders and the DWMP. These are summarised in **Error! Reference s ource not found.**.

Customers views have been considered throughout different stages of the DWMP development, with their views influencing the type of options that are proposed. Their

willingness to support and pay for best value options has been considered within the programme optimisation and appraisal part of the framework.

We have undertaken lot of engagement. Please see the main report.

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5.1 Council stakeholders (Level 2b)

Collaboration and partnership working with the ten Lead Local Flood Authorities (LLFA) across the Wessex area is an essential component to the success of the DWMP through effective surface water management. We have developed very established and trusted relationships with flood risk management authorities across the Wessex area for over a decade since the introduction of the Flood and Water Management Act in 2010. This has facilitated co-creation of partnership schemes with relevant stakeholders to deliver integrated flood risk management and improved performance efficiently.

We liaise closely with flood risk management teams in the LLFAs and the Environment Agency (EA) on a regular basis to review local flood risks. There are 10 LLFAs in the Wessex area, as shown in Figure 1. The council boundaries in some cases cover multiple Level 2 catchments (**Error! Reference source not found.**). We attend over 100 meetings a y ear to review flood risks with our key LLFA and EA flood risk stakeholders. These meetings are used to identify synergies between the flood Risk Management Authorioties (RMA) to identify opportunities for partnership working and collaberative working approaches.

There are various plans and strategies developed by the council which could provide opportunities to align with the DWMP. These could include local flood risk management strategies, surface water management plans, strategic flood risk assessments, local plans, climate emergency plans, green infrastructure strategies etc.

5.1.1 Bath and North East Somerset

Bath and North East Somerset (BaNES) council's administrative area falls into the Level 2 DWMP area of the Bristol Avon.

We attend two flood groups chaired by BaNES; a Strategic Flood Board, and a technical Operational Flood Working Group (OFWG). The Strategic Flood Board is chaired by the Councillor with the portfolio responsibility for flooding. Attendees at these meetings include representatives from various teams from within BaNES (flood risk, planning, emergency planning and environment), Bristol Water, Environment Agency, emergency responders and The Canal and River Trust. The meetings provide an opportunity for different organisations to share updates regarding strategic issues and to have an oversite of the BaNES flood risk works programme, developed at the OFWG.

Technical detail is discussed at the BaNES OFWG which is attended by drainage engineers from BaNES, Wessex Water and the Environment Agency. The group have a clear programme of works relating to flood risk and drainage infrastructure being developed or

undertaken by all partners. This programme provides the opportunity for all organisations to understand where issues exist and opportunities for partnership working and collaboration to be considered and taken forward where appropriate.

Areas for potential collaboration within the BaNES LLFA area as part of the DWMP fall within the fluvial catchments of the Bristol Avon, Chew, Cam and Midford Brook. These areas align well with the priorities included within the Bristol Avon Catchment Partnership Catchment Plan and present opportunities to integrate with strategic plans that are currently in development within BaNES.

See the full report for partnership opportunities we have identified.

5.1.2 Bournemouth, Christchurch and Poole (BCP)

Bournemouth Christchurch and Poole council falls into the Level 2 DWMP areas of Dorset and the Hampshire Avon.

We attend regular meetings with the BCP LLFA team to discuss flood risk and drainage matters. We have worked with BCP Council to develop an integrated catchment model for the whole of the BCP area, developed from the Wessex Water models of the sewer network. The outputs from the joint model have been used to identify priority locations for surface water management for BCP Council. These have been identified as areas to progress partnership opportunities within the DWMP. BCP also has several coastal flood alleviation and erosion schemes being developed and progressed, which provides an opportunity to understand potential alignment of strategic works.

We are currently supporting BCP with the development of their Strategic Flood Risk Assessment and Local Flood Risk Management Strategy. These strategic documents are likely to align with priority locations that have been identified as part of the DWMP.

Partnership priority areas for the DWMP include storm overflows, Turlin Moor, Canford Heath and Hatch Pond, Turbury Common, Poole Town, Whitley Lake and Poole Park Lake. Opportunities may also come forward as part of the Christchurch and Lower Stour strategies that are currently being developed.

See the full report for partnership opportunities we have identified.

5.1.3 Bristol

Bristol City Council's (BCC) administrative area falls into the Level 2 DWMP area of the Bristol Avon.

BCC host monthly flood working groups that we attend with the representatives from the Environment Agency. The regular frequency of the meetings gives a clear understanding of work that is being developed and progressed and provides a technical forum to have an overview on collaborative programme of work.

Additional meetings are also held with partners were to progress the technical detail of specific projects. We are currently attending weekly meetings with the River Frome Reconnected partnership project and also involved in the River Frome Catchment Flood Resilience Innovation project funded by DEFRA.

BCC is leading the development of two significant projects within the city, which provide opportunities for partnership working and collaboration. These include the Bristol Avon Strategic Flood Alleviation Scheme and the River Frome Reconnected Innovation in Flood Resilience programme, funded by DEFRA. Additional opportunities for partnership working that are being progressed with stakeholders within Bristol relating to flood risk include the development of partnership integrated catchment models to inform future partnership schemes. Collaborative agreements are used to progress maintenance or improvements of drainage infrastructure where responsibilities are complex.

See the full report for partnership opportunities we have identified.

5.1.4 Dorset

The Dorset Council area predominantly falls into the Level 2 DWMP area of Dorset, with a small area in Somerset.

We attend regular meetings with Dorset council's flood risk management team which are focused on addressing flooding caused by different sources of flood risk. This has helped inform areas that have been identified as partnership projects within the DWMP, including Bridport, Weymouth, Swanage, Sherborne, Gillingham and the Char and Piddle catchments. Development of the partnership flood alleviation projects will align with opportunities to work with the Dorset Catchment partnerships where possible.

Owing to the chalk geology across Dorset, various communities across the area are at risk from groundwater flooding. In many areas, this leads to groundwater ingress into the sewer network, reducing the capacity of the sewers during wet periods when the water table is elevated.

See the full report for partnership opportunities we have identified.

5.1.5 Gloucestershire

A small part of our drainage and wastewater infrastructure falls within Gloucestershire County Council's administrative area which falls into the Level 2 DWMP area of the Bristol Avon. Meetings are held with Gloucestershire council as required.

Priority locations that have been identified within the Gloucestershire area include the Little Avon Catchment, which already includes the Wessex Water Cromhall treatment wetland. This catchment has been identified as a future priority for BACP stakeholders to apply a future catchment-based approach.

5.1.6 Hampshire

A small part of our drainage and wastewater infrastructure falls within the administrative area of Hampshire County Council (HCC), which is situated within the Level 2 DWMP area of the Hampshire Avon. We attend regular Technical Delivery Group meetings chaired by HCC.

The County Council published its updated Local Flood and Water Management Strategy in 2020. Following on from the Local Flood and Water Management Strategy and its recommendations, Hampshire County Council has produced draft Catchment Management Plans (CMP) for the 18 river catchments in Hampshire. These plans provide an assessment of flood risk from a range of flooding sources and have been used to identify 66 priority areas across Hampshire. Relevant Catchment Management Plans (CMP) for Wessex Water include the Avon CMP[46] and Avon Water CMP[47]. Ringwood has been identified as a priority location by HCC. The next step will be for various tasks to be completed to define a Flood Action Plan.

See the full report for partnership opportunities we have identified.

5.1.7 North Somerset

North Somerset Council falls within the Level 2 DWMP areas of the Bristol Avon and Somerset Catchments. We attend regular Flood Risk Management partnership meetings hosted by North Somerset Council, with the Environment Agency, Internal Drainage Board, Highways England and Network Rail. We also attend additional meetings to progress technical detail related to the development of partnership projects.
Figure 18 presents a case study of a partnership surface water flood alleviation scheme led by North Somerset Council that Wessex Water contributed to.

Partnership priority areas that have been identified by North Somerset Flood Risk, which also align with their Local Flood Risk Management Strategy including Clevedon, Weston-Super-Mare, Portishead, Pill, Ashton Vale, North Somerset natural flood management (NFM).

Figure 18: Case Study: North Somerset Council led Partnership working – Summer Lane

North Somerset – Summer Lane

Wessex Water has contributed funding towards a £1.3million Flood Alleviation Scheme led by North Somerset.

The project has extended the capacity of a surface water attenuation pond which led to significant flooding in 2012 in the area between Summer Lane and Moor Lane.

During the floods, North Somerset, Wessex Water and Environment Agency installed barriers and pipeline which prevented several residential properties, including a care home, from flooding. The new scheme will reduce the flood risk to 85 properties identified and prevent significant disruption to key infrastructure, including Wessex Water's assets in the area.

See the full report for partnership opportunities we have identified.

5.1.8 Somerset

Somerset Council falls within the Level 2 DWMP areas of Somerset.

We attend regular Flood Risk Management partnership meetings hosted by Somerset Council, we also attend the Somerset Rivers Authority technical groups with the Environment Agency, Internal Drainage Board, Highways teams and catchment partnership. Additional meetings are held to progress technical detail related to the development of partnership projects. An example of a partnership project delivered with Somerset Council and partners is given in Figure 19.

DWMP partnership priority areas identified by Somerset Flood Risk Management team include Minehead, Chard, Ilminster, Taunton, Yeovil, Frome.

The Somerset Catchment partnership has identified the Brue Catchment as a priority catchment, which may provide further opportunities for collaboration with the LLFA. Additional partnership opportunities that come forward to deliver drainage and wastewater improvements in collaboration with the newly created Somerset Wetlands National Nature Reserve (NNR).

See the full report for partnership opportunities we have identified.

Figure 19: Case study: Wessex Water led Partnership working in Somerset at Highbridge

Somerset - Field Way – Highbridge

Wessex Water completed construction of a surface water flood alleviation scheme in Highbridge, which received partnership funding from Somerset County Council, and Local Enterprise Partnership funds from Heart of the South West administered by the Somerset Rivers Authority. The Internal Drainage Board also supported the works to the rhyne system. The scheme attenuates surface water flows to reduce the risk of regular restricted toilet use and need for tankering to prevent sewerage flooding experienced by the local community.

5.1.9 Internal Drainage Board (IDB)

Areas of Somerset Council and North Somerset Council are managed by the Internal Drainage Board (IDB) which are covered by the Somerset Drainage Boards Consortium that cover the Axe, Brue, Parrett and North Somerset levels.

Regular engagement is held via meetings with the LLFAs. Given the interactions between surface water outfalls and the rhyne drainage network used to manage water levels, collaboration is often required to address issues of concern.

The Somerset Drainage Boards Consortium is the organisation that manages the operations and affairs of three Drainage Boards in Somerset and North Somerset.

The Boards are:

- Axe Brue Internal Drainage Board
- Parrett Internal Drainage Board
- North Somerset Levels Internal Drainage Board

The main activity of a Board is to manage water levels for the protection of people, property and the environment. In undertaking this work we will be following a series of policies that will generally be common to the three Boards in the Consortium. These policies will cover a number of areas including activities in or adjacent to watercourses and the control of development in their areas.

The individual Boards are still autonomous public bodies that retain all of the powers and duties bestowed to them from the Land Drainage Act 1991 as well as the environmental and health and safety legislation.

5.1.10 South Gloucestershire

South Gloucestershire Council's administrative area falls into the Level 2 DWMP area of the Bristol Avon.

We attend regular Flood Risk Management partnership meetings hosted by South Gloucestershire Council, weekly meetings with the River Frome Reconnected partnership project and involved in the River Frome Reconnected Flood Resilience Innovation project funded by DEFRA. These have informed the DWMP priority locations identified within South Gloucestershire for partnership working opportunities, which align with the South Gloucestershire Local Flood Risk Management Strategy.

DWMP partnership priority areas include Yate, Chipping Sodbury, Tytherington and Frampton Cotterell.

See the full report for partnership opportunities we have identified.

5.1.11 Wiltshire

Wiltshire Council's administrative boundary falls within the Level 2 DWMP areas of the Bristol Avon and Hampshire Avon.

We attend Wiltshire Council's monthly Operational Flood Working Group meetings with other flood risk management authorities including the EA, Highways England, Network Rail and representatives from town and parish councils across Wiltshire. The meetings are chaired by the elected member with the portfolio for flooding. The OFWG meetings ensure that the communities can advise different authorities of flooding and drainage issues and work with partners to assist with the co-creation and design of flood alleviation measures. Communities are also empowered to develop community flood plans, which then provides them with community resilience equipment supplied by Wiltshire Council.

DWMP partnership priority areas within Wiltshire include Warminster, Malmesbury, Chippenham, Trowbridge, Melksham, Bradford-on-Avon, Amesbury, Salisbury, and Wilton.

See the full report for partnership opportunities we have identified.

5.2 Partnership priority areas

Throughout the development of the DWMP and through our established relationships and regular engagement with stakeholders across the Wessex area, we have a clear understanding of priority catchments where stakeholders are interested in potential development of collaborative projects.

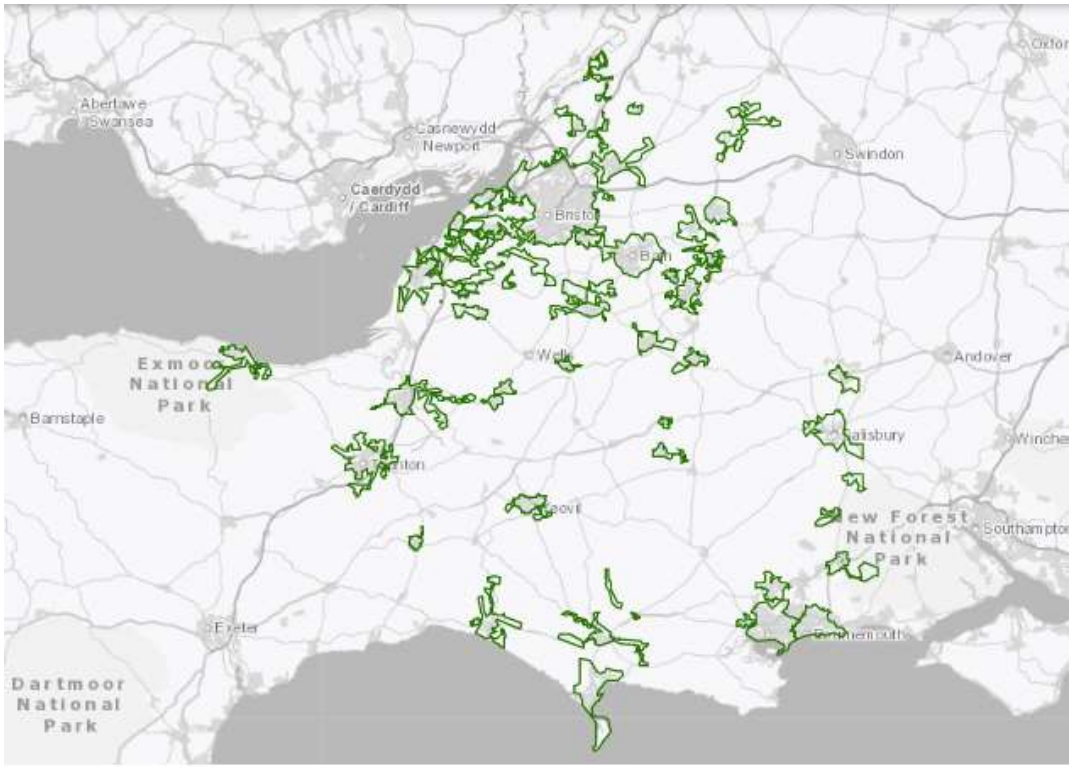
This information on priority areas will be used in a variety of ways dependent on the timing and phase of project development and location of where stakeholders are looking to work in the catchment. Our approach to partnership working is very flexible, this enables open discussions with stakeholders about a whole range of work from small scale opportunistic 'quick wins', to support with investigations, to co-development and delivery of large-scale capital schemes. There may also be some partnership priority locations identified in the DWMP where it is not possible to progress collaborative solutions.

In areas where projects have already progressed and ideas developed, the DWMP outputs will be used to help inform where we might be able to invest in our drainage and wastewater infrastructure to help meet mutual outcomes or try to align the Wessex Water investment for it to then be used as match funding for application to other sources. Where locations have been identified for partnership working but projects not developed, the DWMP outputs will be used to inform discussions where co-creation and delivery of solutions investigated further.

This would facilitate the identification of relevant actions required to develop projects delivering mutual benefits.

Figure 20 highlights areas that have been identified as partnership priority catchments. **Error! Reference source not found.** to **Error! Reference source not found.** lists the ca tchments that have been identify DWMP priority areas.

Figure 20: Partnership priority locations for the Level 1 Wessex area



See the full report for more detail.

5.3 Local areas (Level 4)

5.3.1 Communities

The communities that have been identified by LLFAs as DWMP priority areas have either experienced flooding from multiple sources, or have a significant risk of flooding. Priority areas identified by catchment partnerships often have environmental or water quality drivers. For all the priority areas identified, communities have been central to this selection.

We have regular engagement with communities regarding drainage and wastewater infrastructure through correspondence and attendance at established forums with the Lead Local Flood Authority (LLFA) and the EA. We provide support to the flood warden network of volunteers and representatives from town and parish councils that exist across a large proportion of communities within the Wessex Area. This regular engagement assists communities with understanding of roles and responsibilities relating to flooding and how to report any concerns. We have supported annual flood warden training sessions across all four Level 2 areas and raised awareness and provided updates on progress on the DWMP.

Figure 22 presents a case study of our regular engagement with communities in Wiltshire through the LLFA led Operational Flood Working Group.

Where communities have experienced sewage flooding in their houses or on their property, the impact is significant during flooding and throughout the recovery phase. The emotional traumer from experiencing flooding can also lead to great anxiety and concern. Often where sewer flooding has occurred, the capacity of other drainage infrastructure management by other Risk Management Authoriteis (RMA) has been exceeded. An essential component of a community's recovery to flooding is ensuring that all RMAs work closely together to investigate causes of flooding and take initial actions to reduce further flood risk.

Reporting of flood incidents is essential to ensure the impacts are captured to support the case for future investment to reduce the risk of flooding. The information also helps ensure flood mechanisms are understood (which are often complex). Where significant flooding has occurred, the information will form the evidence base for the council's section 19 report. This investigates significant flooding and identifies authorities that are responsible. Following large flood incidents, we support and attend flood drop-in sessions with other RMAs. These sessions are usually led by the EA, LLFA or Town or Parish Council. By all RMAs meeting together, this helps the community experince integrated flood risk management. A photo of a public event is presented in Figure 21.

Figure 21: Photo of flood public meeting with other Risk Management Authorities

Figure 22: Case Study - Operational Flood Working Groups hosted by Wiltshire Council

Wiltshire council set up Operational Flood Working Groups (OFWG) in response to the Flood and Water Management Act (2010). It is a forum for stakeholders with interests in flooding from highways, surface water runoff and drainage to identify lead authorities to enable focused, efficient, and coordinated response, enabling resources and funding to be targeted effectively, consider proposals for prioritising funding and programming of schemes, implement government legislation, communicate information about flood alleviation schemes.

The OFWG meetings have empowered communities to act and reduced the risk of flooding and enhance actions and schemes taken by Flood RMAs.
The OFWG meets monthly were representatives from Parish and Town Council's meet Flood Risk Management Authorities. The regular meetings enable development of a shared understanding of flood risks between communities and Flood RMAs. This has enabled trusted relationships to be developed between everyone involved which has resulted in proactive actions taken by the lead Authority and relevant partners.

Community flood plans inform actions that Wiltshire's communities undertake during flooding to reduce the risk and consequence of flooding. This is supported by appropriate resilience equipment provided by the Wiltshire Council 'Parish Emergency Assistance Scheme' (as defined in the Flood Plan). Several communities have progressed to developing community led flood alleviation schemes which involve both engineering and natural flood management solutions where Flood Defence Grant in Aid (FDGiA) funded schemes are not deemed viable. The result of the work of the OFWG's has increased the resilience of communities to take local actions before, during and after flooding to reduce their risk and consequence of flooding and provide informed responses to planning applications via neighbourhood plans.

Concerns raised regarding riparian responsibilities and identification and activation of measures defined within flood plans enables Wiltshire's communities to address flood risks caused from blockages or poor maintenance and take action to mitigate the impact of flooding. During flooding, the reporting of impacts through community reports has provided supporting evidence to inform business cases for partnership flood alleviation schemes including all flood risk management authorities. The mature and established relationships developed from ten years of OFWG in Wiltshire have empowered communities to act and reduced the risk of flooding and enhance actions and schemes taken by Flood Risk Management Authorities.

Communities can also play a part in preparing for future flooding by:

- understanding flood risk management responsibilities
- knowing who to report flooding to
- promoting behaviour change to help reduce flooding (i.e. helping to raise awareness about the causes of blockages or to ensure residents understand the consequences of lifting manhole covers to prevent gardens from flooding)
- preparing community flood plans
- managing surface water at source through property level SuDS

Throughout the development of the DWMP, there has been an increased awareness of storm overflows within communities. The drainage and wastewater network was designed to prevent sewer flooding in properties by installing storm overflows in the network, to discharge sewage into the rivers instead of it backing up into peoples homes. The installation of monitors on the storm overflow network has provided a new evidence base which shows how often the storm overflow operates. This new data has provided evidence to make informed decisions regarding measures to reduce the frequency of storm overflow discharges. In an ideal world we wouldn't have storm overflows at all – they are a legacy from the past. We are now getting more intense rainfall due to climate change, which can affect when overflows operate. Storm overflows often have minimal or no ecological impact because what is released is diluted wastewater. We understand the ammenity, social, and wellbeing benefits of our watercourses and are keen to work with communities to either understand the impact of storm overflows or to work with them to reduce the frequency of storm overflow discharge in parallel with our work to inform and influence national policy.

A number of our water guardian schemes have recruited community volunteers to report pollution concerns to us. They have also supported our WINEP investigations and participated in citizen science to get a better understanding of water quality.

5.3.2 Customers

This DWMP customer research included qualitive and quantitative research, over 2000 interviews were held with a broad range of customers from across the four Level 2 DWMP areas.

5.3.3 Customer research

In line with the DWMP guiding principles and the UK Government's strategic policy statement for Ofwat, we carried out customer research for our DWMP programme in 2021 to get an update on our customers priorities and willingness to pay for increased (and lower) wastewater levels of service. This has enabled us to take account of customers' priorities and develop an affordable plan. The information gained through this DWMP research aligns with research that will be used to triangulate with our PR24 business planning process. This section summarises how we have undertaken extensive research to customer and stakeholder engagement.

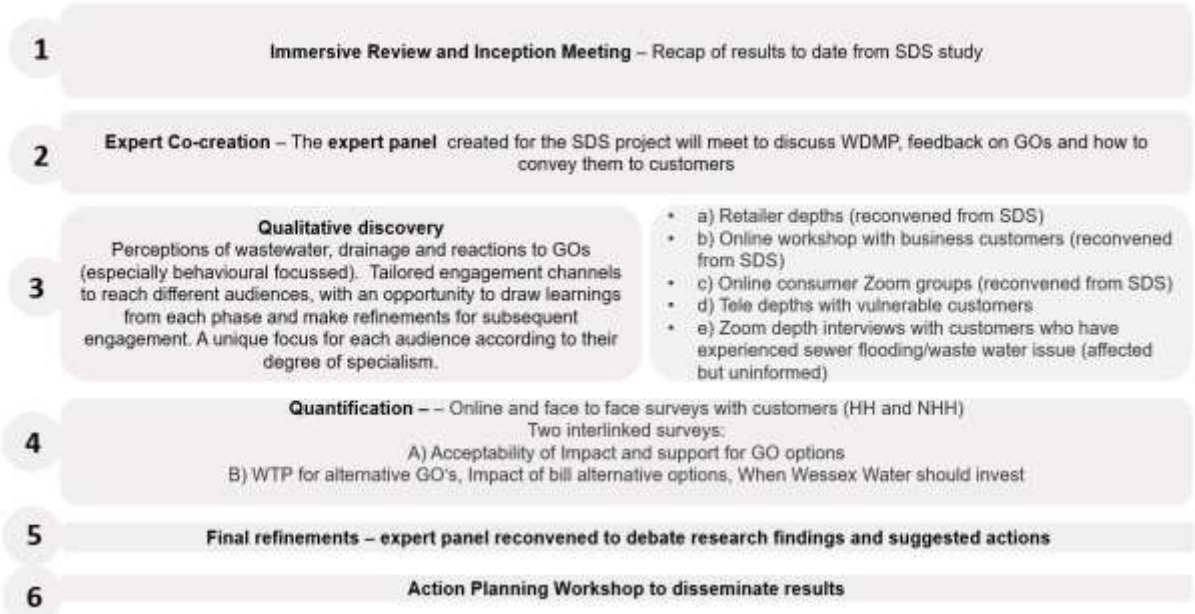
The aims of the customer research that we undertook to inform the DWMP were to:

- understand customer views on issues relating to wastewater drainage
- establish customer views of the acceptability of impact and frequency of sewer flooding
- Understand the acceptability of and willingness to support a range of potential 'generic options' to include:
  - a ranking of options/groups of options according to their willingness to support
  - an understanding of relative customer preferences for more traditional engineering-based solutions compared to more sustainable solutions which may have differences in their associated levels of certainty in their ability to fully solve the problem
  - customer willingness to support and participate in 'behavioural change' projects to reduce sewer misuse and water flow within sewers
- Understand customer willingness to pay for alternative Generic Options (GOs)
- Understand customer views on the impact on bills of alternative options (including removing harm from storm overflows) and levels of service
- Customer views on when we should invest in systems to make them resilient to potential future challenges such as climate change – e.g., should we invest now, in 10 years or only when emergency situations occur. Questions on this topic could be framed in a wider context than only wastewater – issues around intergenerational investment is a key topic for our wider PR24 business plan.

The research engaged with a range of customers including:

- domestic customers – informed and uninformed, including vulnerable, seldom heard, hard to reach (including those without access to the internet)
- water retailers
- business water consumers and business industry stakeholders

Figure 23: Methodology used for the DWMP customer research



5.3.4 Customer views on issues relating to drainage and wastewater

The qualitative research highlighted customers' initial knowledge and understanding of drainage and wastewater is generally low, as shown in Figure 24.

Initial feedback from the qualitative sessions discovered that the responders highlighted:

- a limited understanding of terminology: 'surface water', 'groundwater', 'combined sewage'
- detachment of sewerage from daily water usage
- no consideration to the impact of customer behaviour
- no consideration of what happens to surface water or the sewage treatment process
- limited awareness of environmental issues

Figure 24: Comments relating to starting knowledge and understanding of drainage and wastewater infrastructure

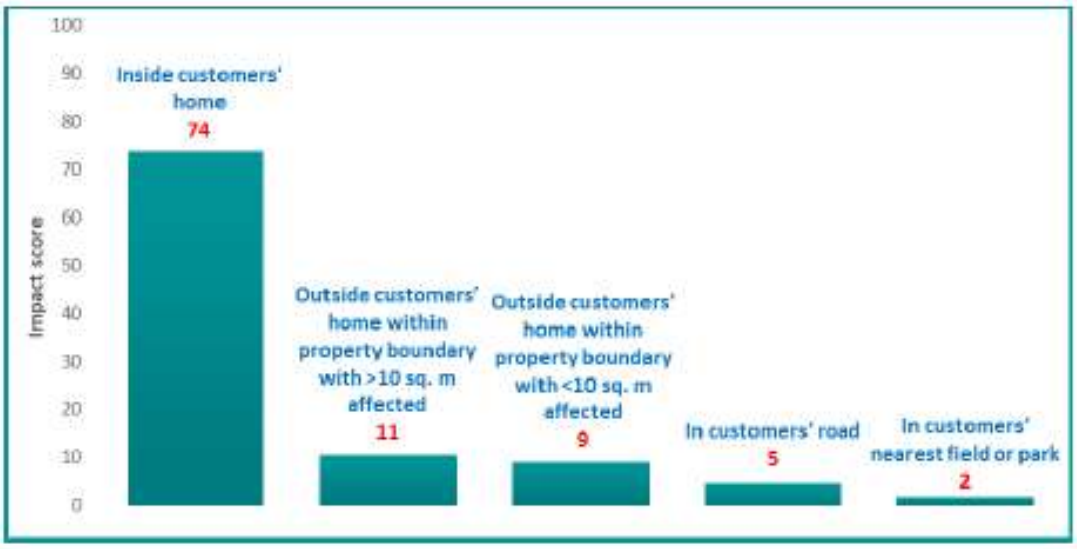
Understanding was greater among those living near treatment works or had experienced local drain or sewer flooding.

The information from this initial qualitative research informed the material developed for the quantitative research. The findings also highlight the importance of developing an increased understanding about drainage and wastewater infrastructure amongst our customers and communities.

5.3.5 Customer views on the acceptability of impact and frequency of different types of sewer flooding and receptors

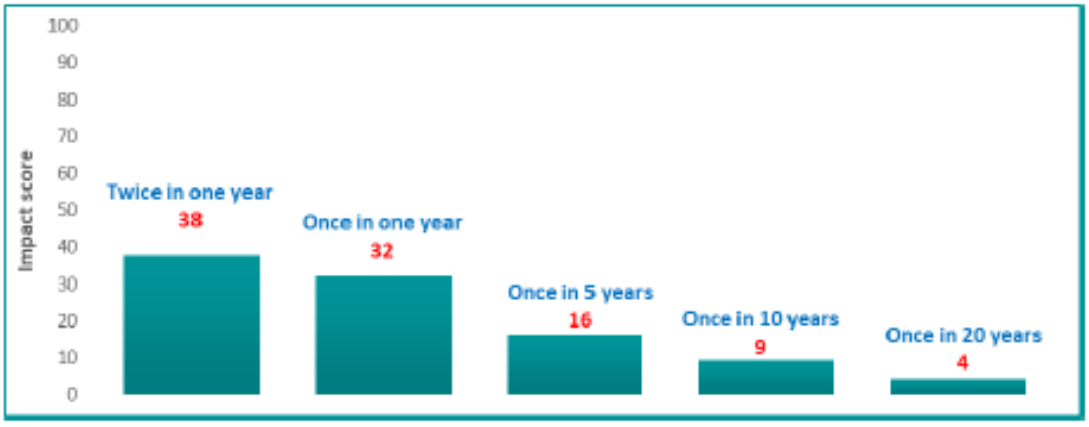
The results from the customer research relating to customers views on the acceptability of impact of flooding are shown in Figure 25. The impact of sewer flooding is clearly worst when inside the home. Next worst, but significantly less of an impact, was when flooding was outside the customers' home but within the property boundary, with more than 10 square metres affected followed by when less than 10 square metres were affected. The next worst location was the customers' road, and the least impactful location was in the nearest field or park.

Figure 25: Relative impacts of flooding by location



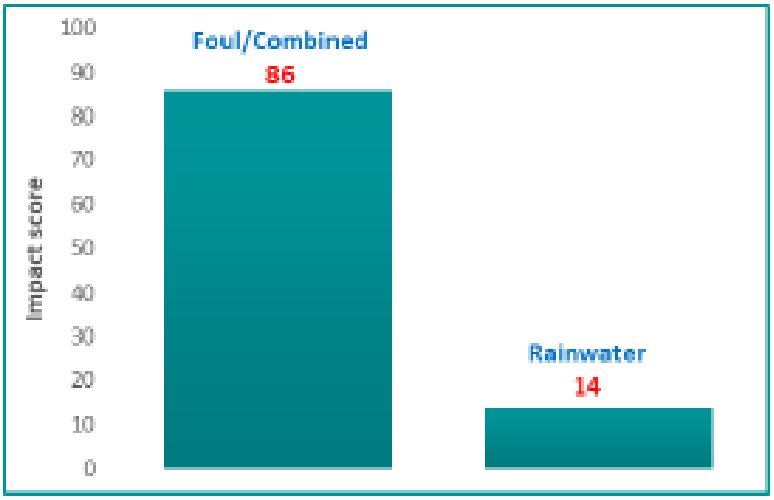
The results from the customer research relating to customers views on the acceptability of impact of flooding are shown in Figure 26. The impact of sewer flooding was worst when occurring more frequently. This order of impact is again as expected.

Figure 26: Relative impacts of flooding by frequency



The results from the customer research relating to customers views on the acceptability of impact of flooding are shown in Figure 27. The impact of rainwater sewer flooding was significantly lower than the impact of foul/combined sewer flooding. However, customers may not be aware that surface water flooding can be devastating too.

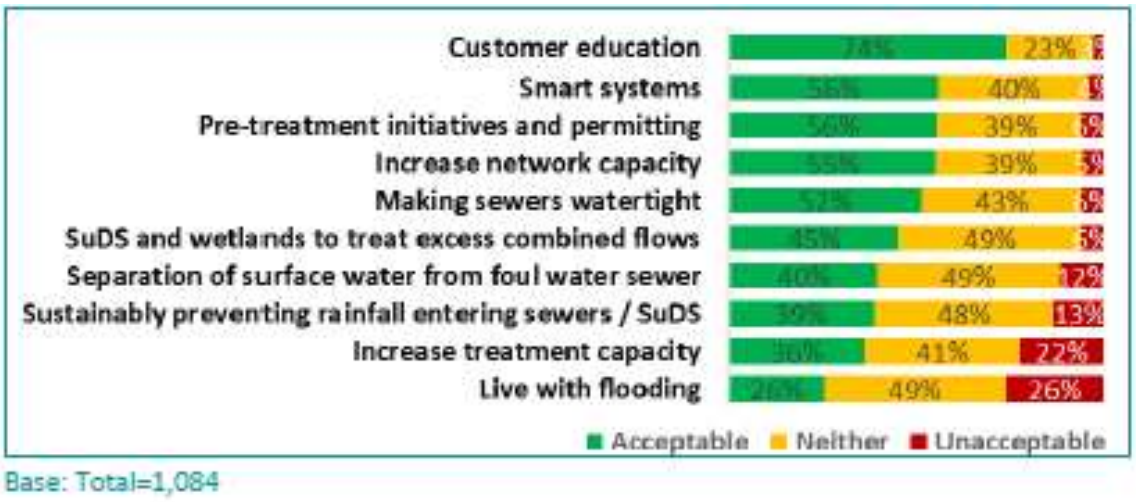
Figure 27: Relative impacts of flooding by type (Rainwater or Foul / Combined)



5.3.6 Customer views on the acceptability of and willingness to support a range of potential 'generic options'

The willingness to support element of the customer research work identified the appeal of the different generic options that are considered as part of the Options Development and Assessment phase of the framework. "Customer Education" is the highest among all the GOs while the option to "Live with flooding" is the most unappealing of all the GOs.

Figure 28: Customer views on acceptability of generic options considered in the DWMP



Base: Total=1,084

5.3.7 Customer views on the impact on bills of alternative options (including removing harm from storm overflows) and levels of service

Research was undertaken for the DWMP customers willingness to support the options and pay (WTP) towards drainage and wastewater services. This research was undertaken to inform the DWMP, the outputs from this work will be used triangulated with our business plan customer research in 2023. It is recognised that the values used for the WTP for the DWMP will differ to for the business plan, which will consider all business needs for PR24.

The customer research for the DWMP identified that the mean WTP for reduced flooding was 19% of the annual wastewater bill per year. For an average household paying an annual water bill of £223, this implied a mean WTP for reduced flooding of £42 per year.

The customer research was undertaken in 2021. We recognise that at the time of writing of the draft DWMP, views regarding the cost-of-living crisis of 2022 may have modified customers views regarding their willingness to pay for drainage and wastewater services.

5.3.8 Customer views on when we should invest

Customer views were asked on when we should invest in systems to make them resilient to potential future challenges such as climate change – e.g., should we invest now, in 10 years or only when emergency situations occur.

With regard to the timing of investment, customers preferred that Wessex Water invests to reduce sewer flooding rates in the period 2025-2030 rather than spread investment out over a longer period, all else equal. They may not have been aware of the bill implications of this, so this research may be void.

5.3.9 Outputs from the customer research

Technical appendix B contains the DWMP Customer research report, produced to inform the DWMP. The insight gained through the customer research has been applied throughout the DWMP framework to:

- inform our approach to ongoing and future customer and community engagement
- validate the technical judgment used to inform the ODA screening process
- apply and use the information about acceptability combined with the draft DWMP consultation responses in the final DWMP to ensure customer views are considered when selecting the 'best value' programme and timing of investment
- apply the data gathered for the DWMP and consideration in the business plan customer research.

In summary, customers are willing for bills to increase to improve the environment and reduce sewer flooding.

Key findings of our customers DWMP priorities are shown in technical appendix B, which can be summarised as:

- We should be investing more to improve the environment (WRC and storm overflows)
- Flooding inside houses is 7 times worse than external flooding
- Foul/combined flooding is 6 times worse than surface water flooding
- More frequent flooding is ten times worse than infrequent flooding.

We should therefore be focussing on internal property flooding that frequently occurs from the foul/combined system.

5.4 Next generation research

Our Young People's Panel returned for its sixth year for us to understand the views of the next generation of customers. We selected a group of 20 talented sixth form students from across the region who took part in the two-day event held in 2021.

The students took part in some in-depth discussions on storm overflows and sewer misuse, giving us some great insight into the awareness and attitudes of future customers. Future customers are aware of and concerned by river pollution, but had little understanding of the causes, suggesting more can be done to inform this future generation.

5.5 Wessex Water Customer Challenge Group

Wessex Water has an established group, the Customer Challenge Group, that have been set up to monitor and report on our performance on behalf of our customers. The website (here[105]) contains further information and minutes, including when we presented and sought views of our DWMP progress in March 2021.

5.6 Wessex Water Customer Magazine

We find that communicating with our customers using our posted magazine is a successful way to reach them, even in a digital age.

The magazine is delivered twice a year to all customers addresses. Our most recent edition was regionalised with different content for four different areas – Dorset, Bath/Bristol, Somerset, and Wiltshire which aligns well with our DWMP Level 2 planning areas.
The customer magazine has proved to be a very effective way of reaching a wide range of audiences and presents a good value way of sharing key messages with a significant proportion of our customers.

Figure 29: Examples of our customer magazine informing our customers about our work

5.7 Customer engagement undertaken in 2022/23

Since submitting our draft DWMP we have completed further customer research that helps us to understand customer priorities and their appetite to support investment proposals on a range of topics relevant to the development of our PR24 business plan. Wastewater issues have not been looked at insolation but as part of the wider programme.

Recent projects of relevance are:

- **Customer tracker survey** – We have run a continuous customer image tracker survey to measure and monitor household customer views in relation to overall service, value for money and satisfaction for over a decade. The survey also helps identify and monitor customer priorities, awareness of our outbound communications and a 'flexi-section' of questions allows us to switch in and out a suite of questions to explore 'hot topics' such as attitudes to storm overflows and water saving. Blue Marble administer and analyse our Tracker survey. 1000 survey responses are collected continuously throughout the year and analysed in quarterly blocks and at year-end.
- **Willingness to pay** (WTP) – Phase one of our WTP research on support for investment to deliver improvements to each of the outcome priority areas was undertaken by NERA and Qa Research in 2022. The research used a stated preference survey to estimate customers' WTP for service improvements. The survey achieved a large sample size of nearly 7000 household customers and 91 non-household customers. It included dual service, sewerage only and water only customers.
- **Your Say Your Future** – In February and March 2023 we ran a public consultation programme to obtain feedback from customers, stakeholders and staff on our PR24 Business Plan aims for 2030 and 2050. Face-to-face engagement at 10 events across our region was the core of this project – 149 people completed a survey having attended one of the events and it's estimated a further 75 people attended but did not complete the survey.

More detailed descriptions of these projects and their findings will be provided as part of our PR24 submission. Key elements of insight from these projects are outlined below. At the time of writing, there are other research projects in flight to support our overall business plan, that are also relevant to this DWMP. These include:

- The Affordability and Acceptability Testing project prescribed by Ofwat and CCW
- Ofwat's national research on Outcome Delivery Incentive Rates
- Our own study on social tariffs and customer willingness to support increased help for customers that struggle to afford their bills.

These projects will be concluded over the coming months and findings will be evaluated in combination (triangulated) and published as part of our PR24 submission.

Further details of our customer research programme can be found here: https://corporate.wessexwater.co.uk/our-purpose/great-customer-experience/customer-insight.
The outputs from customer research projects are being published here as they become available. All our research projects are designed to align with Ofwat and CCWater's requirements for high quality research.

5.7.1 Summary of findings from customer research

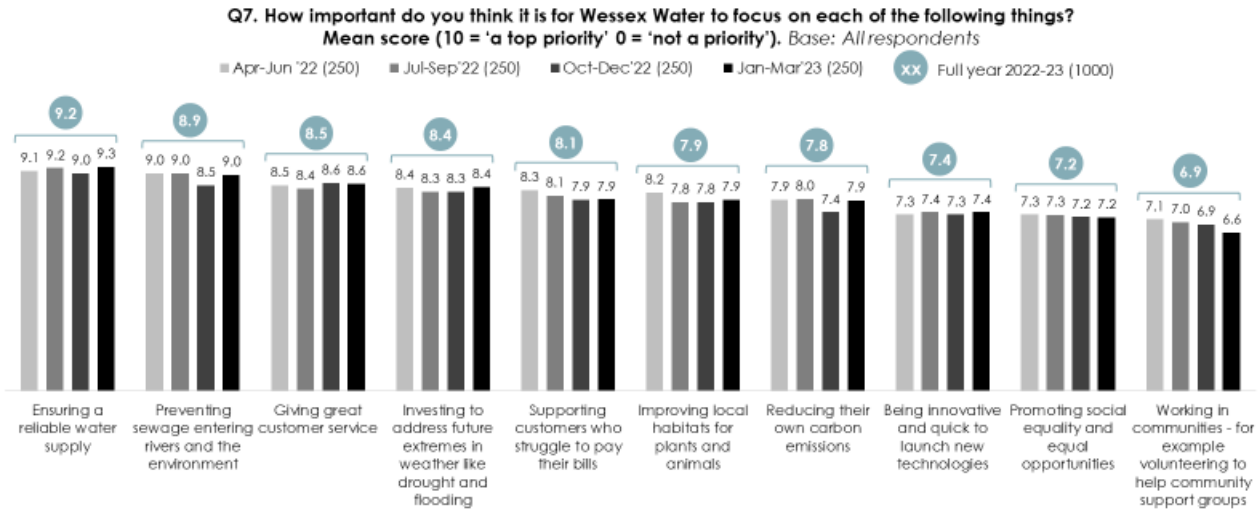
Overall key insights from recent studies can be summarised as below; evidence from research to underpin these statements is presented in the text that follows:

- There is growing customer awareness of storm overflows matched with a growing customer view that their discharges are unacceptable. Many customers and stakeholders feel that urgent action and investment is required.
- There is evidence that significant proportions of customers are willing to pay increased bills to support investments that reduce the operation of storm overflows and improve river and coastal water quality.
- The cost-of-living crisis that has been developing over the last year or so has led to increased concerns for many customers about the affordability of current water and sewerage bills.
- Despite this, and some shock at the scale of future bill increases proposed, overall, the majority of customers (73%) were satisfied with the overall proposed business plan although only around half of customers indicated they felt the bill increases would be affordable to them. Many respondents were concerned about others' financial capacity to absorb the increases and were pleased to see a focus on affordability in the business plan and the measures set out for the 'affordable bills' outcome'.

In 2022-23 our Tracker Survey provided several insights in relation to customer views on what they see as the key issues for the sector and bill affordability in the current economic climate.

Customer priorities have remained stable through the year with 'preventing sewage entering rivers and the environment' scoring as the second top area of importance (Figure 30).

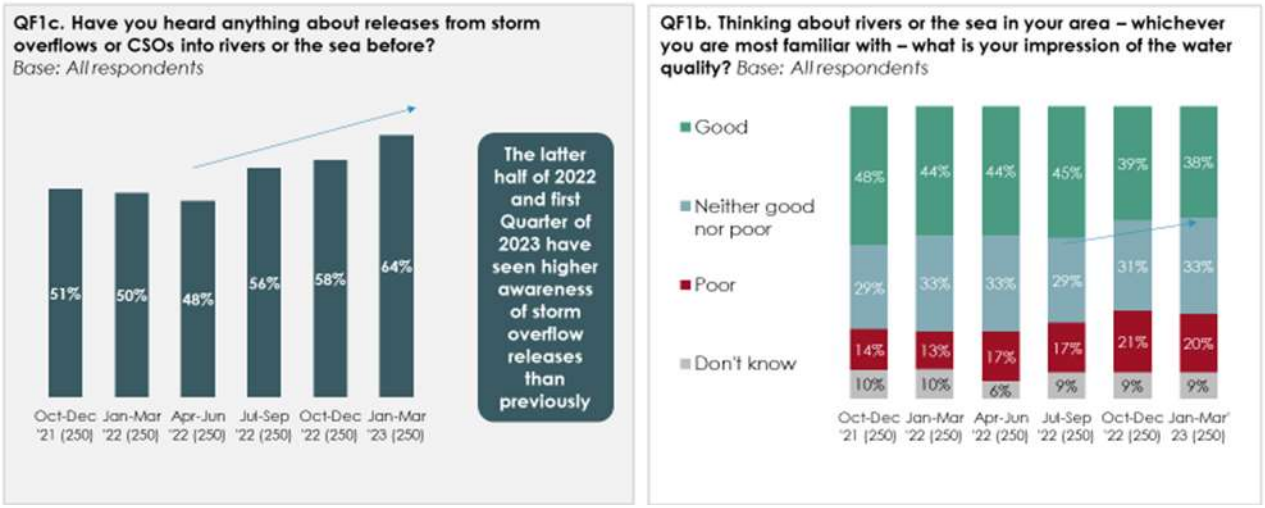
Figure 30: Results from customer Tracker Survey in 2023 on priority areas



In October 2021 we introduced some new questions in the flexi-section of the Tracker Survey to explore attitudes to storm overflows. We have seen a growing awareness of storm overflows over the last 12 months and for the quarter of January-March 2023 awareness amongst the representative sample of customers surveyed stood at 64%. This

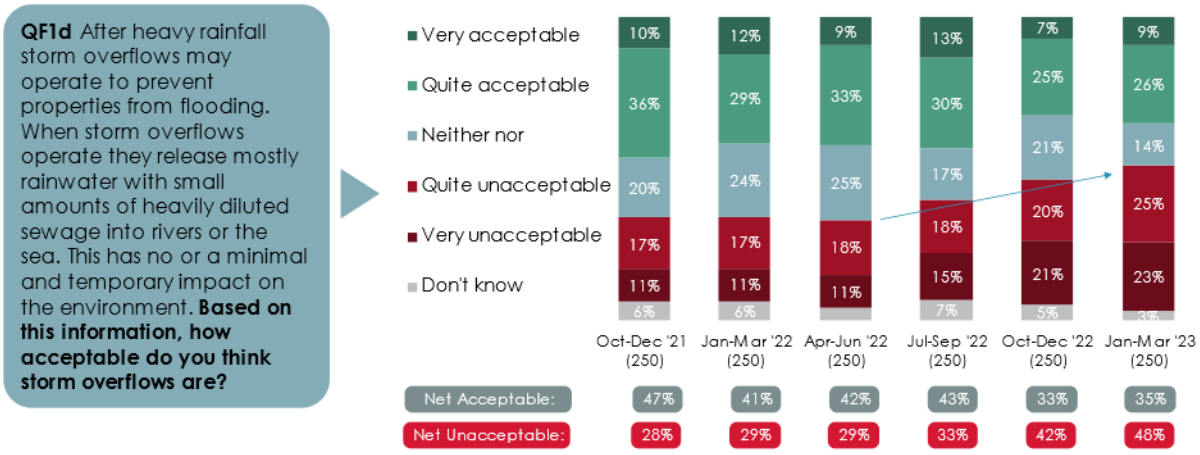
coincides with a marginal decline in underlying impressions of local river and sea water quality although the balance of opinion remains positive (**Figure 31**).

Figure 31: Results from customer Tracker Survey on storm overflow awareness and water quality perception



During 2023 there has been a shift towards fewer people finding the operation of storm overflows acceptable (**Figure 32**).

Figure 32: Results from customer Tracker Survey on storm overflow acceptability



The cost-of-living crisis continues to be a key concern for many customers with widespread pessimism about the outlook for household finances (**Figure 33**). Around six in every 10 customers think that they will be worse off in the next 12 months. Amidst the cost-of-living crisis and high inflation, customers' worries about being able to afford their water bill became progressively more widespread though the first three quarters of 2022. This anxiety has shown signs of reducing through the winter of 2022-23 (**Figure 34**) – some people may not be as badly affected as they were expecting perhaps, although at the end of 2022-23 it remains that around a quarter of customers indicated concerns about bill affordability.

Figure 33: Results from customer Tracker Survey on expectations for household finances

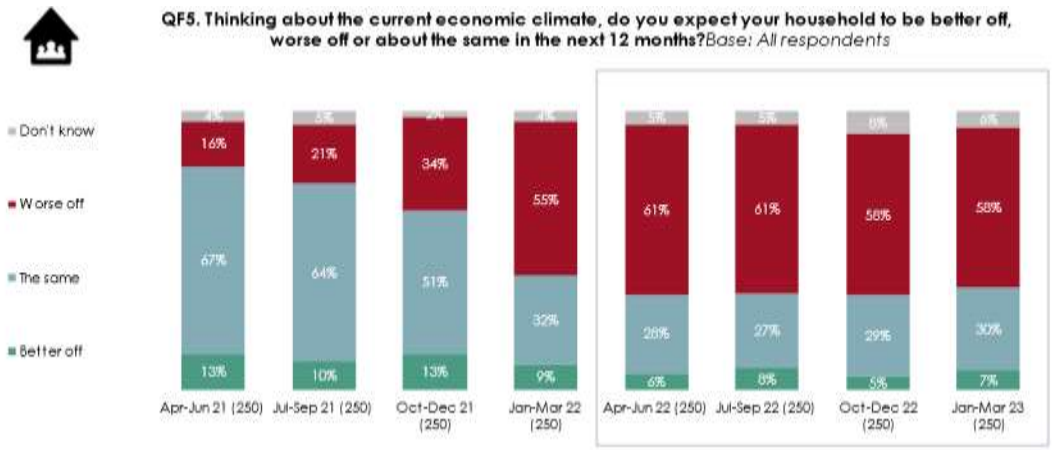
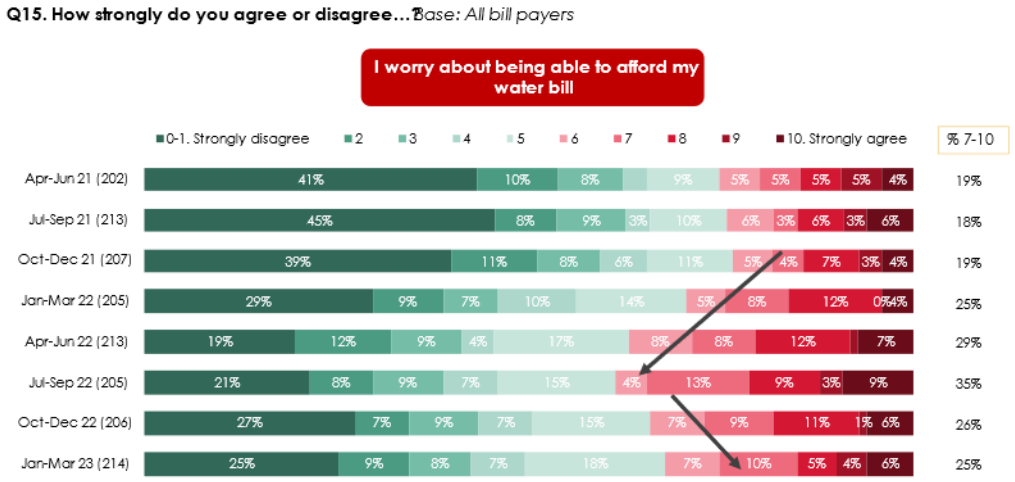


Figure 34: Results from customer Tracker Survey on bill affordability



The recent Willingness to Pay study identified that customers preferred the 'status quo' option for all but one of the 10 attributes they were presented with. The preference for keeping service levels the same as now, with no change to bills, was strongest for 'improving customer service', closely followed by 'Reducing sewer flooding'. Customers were more likely to opt for bill increases to bring about improvements to the environment, although the status quo was still the predominant choice, with the exception 'Supporting nature and wildlife' where the majority of customers (>40%) chose the invest more option.

A summary of the WTP results for the DWMP are:

- For reducing sewer flooding nearly 60% of people chose to maintain current service levels and around 30% would be prepared to pay more to see improvements.
- For reducing pollution incidents more than 45% of people chose to maintain current service levels and around 45% would be prepared to pay more to see improvements.
- For improving river and coastal water quality around 40% of people chose to maintain current service levels and over 50% would be prepared to pay more to see improvements.

The ‘Your Say, Your Future’ public consultation events in February and March 2023 on our overall PR24 business plan asked survey respondents to consider proposed goals for our eight outcome areas for 2030 and 2050. Drainage and wastewater issues were therefore considered alongside other elements of our investment proposals.

During this customer consultation, the in-combination impact on customer bills of the investments that underpin activities to deliver against all eight outcome areas was presented. It was shown that bills would increase by, on average, £280 a year (£23 a month) by 2030. It was recognised that this is a significant increase and that more customers may struggle to pay increased bills and so the additional affordability help that is part of the plan was also presented to customers. This includes:

- Increasing the number of households on our affordability schemes to at least 100,000 by 2030
- Continuing to work with a wide range of partners across our region, such as Citizens Advice and local charities, to raise awareness of the support we can offer and reach customers who need us most.
- Continuing to fund our debt advice partners so they can increase the number of clients they can advise about their bills and debt.
- Making it as easy and quick as possible to apply for the support we offer and use data to automatically apply bill reductions to customers where we can without the need to complete an application.
- Helping customers, particularly those with water meters, to save water and energy.
- Continuing to fund local community projects across our region through the Wessex Water Foundation aimed at improving access to services and building financial capability

At the face-to-face consultation events customers viewed summaries of the overall plan and the detail of each of the outcome areas and were then asked to complete a survey. They were asked how satisfied they were with what we want to achieve by 2030; 73% of people gave a score of 7 or above out of 10. Furthermore 83% of people responded that they think the plan focusses on the right things. However, a significant proportion of customers felt they were not sufficiently knowledgeable to give an opinion on levels of ambition or how achievable the plan is.

The affordability of the bill increases was a key issue for many customers. Projected price increases shocked many customers, but this was tempered by the realisation that inflation was a key driver. Just over half believed they could afford the increases, but uncertainty alongside the backdrop of cost-of-living worries was reflected in the fact that a quarter neither agreed or disagreed that they could afford the increases or did not know. Many respondent respones stressed that whilst they themselves could afford higher bills, they were concerned about others’ capacity to absorb the increases. Almost half thought the price increases were reasonable, although a third felt they were not.

Specific customer feedback on the effective sewerage outcome included:

- Customers were pleased to see actions to tackle an issue that they perceive to be important.
- Nature based solutions were positively received.

- Some customers had local concerns related to sewage flooding and blockages and were keen for this to be addressed quickly
- Several customers showed a willingness to engage, asking for advice around blockage prevention. Some customers wanted to see more mention of education campaigns to help prevent blockages.
- There were some views that the plan was not ambitious enough – from customers this was seemingly linked to media coverage of storm overflows – many customers are unaware of their purpose in protecting homes and think it is possible to eliminate them entirely and quickly.
- Some stakeholders as well as customers indicated they felt plans lacked innovation, could be more ambitious or faster in delivery.

Specific customer feedback on the great river and coastal water quality outcome included:

- Customers felt the health of waterways has decreased in recent years due to 'dumping' of sewage and fertiliser with impacts on nature and health risks for swimmers. Tackling this is seen as a top priority by customers and stakeholders. Customers were pleased to see plans to address the issue.
- Smart sewers seen as a good value investment
- Collaboration between key players welcomed, especially by stakeholders
- Targets for when improvements will be delivered by seen as not being ambitious enough by some.

More detail of our customer engagement is provided in Appendix B.

5.8 How customers and stakeholders have influenced our final plan

As described above, we undertake significant engagement with our customers, regulators, risk management authorities (RMA) and other key stakeholders. This influences our plans in many ways, such as the way we operate and what we includes in the final DWMP.

We listened to our RMA colleagues and tried to adapt how we liaised with them to suit them. This avoided having formal meeting with them, instead we had regular at a local scale and held one formal RMA meeting which we invited all RMAs. The RMA have changed our plan, as this liaison has identified more partnership schemes than our draft. We have now allocate more than £20m for partnership working between 2025 and 2030. This was only £5m in the draft plan due to the lack of evidence.

We read and responded to all the valuable feedback from the draft DWMP consultation. Our statement of response, provided in Annex H, lists the feedback and our responses.

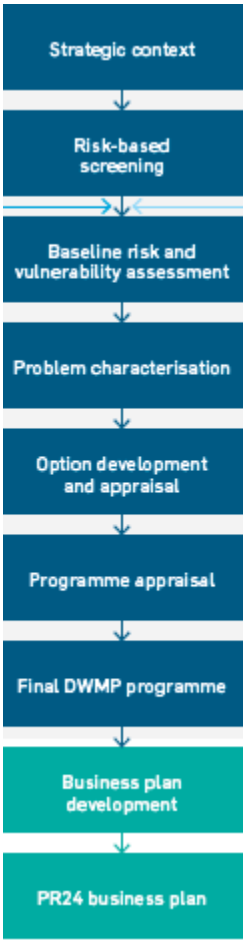
We have made a lot of changes following feedback from the consultation and other new obligations to produce our final DWMP.
Not surprisingly, affordability is op or near the top of our customers main concerns. Because of this, we have put forward a core plan that delivers what we need to, using best value

solutions. Our ambition for storm overflows was to completely eliminate untreated discharges, but that is deemed unaffordable, so we have put that as an adaptive pathway.

6. Plan development

This section outlines at a high level the overall approach we have taken to apply the DWMP framework[74]. Figure 6-1 shows the framework stages and a summary of the purpose of each stage. This section contains a summary, but more detail is provided elsewhere in this report and our website, as referenced.

Figure 6-1: DWMP framework stages



Setting the context in terms of planning objectives levels of service and how we report and communicate at different levels

Initial screening of WRC catchment against 18 indicators

BRAVA investigated over 200 WRC catchments, which included 99% of the population. It looks at existing and future needs with the growing population, urban creep and climate change.

How big is the problem and how difficult will it be to resolve

Options appraisal for the existing and future issues identified including grey, green and partnership working opportunities

Prioritising options into a deliverable plan that keeps bills affordable and considers our customers preferences

This will be provided in the Final DWMP in March 2023, after consultation and prioritising our DWMP investment needs against other company requirements.

Our PR24 business plan will not be drafted until September 2023, but will be informed by the DWMP submissions.

6.1 Introduction to plan development

The DWMP framework advocates that the amount of time and effort spent developing the strategy should be proportional to the level of risk and the complexity of addressing the risks. It also looks to build on existing water company practices wherever possible. As such, risks that can be resolved simply should be addressed using business as usual methods.

Some catchments may not have any drainage or wastewater issues, so the DWMP framework screening these out in early stages. However, as the size and complexity of the risks in a catchment increases, further effort should be spent developing options to ensure the most effective strategy is developed with the maximum benefit possible.

Section 6.3 explains the first screening stage; the Risk based catchment screening stage.

The higher risk catchments are undergoing desk studies, including computer hydraulic modelling, to evaluate the existing and future risks, known as baseline risk and vulnerability assessment (BRAVA) described in section 6.4.

Section 6.6 describes the Problem characterisation stage. This ensures a suitable level of investigation for each catchment which is a lightly modified version of the process set out by the UKWIR report, 'WRMP 2019 Methods – Decision Making Process: Guidelines'.
There are two elements to the problem characterisation assessment:

- "how big is the problem?" (strategic needs), a high-level assessment of the scale of need for interventions to address near, medium and long-term performance concerns; and
- "how difficult is the problem to solve?" (complexity factors), an assessment of the complexity of issues that affect investment in a drainage and wastewater planning area.

Scores are applied to these two elements, resulting in a characterisation matrix. The corresponding matrix colour relates to the complexity of the catchment and thus the level of assessment required. The three broad catchment categories are standard, extended and complex and each is of progressively higher concern than the preceding level that affect investment in a drainage and wastewater planning area.

More detailed optioneering will be undertaken for the extended and complex catchments. drainage and wastewater strategies, will be produced for each of the extended and complex catchments. The standard catchments will have a briefer drainage and wastewater strategy, as previously outlined the challenges in those catchments can be resolved more easily.

6.2 Strategic context

The strategic context stage sets the context in terms of planning objectives levels of service and how we report and communicate at different levels (as described in section 4).

The DWMP framework requires us to consider key performance indicators, known as planning objectives. Six planning objectives were set nationally, so are common across all companies. We set ourselves an additional 6 bespoke planning objectives. These are described in section 5.

For each planning objective we have set target performance levels for PR24, which are aimed to be industry leading for the common metrics and stretching for the bespoke objectives, where feasible. These are detailed in section 5.

6.3 Risk based catchment screening

The risk-based screening stage is an initial screening of WRC catchments performance using 18 indicators, such as flooding, frequent spilling overflows and other known drainage issues in each catchment. It is a filtering stage intended to reduce the number of catchments that progress to the next stage.

Risk-based catchment screening was used to identify catchments that required further assessment through the DWMP process based on if the catchment triggers for one or more indicator as defined in the framework.

The indicators include:

- Intermittent discharges impact upon bathing or shellfish waters
- Continuous or intermittent discharges impact upon other sensitive receiving waters
- Storm overflow assessment framework
- Capacity assessment framework
- Internal sewer flooding
- External sewer flooding
- Pollution incidents (categories 1, 2 and 3)
- WRC quality compliance
- WRC dry weather flow compliance
- Storm overflows needing improvement
- Risks from interdependencies between RMA systems (partnership schemes)
- Planned residential new development
- WINEP
- Sewer collapses
- Sewer blockages
- Groundwater infiltration risk*

*The groundwater infiltration risk is a bespoke indicator that we added to the list to include the risks for catchment that are vulnerable to groundwater inundation.

Each indicator requires data to be processed to identify if a WRC catchment (level 3) has breached the indicator. The output for each indicator is then collated into one record to summate the number of breaches and identify if a catchment should progress to the BRAVA stage. Some indicators require just one occurrence others need more than on before passing to the BRAVA stage. That detail is provided in the framework so not repeated here.

The RBCS results are whether the WRC catchments go thought to the next stage of the framework (BRAVA). 228 WRC catchments need to be reviewed in the BRAVA stage.

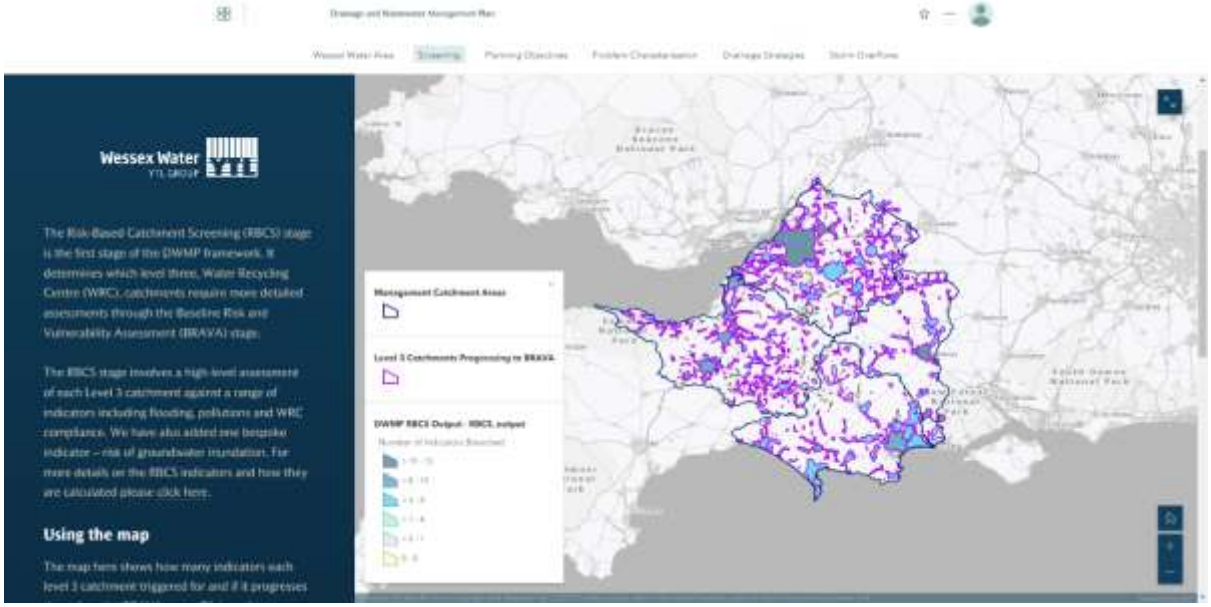
171 of the WRC catchments fell out of the process. These were mostly small catchments, so this only equates to 1% of the population not passing to the BRAVA stage.

The DWMP framework suggests the results are provided in Tabular form in technical appendices. This lists WRC catchments and highlights for each indicator whether the risks are likely to be an issue or not. It also summaries whether the catchment should proceed to

the BRAVA stage. We have provided a summary in our Level 2 technical appendices, in Annex A to D. But the detailed results are provided on our portal[82] as described below.

The RBCS is refreshed annually, so this does not lend itself to being presented in a report, as it will not be live information. So as well, we have given visibility to the Level 3 indicator results on our geospatial portal, shown in Figure 36.

Figure 36: Example of the RBCS results on our website



6.4 Baseline risk and vulnerability assessment (BRAVA)

The catchments that went through the RBCS stage then underwent more detailed assessment of risks in the Baseline risk and vulnerability assessment (BRAVA) stage.

The objective of the Baseline risk and vulnerability assessment (BRAVA) stage of the DWMP is to assess the level of risk at a catchment level. This includes the current risk and how the risk is anticipated to change over the next 5, 10 and 25 years considering the impact of growth, urban creep, climate change, per capita consumption, and infiltration.
The 2014 Ofwat's flooding assessment of future impacts[41] by Mott MacDonald, used available computer hydraulic models across England and applied potential development and climate change uplifts. It summarised that flooding would increase by:

- Climate change 27%
- Urban creep 12%
- New development and growth 5%
- Combined effects 51%

The BRAVA stage of the DWMP is replicating this assessment using our latest computer models. The overall results from BRAVA show similar results, with predicted flooding in 2050 being 57% higher than the 2025 results for the 1 in 30-year (worst case duration) results.

The BRAVA stage investigated 228 WRC catchments, which included 99% of the population. It assessed existing and future needs of the growing population, urban creep and

climate change. This included using computer hydraulic modelling, to evaluate the existing and future risks.

The future risks assumes that the current infrastructure is maintained at the current maintenance investment levels, but the assets are not enhanced. This therefore shows how things will get worse over time if we don't act.

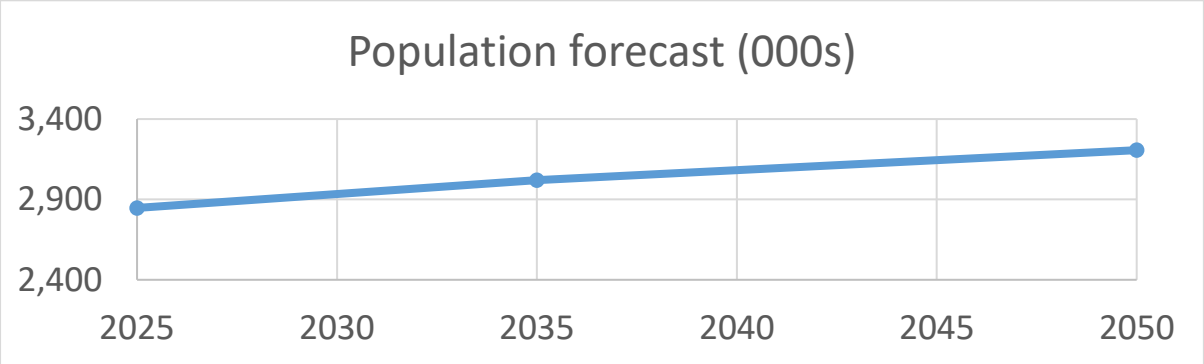
The next stage (section 8) is the options stage to investigate what can be done to mitigate the existing and predicted future failures of levels of service. 214 WRC catchments progressed to the options stage (14 fell out of the process as they were assessed in BRAVA stage as having no significant risks).

6.4.1 Population growth

The continued upturn in the housing market has seen growing numbers of new houses being built year on year with steady progress towards government targets. The industry paused over the recent pandemic period and swiftly mobilised a return to production by mid-2021. Demand in house building is predicted to remain at elevated levels with proposed reforms in the planning system and the developer services market aimed at raising future output, as shown in Figure 37.

Based upon a range of information available we maintain demand projections for both short and long term through water resource and strategic drainage and wastewater planning. These are supported with a rolling capital programme for investment using a phased approach where necessary to maintain standards of service and compliance.

Figure 37: Population growth forecast



Supporting growth and new development includes the following core activities:

- Providing network connections for new development
- Maintaining network capacity with resilience measures
- Providing water resources and waste recycling with process capacity
- Service quality in developer services markets

These ongoing activities have established processes to evaluate the impact of growth and new development upon the capacity and performance of sewerage assets. We have always

focussed upon investment planning during our business plans. Longer term strategic planning is perhaps less visible to external stakeholders but has remained in the background as a fundamental part of capacity planning.

One of the key elements of the DWMP is assessing the impact of new development and the future performance of existing wastewater assets. This involves preparing a demand forecast. Our planning liaison team prepare and update demand projections for Level 3 WRC catchments.

Understanding the scale, location, and rate of new development over time are primary inputs, which can be translated into peak, average and daily flows for characteristic consumption and discharge to sewer. There are allowances and design criteria used for surface water, storm events and infiltration. Reductions in Per Capita Consumption to 110 litres/per head/day are factored into company plans over the longer term. This has reduced influence where verified network models are used for catchment appraisal.

Assessment of network and treatment capacity and performance uses common development data established from Local Authority plans. Demand projections for network and treatment purposes use common development data adjusted for catchment boundaries.

Local Planning Authorities publish local plans which prescribe the scale, scope, and timing of new development to meet demand for housing and employment land. Local plans generally cover a 10-to-15-year period with further information available to inform location through a site allocations document and a 5-year supply of development land.

Beyond a 5-year local plan period a long term 25-year projection can draw upon data published by the Office of National Statistics (ONS). Household and population projections are available from government websites. This information provides some guidance upon the level of future growth over both 10 and 25 years.

- Household projections for England - Office for National Statistics[43]
- National population projections - Office for National Statistics[44]

New development can provide opportunities to provide benefits – such as the Weston-Super-Mare super pond partnership example. But most development adds extra pressure onto the sewerage network and the WRC.

We must ensure that all new development is sustainably drained. Well-designed multifunctional sustainable drainage systems deliver a wide range of water quantity, water quality, flood risk, amenity and biodiversity benefits. Run-off attenuation, storage and infiltration can help relieve pressure on our assets. Other opportunities include using planting and wetland areas to avoid the embodied carbon of a traditional ‘piped’ system. Overall, there is huge potential for sustainable drainage systems to contribute to achieving the biodiversity net gain mandate brought forward in the Environment Act 2021.

More development related detail is provided in Annex F.

6.4.2 Urban creep

Urban creep is when property owners pave or make their gardens of driveway impervious to rainfall. This increases rainfall runoff that can enter the sewers.

The 2009 UKWIR study on urban creep analysed over 34,900 samples, equating to about 2 million properties and it was found that the average rates of urban creep were between 0.4 and 1.1m^2/house/year. This matched our study undertaken in 2008.

This increase in impervious area will undoubtedly increase rainfall runoff rates placing extra pressure on the receiving assets, combined sewers, surface water sewers, highway drains or soakaways, and lead to an increased flood risk.

Local councils have duties to ensure planning permission is sought for paving over permeable areas. But this existing duty is not enforced. With the growth of domestic vehicular charging arrangements, pressure to park cars closer to properties will exacerbate the problems resulting from increased impermeable areas.

6.4.3 Climate change

The UK is faced with unprecedented environmental challenges and our day-to-day work is greatly influenced by the weather. The climate crisis will lead to drier summers, wetter winters and more frequent extreme weather events. This will have a direct bearing on the services we provide and that's why we are building long-term resilience into our DWMP. The scale and urgency of these challenges allied to rising customer and environmental expectations cannot be underestimated. The DWMP is providing evidence to this challenge.

The DWMP framework (BRAVA section) states that at the 2050-year horizon we should apply a 20% uplift of rainfall intensity for climate change allowance, with sensitivity tests at 14% and 26% when assessing flooding.

The new tool that the EA has published, the Peak rainfall climate change allowance by management catchment[13], includes a 20% uplift in rainfall for the central emissions prediction and 35% to 40% increase for the high emissions prediction, as detailed in Table 1.

Table 1: Peak rainfall allowances for climate change

Management catchment name	River basin district	2050s central for 30 year return perio	2050s upper end for 30 year return perio	2070s central for 30 year return perio	2070s upper end for 30 year return perio
Avon Bristol and North Somerset Streams	Severn	20%	35%	25%	40%
Avon Hampshire	South West	20%	35%	25%	40%
Dorset	South West	20%	35%	25%	40%
South and West Somerset	South West	20%	35%	25%	40%

We have applied 20% uplift to the FEH13 rainfall for the 2050 horizon. This is in-line with the DWMP framework and Table 1. Sensitivity testing (+/- 6% of 20% climate change uplift) was applied to the complex catchments, like Bristol.

Climate change will also potentially raise sea levels, but not significantly by 2050. The Met Office 'UKCP18 Marine report'[72], has been used for the complex catchment of Bristol which could be affected by the Bristol channel which has the second highest tidal range in Europe.

Future DWMP cycles will include more assessment of sea level rise risks, in catchments including Weymouth and Poole.

Climate change is also predicted to increase the probability of wet winters. This is problematic for Wessex Water because we have seasonal groundwater infiltration problems. The effects may already be happening, because in the 2010, we had 3 wet seasonal inundations periods, whereas previous decades typically only had one year of seasonal groundwater inundation.

For more information on how we are tackling the climate emergency, please see our climate change adaptation report[80].

6.4.4 How we modelled BRAVA

We used appropriate tools and data that is available to us to assess the BRAVA.

Computer hydraulic models are the best tool for predicting storm overflow performance and flooding performance, now and the future. We were funded by Ofwat under this PR19 DWMP programme to improve our 1-D modelling stock, which we have achieved.

For the foul and combined sewers, we have:

- 85% coverage of 1-D models (verified)
- 15% coverage of 1-D models (unverified) for lower risk catchments.

Surface water sewerage systems are more discrete and are more difficult to verify than foul/combined systems. Where we have surface water flooding problems, we do already verify the sewers using traditional short-term flow surveys. We have built (unless newly arising) verified models of those system with known problems. Unverified models have been built for the remaining public surface water sewers that are mapped. This required a significant amount of data collection.

For the surface water sewers, we have:

- 1-D models (verified) of surface water sewers with known issues
- 1-D models (unverified) of all other public surface water sewers.

These computer hydraulic models have been used in the BRAVA stage. Hundreds of thousands of computer simulations have been undertaken in the BRAVA and Options stages, some taking more than an hour each. This was an enormous task.

The hydraulic computer models predict how often storm overflows operate (and the discharge volume) and in more severe events how much flooding occurs and the frequency due to hydraulic reasons. This has been simulated for the baseline (2025) and future

scenarios (2030, 2040 and 2050) including urban creep, growth, and climate change as appropriate.

We have used innovative techniques and DST, such as Ruby scripting and ModeFronteer to achieve this.

Hydraulic computer models are not used for all the planning objectives. The others have different models, usually calculated in spreadsheets.

For the WRC planning objectives, we have spreadsheet-based load and capacity models, based on known flows, and loads and expected development.

Models for blockages, collapses and other planning objectives are based on historical trends. Future predictions of increased investment are based on other models such as our sewer deterioration modelling of sewers.

These are detailed in the programme appraisal sections of this report.

6.5 BRAVA results

The Baseline risk and vulnerability assessment (BRAVA) stage of the DWMP assessed the level of risk at a catchment level, now and where possible in the future, for each of the 12 planning objectives.

Where more than one risk was identified then the catchment progressed through to the following stages of the DWMP framework, including optioneering to see what was needed to reduce those risks.

Figure 38 shows an example of our geospatial portal[82] which contains the details of the BRAVA results.

Figure 38: Geospatial portal showing BRAVA results

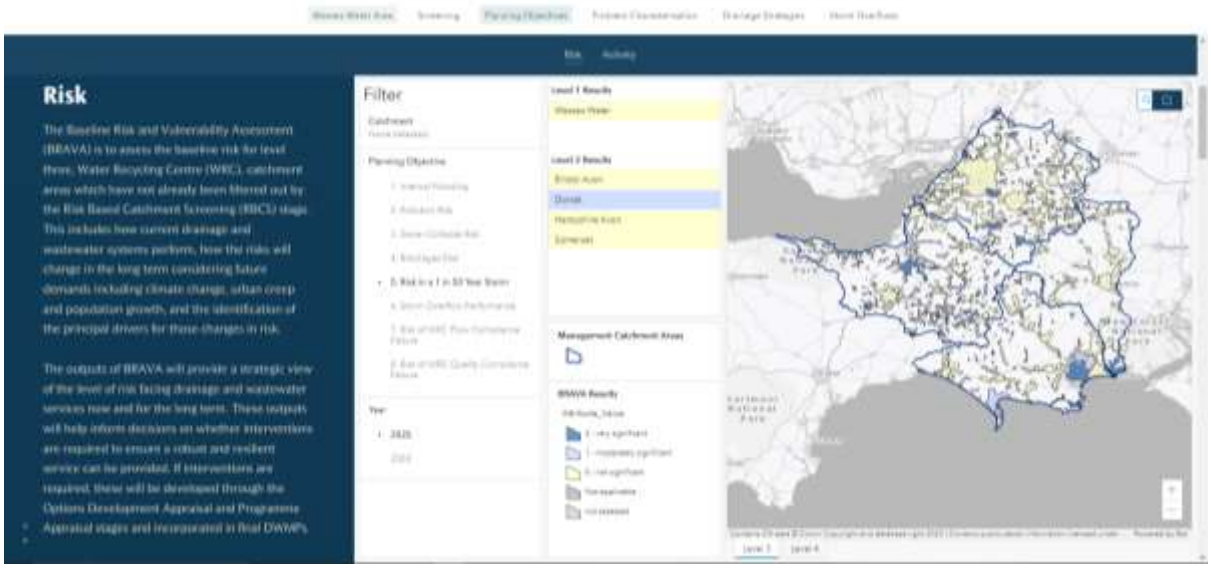
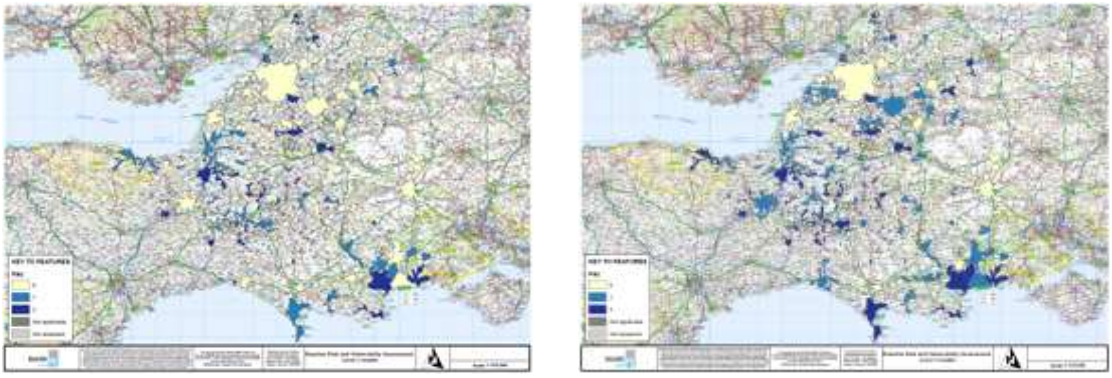


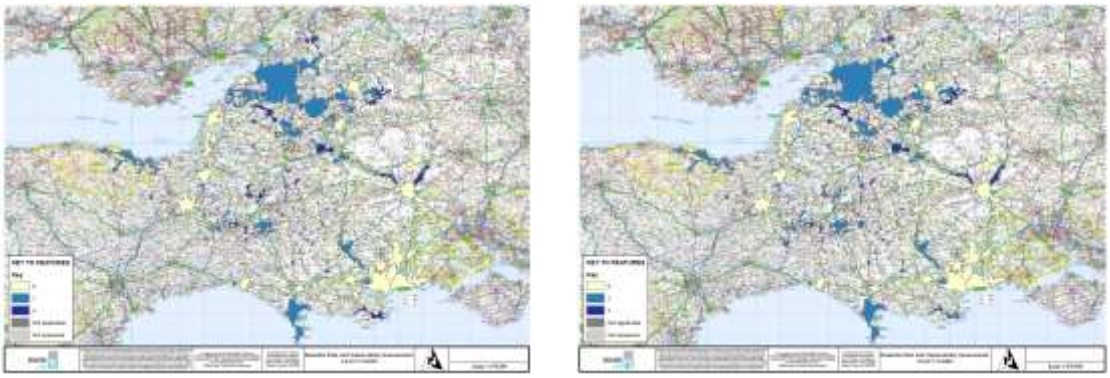
Figure 39, Figure 40 and Figure 41 show the results for different planning objectives, displaying risk in the baseline (2025) and the future (2050) assessments. Light yellow shows that the catchments not at significant risk, light blue have some risks, and dark blue have significant risks.

Figure 39: Population at risk of flooding planning objective (in 2025 and 2050)



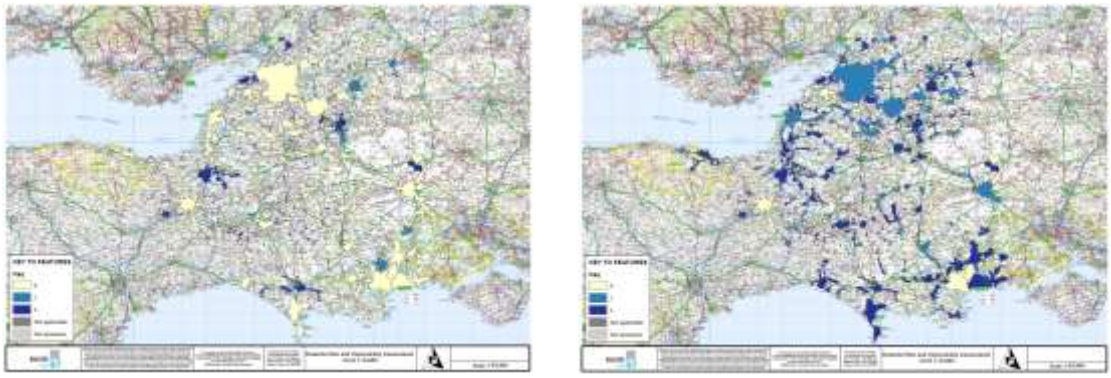
2025 2050

Figure 40: Storm overflow planning objective (in 2025 and 2050)



2025 2050

Figure 41: WRC compliance planning objective (in 2025 and 2050)



2025 2050

Our geospatial portal[82] contains all the BRAVA results from our DWMP. Simply go to the Planning Objectives tab and click on a catchment to see if any planning objectives were breached, as shown in Figure 38. A breach shows there is a risk in that catchment.

6.6 Problem characterisation

The problem characterisation stage ensures an appropriate level of assessment and reporting for each catchment. It follows the process set out by the UKWIR report, 'WRMP 2019 Methods – Decision Making Process: Guidelines' and applies it to the sewerage business. The sewerage business is more complex that the water resources because heavy rainfall can occur anywhere, leading to flooding or storm overflow operation. This has required the DWMP to delve into a very detailed level of granularity to provide the evidence base to inform the strategic plan. We have undertaken the problem characterisation assessment for all the WRC catchments that went through the BRAVA assessment.

There are two elements to the problem characterisation assessment:

- "how big is the problem?" (strategic needs) - a high level assessment of the scale of need for interventions to address near, medium and long-term performance concerns; and
- "how difficult is the problem to solve?" (complexity factors) - an assessment of the complexity of issues that affect investment in a drainage and wastewater planning area.

Scores are applied to these two elements, resulting in a characterisation matrix (Table 2). The corresponding matrix colour relates to the complexity of the catchment and thus the level of assessment required. The three broad catchment categories are standard, extended and complex and each is of progressively higher concern than the preceding level that affect investment in a drainage and wastewater planning area.

We held several workshops reviewing the findings of the BRAVA stage to decide for each WRC catchment 'how big is the problem' and 'how difficult will it be to solve the problems'. This decides the level of optioneering and reporting required. We have 189 standard catchments, 20 extended catchments and 5 complex catchments. 14 catchments did not have any risks identified through the BRAVA stage and so do not progress through to ODA. The level of detail required in the optioneering stage is much higher for the extended and complex catchments.

More detailed optioneering has been undertaken for the extended and complex catchments.

Drainage and wastewater strategies, will be produced for each of the extended and complex catchments. The standard catchments will have a briefer drainage and wastewater strategy, as previously outlined the challenges in those catchments can be resolved more easily.

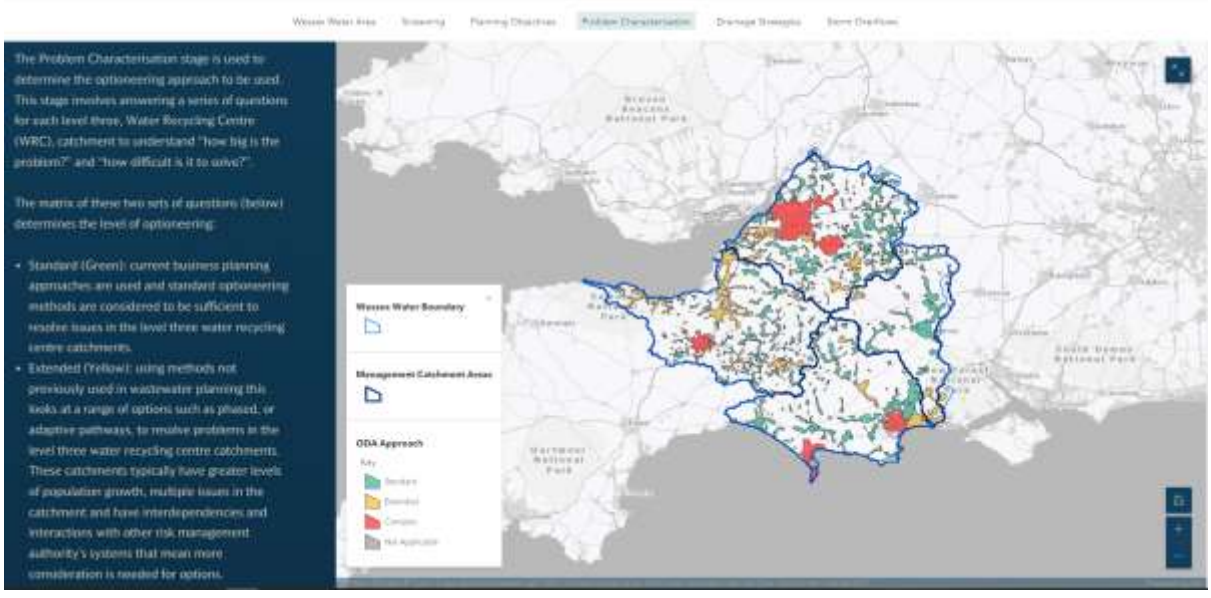
Table 2: Problem characterisation matrix

		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+)				
	Medium (5-7)				
	Low (<4)				

The results of the problem characterisation are published at WRC catchment (level 3), showing how big and how difficult we think the issues are to solve for each catchment.

Our geospatial portal (here) contains all the problem characterisation results. Simply go to the problem characterisation tab and click on a catchment to see how complex the catchment is, as shown in Figure 42.

Figure 42: Example of the problem characterisation on our website



6.7 Options development and appraisal (ODA)

The Options development and appraisal (ODA) stage of the DWMP framework is to determine unconstrained, constrained and feasible options and costs to inform the requirements of the DWMP.

The outputs from the BRAVA (section 7.5) and problem characterisation (section 7.6) stages of the DWMP Framework indicate the planning approach to be taken for the options

development and appraisal (ODA) phase. The previous stages of the framework inform the scale of the investment needs, the complexity of the solutions and the timing of when the investment is required to install measures to meet the thresholds proposed for the planning objectives.

We have adopted two approaches to the unconstrained ODA:

- a short-term bottom-up approach looking at identifying solutions wherever a future investment need is identified in the short to medium term to address flooding or storm overflows; and
- a top-down holistic catchment-wide approach where a solution is developed and is aimed at addressing all investment needs up to 2050.

The DWMP framework sets out a 4-stage screening process to filter an initial long list of 30 generic options down to a short-list of two feasible options outlining a range of solutions required to meet the thresholds proposed within the planning objectives. Both 'bottom up' and approaches to the ODA apply the same screening process, which promotes sustainable solutions wherever they are appropriate to address the needs up to 2050.

The outputs of the ODA stage of the framework provide a formal structure to inform the scale of investment required for an unconstrained plan. In accordance with the framework, the investment is summarised at a Level 2 (strategic catchment) and Level 1 (Wessex area). A high-level assessment of the financial costs, benefits and carbon enables an understanding of the best value options which will be used to inform the programme appraisal to inform development of the constrained DWMP programme.

The first phase of the screening process is to assess the needs identified in the BRAVA stage against 30 generic options for technical feasibility within a given catchment. This will then give a decision regarding whether the option progresses to the unconstrained options stage. This also allows the addition of bespoke catchment specific solution types not covered in the generic options list.

The generic options list was developed by the Water UK ODA Task and Finish group (ODA T&F) based on the themes initially provided in the framework of customer management, surface water management, combined foul and surface water systems, wastewater treatment, partnership working and indirect measures.

The DWMP framework advocates a *four-stage process to optioneering* starting with a list of generic options, moving through unconstrained and constrained option stages, to identify two feasible options to resolve an issue. There are intermediate unconstrained and constrained options stages, and the framework also identifies the factors that should be considered when moving between stages.

The assessment of 30 generic options for technical feasibility within a given catchment and a Yes / No decision over whether to progress to the unconstrained options stage. This allowed the addition of bespoke catchment specific solution types not covered in the generic options list. These unconstrained options were subject to a high-level assessment of effectiveness, cost, environmental risks, customer acceptability and resilience against future uncertainties.

This assessment led to a set of constrained options to be investigated in detail. These options were then assessed against additional factors such as political acceptability, timeline for implementation, complexity, flexibility, dependencies on other parties / schemes, regulatory constraints, and third-party opportunities. From this, two feasible options were identified and put forward for programme appraisal.

This process has been followed when developing options for all short-term risks identified, and when looking at long term catchment wide solutions for extended and complex catchments.

Throughout the screening assessment, it became apparent that solution types were rarely implemented in isolation. Most schemes required a range of options to achieve the required outcome. As a result, additional steps were added to the screening process to help identify the best way to combine different option types to best minimise the future risk and promote the option types that best met the framework criteria.

The full ODA process applied is documented in section **Error! Reference source not found.**. W here possible, the process was automated to deliver the screening phase efficiently. However, the of the constrained options required engineering judgement by the person undertaking the assessment. Following the framework principles of proportional effort, the standard catchments have taken a simpler approach to long term catchment wide solutions and bypassed the constrained options stage.

Where the underlying problem was due to overloaded sewers (hydraulic capacity), the solution required additional capacity or measures to prevent groundwater or surface water getting into the sewer.

Throughout the screening process, computer models of the sewerage systems were used to identify the scale of the problem, develop options, and quantify the benefits from implementing the solution. Options that were considered included both grey and green solutions:

- grey solutions are traditional options such as underground storage tanks or increasing the pipe capacity
- green solutions are more sustainable solutions such as Sustainable urban Drainage Systems (SuDS), separation schemes or nature-based solutions (like attenuation ponds to hold surface water at source).

The screening process promoted the use of green nature-based solutions. To meet the thresholds outlined within the planning objectives, the green solutions were supplemented by traditional measures. The following solutions were considered as part of the modelling assessment:

- storage tanks (to attenuate flow underground)
- larger or new sewers (to increase flow)
- larger or new pumping stations (to increase flow)
- lining sewers to make them watertight (preventing groundwater from entering sewers)

- surface water separation from combined sewers (to reduce the surface water from entering combined or foul sewers)
- nature based and sustainable solutions (e.g., water butt attenuation of surface water at property level or separation (removal) of surface water from foul/combined sewers)
- real time control to optimise the performance in near real time
- partnership working (to deliver separation schemes more efficiently).

Additional options which are not appropriate for assessment using hydraulic models have been considered at using existing processes and decision support tools to prioritise. These programmes of work will be determined at a Level 1 area which include customer behaviour, sewer rehab and resilience. Stakeholders have been involved throughout the ODA to confirm the ODA categorisation and partnership priority locations, gain their support to the ODA approach and methodology and understand which options they would be interested in future collaboration, co-creation, and assessment.

Table 3: Long list of Generic Options considered by the ODA screening process

Topic	Generic Options
Wastewater treatment	- Treat/pre-treat in network - Treatment at overflows - Increase treatment capacity - Rationalisation/centralisation - De-centralisation - Modify consents/permits - Catchment management initiatives - River catchment/dynamic permitting - Effluent re-use
Combined, foul and surface water sewer systems	- Intelligent network operation - Increase capacity existing foul/combined networks - Wastewater transfers - Sewer rehab - Sewer groundwater infiltration reduction - Property Level Resilience (PLR) - Attenuation - Sewer maintenance
Surface water management	- SW source control measures - 5% - SW source control measures - 10% - SW source control measures - 25% - SW source control measures - 50% - SW pathway measures - 5% - SW pathway measures - 10% - SW pathway measures - 25% - SW pathway measures - 50% - Separate flows
Customer management	- Water efficient appliances - Water efficient measures (property/community/industrial) - Customer incentive - Domestic and business customer education - Greywater treatment and re-use - Blackwater treatment and re-use

Partnership working	- Making space for water - Surface water separation - Contributions to and from partnership schemes - Alignment of programmes and works - Development of joint evidence bases
Indirect measures	- Influencing policy - Investigate and monitor - Future technology

ODA screening was not required for some of the planning objectives, as they have a single option to resolve the issue. So, we have a regional approach and follow existing business practices to determine approaches and engagement (i.e. undertaking customer engagement to reduce water consumption / blockages or progressing the infiltration sealing through a Wessex-wide prioritised programme of works).

When a blockage occurs, the only option is to clear the blockage. This can be by jetvac or jetting depending on the situation. When blockages are caused by wet wipes we post ‘bag it and bin it’ letters, or ‘just flush the 3 Ps’ letter.

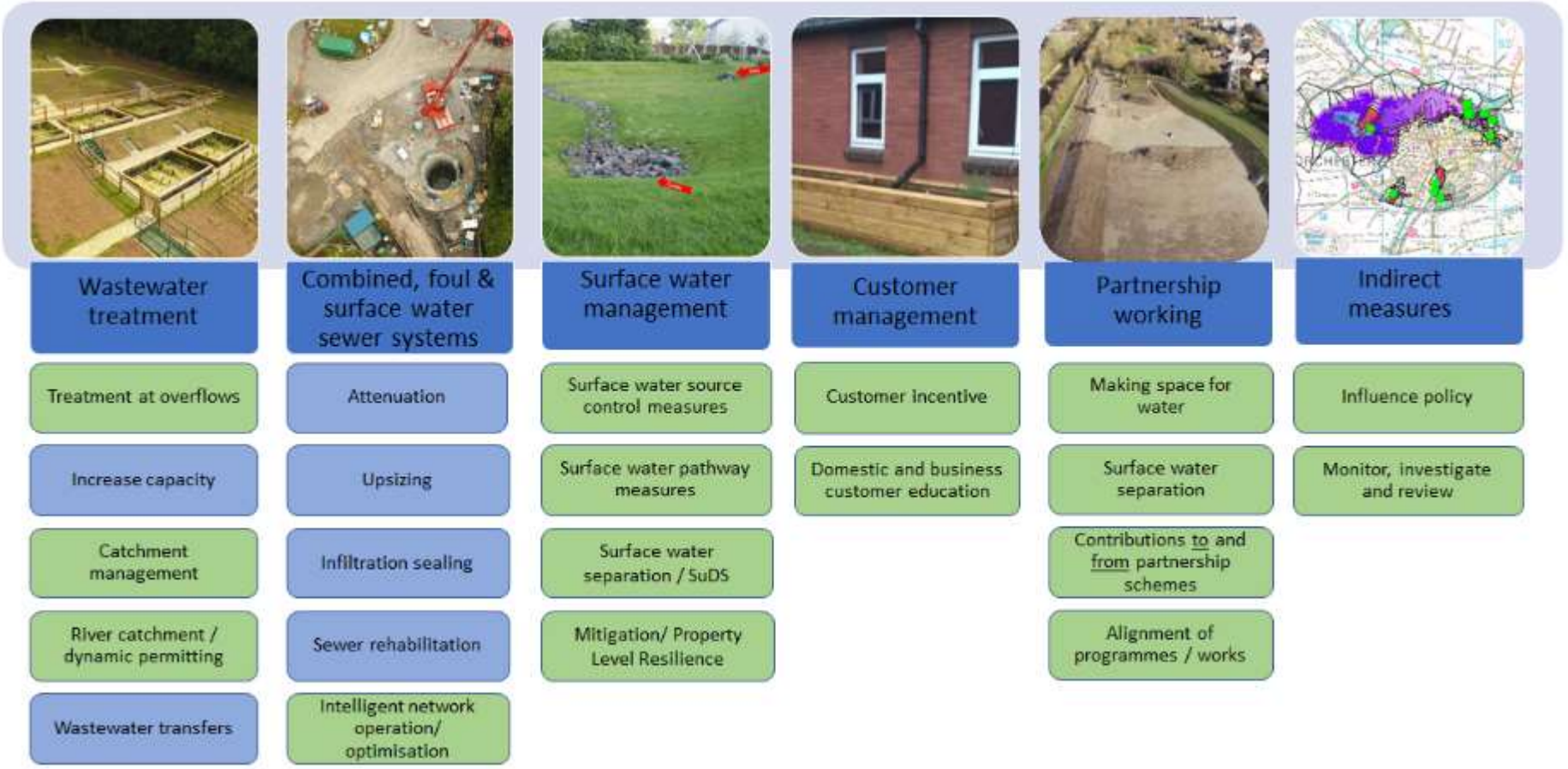
The BRAVA stage has highlighted which catchments have higher blockage rates so we can focus on wider campaigns, especially if the blockage are repeats or cause pollution.

Where blockages are caused by roots, we can jet the roots away, but they are likely to grow back, so the best option is to line the sewer. If the lining of the sewer is expensive, then it may be worth taking the regular jetting approach and if in a sensitive location consider installing an in-sewer monitor, so it becomes part of the intelligent network, and we can proactively react should the roots grow back.

Where blockages are caused by private interceptor traps, and repeat flooding has occurred, we automatically remove the private interceptor.

Where groundwater is entering the sewers or manholes, the only option is for sewer rehabilitation by either lining the sewer or digging down and replacing it. Similarly, when a sewer collapses or is about to collapse the only option is sewer rehabilitation, by either lining or replacing the sewer.

Figure 43: Typical feasible options that were selected during the ODA screening process



Although we will continue to improve our sewerage network, this will not solve the issue of sewer misuse – addressing the issue 'at source' by encouraging customers to adopt blockage-friendly behaviours and dispose of waste appropriately or not generate the waste in the first place is pivotal to protecting our customers from blockages and flooding incidents.

Our current strategy uses data to identify blockage hotspot areas to focus customer engagement where it can have most impact. We plan to build on this approach to engage with all customers who experience blockages due to sewer misuse. These customers may receive a letter offering advice, a face-to-face visit, or be offered one of our free waste packs to help them prevent future blockages. Targeted engagement will also be supplemented with more public awareness campaigns.

Our future working will additionally see customer engagement on the topic of stormwater separation including advice and support on what can be done at a household and community level to help reduce flooding incidents. Figure 44 provides examples of the engagement material that has been developed to support domestic and customer education.

Figure 44: example of engagement material developed to support domestic and customer education

Throughout the development of our DWMP we have worked closely with a range of stakeholders to get a clear understanding about the mutual concerns and challenges we face and to help us understand potential areas to develop opportunities for collaboration and promotion of nature-based solutions

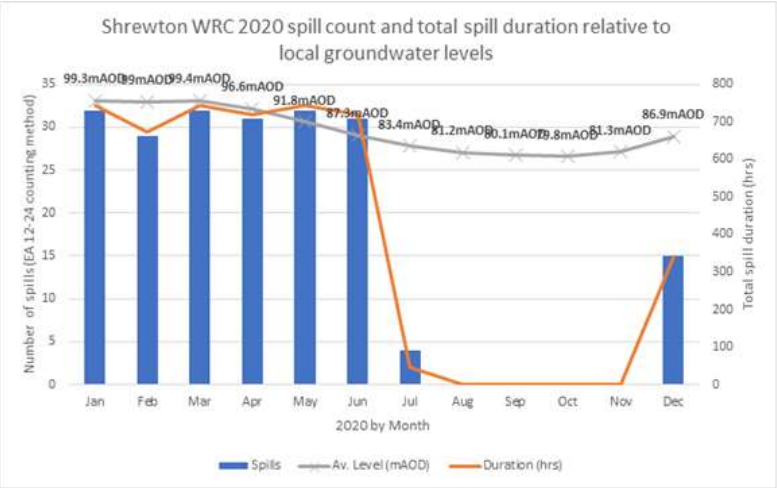
Partnership working can involve an extensive suite of measures which can include

- contributions to and from projects,
- use of Wessex Water investment in infrastructure in certain areas to be used as match funding to draw in contributions from other sources
- development of collaborative models
- involvement in the co-creation, funding, support, and delivery of initial investigations,
- delivery of small-scale amendments to large scale strategic interventions and strategic flood alleviation schemes.

Partnership working will continue to establish more integrate working with opportunities for collaboration to be explored as standard when taking options forward in partnership priority areas.

Figure 45: Case Study: Shrewton WRC groundwater induced overflow

The storm overflow at Shrewton WRC discharges seasonally when the groundwater table (grey line) reaches an elevated level. The number (blue bars) and hours of discharge (orange line) are linked to the groundwater level. Groundwater enters the public and private sewer system in the village, often through gaps in the system caused by tree roots or at the pipe joints.



We have spent hundreds of thousands of pounds sealing pipes and renovating manholes on the public sewer system in Shrewton since 2016. By the end of 2024, nearly a mile of sewers will have been sealed to try and prevent surface water from entering the pipes, however a large amount of groundwater stills comes into the system through privately owned pipework.

Two new reedbeds were built at Shrewton WRC in 2022. The photo on the right shows the freshly planted reedbeds. The storm water arriving at the centre is screened as normal before being settled in a storage tank, ahead of flowing into the reed beds.

Photos of samples taken from different stages through Shrewton WRC are shown below, with crude sewage samples on the left with river samples upstream and downstream of the discharge point on the right.

More details can be found at: [Shrewton Water Recycling Centre (wessexwater.co.uk)]

Surface water management options could include a combination of traditional, nature-based or property flood alleviation measures including surface water source control or pathway measures, separating flows and mitigation.

6.8 Resilience

A resilience assessment of WRC and pumping stations was undertaken for all level 3 catchments by taking a sample number of sites and extrapolating to the Wessex area.

Wessex Water commissioned Mott MacDonald to conduct the DWMP flood resilience assessments at 125 wastewater sites, including water recycling centre (WRC) sites and sewage pumping station (SPS) sites. The report can be found in Technical appendix D. The project undertook high level flood risk assessments for the sample sites, considering flood risk up to the 1 in 1000-year event and climate change impacts. The flood risk assessments have been used to inform the DWMP and our business plans for what mitigation measures are needed.

The Scope of Work included:

- Phase 1: Flood Risk Mobilisation Stage
  - Data collection and review
  - Gap analysis
  - Workshops with Wessex Water project team and site operators
  - Site visits to identify critical equipment at 49No. sites
  - Definition of way forward for sites where modelled data is available; Total 125No. sites determined to be in scope for assessment.
- Phase 2: Flood Risk Assessment and Mitigation Strategy
  - High level assessment of flooding at each of the 125No. sites
  - Screening assessment based on modelled data available
  - Prepare Site Summary Sheets
  - Attend intermediate review meetings
  - Indicative site specific flood risk assessment including
  - Fluvial flood risk (1 in 100 year, 1 in 1000 year event, present day and climate change)
  - Tidal flood risk (1 in 200 year, 1 in 1000 year event, present day and climate change)
  - Surface water flood risk (1 in 30 year, 100 year and 1000 year event)
  - Assessment of site operation in time of flood
  - Recommendation for potential options to manage the flood risk for each site, with indicative cost
- Additional topics that were included
- existing procedures and processes in place to manage resilience risks at the sites:
  - power resilience;
  - business resilience and response recovery;
  - communication resilience;

- A review of coastal erosion risks and Coastal Erosion and Shoreline Management Plans

This considers the UK Climate Risk's Independent Assessment (CCRA3)[71] report that we 'must do more' for resilience against climate change.

Figure 46: Case Study: Digital solutions in water (Mott MacDonald)

Wessex Water needed to assess all of their above-ground drainage and wastewater assets for flood risk from rivers, sea, and surface water. Flood resilience solutions and estimates of the costs for implementing them, where required, needed to be developed and produced within six months.

Collecting and analysing information for every asset would normally be a hugely resource-intensive, time-consuming, and expensive task. Mott MacDonald worked collaboratively with Wessex Water, developed and implemented lean processes and digital innovations, including a suite of digital tools, such as a bespoke app for site survey and data collection, and a high level of automation toolkits for data screening and processing, option assessment and solution development. 125 asset sites were chosen as a representative sample of the asset base, which were surveyed using tablets with a bespoke data collection app to identify the location of critical elements and threshold values, including incoming power sources, control panels, chemical storage areas, communications equipment, and access roads.

Bespoke apps, innovative digital tools and robust processes were developed and used to streamline data collection, data processing, analysis, and assessment of flood risks from multiple sources. Each asset was assessed for different potential flood event levels/return periods and scored according to the level of risk for each critical asset. A cost estimated options for making the at-risk assets more resilient. An additional 47 asset sites were added to the programme as part of Wessex Water's review of Shoreline Management Plans. These assets had been surveyed by Wessex Water professionals, but the outputs needed to be mapped and reported in the same manner as Mott MacDonald led 125 sites.

The technology, digital innovations, and open architecture design of the tools allowed easy integration of information from multiple sources with different formats. This, combined with strong leadership, vigorous planning, collaboration, a first-time right mentality, and a seamless execution of the entire process by all parties involved, enabled a huge programme of work to be delivered within a tight time frame and budget whilst managing resources constraints during the COVID lockdown.

Wessex Water now has a clear idea of the flood risk exposure for all 6,000 of its assets and knows which are most at risk and where further investment is required to make these more resilient, as well as the indicative cost of these measures, as required by the Drainage Wastewater Management Programme (DWMP) which will help inform Wessex Water's Business Plan.

7. Strategic environmental assessment

7.1 Environmental report introduction

This section describes our environmental report that was undertaken for the draft DWMP. The environmental report covers both the Strategic Environmental Assessment (SEA) and the Habitats Regulations Assessment (HRA). The DWMP environmental report is included in the DWMP technical appendix C and can be downloaded from our website. The following section is a summary of the technical appendix C and its appendices.

For this first cycle DWMP, it was not a requirement to undertake the SEA or HRA, as this first cycle DWMP is non-statutory. However, it is anticipated that next year the plan will become a statutory requirement and it is considered best practice to consider these future requirements, so we have produced this environmental report for this first draft DWMP cycle.

We appointed a specialist environmental consultant, Wood Group UK Limited, to undertake the DWMP environment appraisal and report for us. Wood has been in pre-consultation with the Environment Agency, Historic England and Natural England, on Wessex Water's behalf.

This included a Scoping consultation process, in which we obtained detailed and useful feedback from the EA, Historic England and Natural England. This pointed out that our environmental considerations needed more reference to nutrient neutrality, which is currently slowing down and even preventing development in the Wessex area.

We will use the feedback and update the environmental report and where necessary our final DWMP.

7.2 Environmental report summary

This section is a summary of the environmental requirements of the DWMP described in the DWMP environmental report. More details are provided in technical appendix C.

7.2.1 What is Strategic Environmental Assessment (SEA)

SEA became a statutory requirement following the adoption of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. In England, this was transposed into legislation on 20th July 2004 as Statutory Instrument 2004 No.1633 – The Environmental Assessment of Plans and Programmes Regulations 2004.

SEA is a systematic decision support process, aiming to ensure that the likely significant environmental effects of plans and programmes are identified, described to avoid, manage, or mitigate any significant adverse effects and to enhance any beneficial effects. In this context, the purpose of SEA is to encourage relevant plan authors to integrate environmental considerations into the development of any plan or programme. Generally, a SEA is therefore conducted before an Environmental Impact Assessment (EIA) is undertaken.
In this context, the purpose of the SEA of the draft DWMP is to:

- identify the potentially significant environmental effects of the draft DWMP in terms of the measures being considered by Wessex Water to manage drainage and wastewater conditions.

- help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the draft DWMP wherever possible.
- give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the draft DWMP may have on them, their communities, and their interests, and encourage them to make responses and suggest improvements to the draft DWMP; and
- inform Wessex Water's selection of measures to be taken forward into the final DWMP.

SEA comprises five key stages:

- Stage A: Scoping;
- Stage B: Develop and Refine Alternatives and Assess Effects;
- Stage C: Prepare Environmental Report;
- Stage D: Consult on the Draft Plan and Environmental Report and Prepare the Post Adoption (SEA) Statement; and
- Stage E: Monitor Environmental Effects.

Stage A of the SEA of the draft DWMP led to the production of the Scoping Report. The scoping stage itself comprised five tasks that are listed below::

i. Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').
ii. Collation and analysis of baseline information.
iii. Identification of key sustainability issues.
iv. Development of an assessment framework.
v. Consultation on the scope of the SEA

The Scoping Report set out the proposed framework for assessing the likely significant environmental effects of the draft DWMP. It was issued for a 5-week consultation to the SEA scoping consultation bodies between 26th April and 3rd June 2022. Responses are in an appendix to the environment report.

Following consultation and amendment, the framework has been used for assessing the effects (including cumulative effects) of the selected interventions contained in the draft DWMP (Stage B). These assessments are presented in this Environmental Report (Stage C). Wessex Water will publish the draft DWMP and accompanying documents (including the Environmental Report) for consultation (Stage D). Following consultation, Wessex Water will prepare a Statement of Response to the representations received during the consultation period. Wessex Water will amend the draft DWMP as appropriate considering the responses and issue a final DWMP. In conjunction with publishing the final DWMP, Wessex Water will also issue a Post Adoption Statement. This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final DWMP. The SEA requires monitoring of any resulting environmental effects of the DWMP (Stage E).

7.2.2 What are the Key Environmental, Social and Economic Issues for the DWMP

As part of the SEA process, a review has been undertaken to identify the key economic, social and environmental issues which are relevant to the assessment of the draft DWMP. The topic areas cover all those identified in the SEA regulations and have been identified

from a variety of sources, including a review of baseline data and other relevant plans and programmes. A summary of the issues identified as being most relevant to the assessment of the draft DWMP are shown in Table 4.

Table 4: Key environmental, social and economic issues relevant to the DWMP

Topic Area	Key Environmental Issues Relevant to the Draft DWMP
Biodiversity	• The need to protect, restore and enhance sites designated for nature conservation. • The need to continue to increase and improve the condition of priority habitats and habitats of priority species and restore populations of these species and other specially protected species. • The need to avoid activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors. • The need to control the spread of Invasive Non-Native Species (INNS). • The need to recognise the importance of allowing wildlife to adapt to climate change. • The need to protect, restore and enhance natural capital and ecosystem services.
Geology Land use and Soils	• The need to influence how land is managed, promoting sustainable patterns of land use including the use of previously developed land. • The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). • The need to protect and avoid damage to geodiversity and conserve and enhance sites designated for geological interest. • The need to manage impacts on soil resources, including control of pollution and remediation of contaminated land, and minimise the loss of the best and most versatile agricultural land.
Water	• The need to recover, maintain and further improve the quality of the rivers, estuarine and coastal waters taking into account WFD/RBMP objectives. • The need to maintain and further improve the quantity and quality of groundwater resources taking into account WFD/RBMP objectives. • The need to ensure the continued risk of flooding is mitigated effectively. • The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface water and groundwaters. • The need to ensure that people understand the value of water.
Air Quality	• The need to minimise emissions of pollutant gases and particulates to comply with air quality standards. • The need to enhance air quality.
Climate Change	• The need to reduce greenhouse gas emissions arising from implementation of the DWMP. • The need to take into account, and where possible adapt to, the current and future effects of climate change. • The need to increase environmental resilience to the effects of climate change.
Human Environment	• The need to ensure drainage and wastewater services remain affordable, especially for deprived or vulnerable communities.

	• The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture. • The need to ensure a balance between the built and natural environment that will help to provide opportunities for local residents and tourists for access to green infrastructure and the natural and historic environment, as well as protecting and enhancing recreational resources. • The need to ensure that the DWMP measures do not adversely affect the health and well-being of any member of the community. • The need to ensure that the DWMP measures do not have an adverse economic impact and that benefits are maximised. • The need to ensure that sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy.
Material Assets and Resource Use	• The need to minimise the demand for water resources through water efficiency measures (including metering) and the reduction of leakage in the region. • The need to address groundwater infiltration into the sewerage system. • The need to reduce energy consumption. • The need to ensure the sustainable and efficient use of resources such as construction materials. • The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of waste on the environment and communities.
Cultural Heritage	• The need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas of archaeological and cultural heritage interest, particularly those which are sensitive to the water environment. • The need to conserve and enhance World Heritage Sites within the Wessex Water area. • The need to avoid damage to important wetland areas with potential for paleoenvironmental deposits, for example within the Avon Valley National Character Areas. • The need to avoid harm to or loss of the significance of heritage assets where possible, and to minimise and then mitigate harm, while maximising positive impacts and enhancements.
Landscape	• The need to conserve and enhance landscape and seascape character, taking into account the effects of climate change and recommendations for managing change in the profile of relevant National Character Areas. • The need to ensure the special qualities of designated landscapes including Exmoor National Park and AONBs in the Wessex Water sewerage services area are protected. • The need to avoid or, if not possible, minimise any adverse impacts upon landscape and seascape that may result from measures in the DWMP.

The key issues listed in Table 4 above have informed the proposed assessment framework that has been used to assess the effects of the draft DWMP (Table 5).

7.2.3 How the effects of the DWMP have been assessed

A framework was developed to assess the economic, social and environmental effects of the DWMP. This was then amended to reflect scoping consultation comments. The revised framework sets out 9 assessment objectives relating to the key issues identified in Table 4.

For each objective, guide questions are provided. The assessment framework that has been used to assess the DWMP measures is shown in Table 5.

Table 5: SEA Assessment framework for the draft DWMP

Topic	SEA Objective
Biodiversity, Flora and Fauna	1. To protect, restore and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhanced ecosystem resilience, habitat connectivity and creation and contribute to the sustainable management of natural habitats and ecosystems.
Soils, Land Use and Geology	2. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.
Water – Quantity and Quality	3. To protect and enhance the quality and quantity of surface and groundwater resources.
Water – Flood Risk	4. To minimise, reduce or manage the risk and effects of flooding.
Air	5. To minimise emissions of pollutant gases and particulates and enhance air quality.
Climatic Factors	6. To reduce embodied and operational greenhouse gas emissions. 7. To adapt and improve resilience to the threats of climate change.
Population growth	8. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.
Human Health	9. To protect and enhance human health and well-being.
Material Assets – Water Resources	10. To promote and enhance the sustainable and efficient use of resilient water resources.
Material Assets – Waste and Resource Use	11. To minimise waste, promote resource efficiency and move towards a circular economy.
Cultural Heritage	12. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.
Landscape	13. To conserve, protect and enhance landscape and townscape character and visual amenity.

The performance of the proposed interventions within the draft DWMP and any reasonable alternatives have been assessed against these SEA objectives to identify, describe and evaluate the likely positive and negative effects and ensure that each intervention is assessed in a robust and consistent manner. The SEA has considered the effects of the draft DWMP in a staged process, complementary to the development of the plans, and reflecting the decision-making requirements, as follows:

- High-level interventions categorised by management areas, covering 17 option types, ranging from ‘domestic and business customer education’ to ‘increased WwTW treatment capacity’.
- Preferred programme of interventions per identified drainage area, combining generic and location specific options with a particular focus on the complex and strategic locations. This has ensured that the effects of the draft Plan have been identified, described and evaluated.

- Alternative Plan assessments: where alternative plans or plan pathways are identified for the draft DWMPs, the cumulative effects will be identified, described and evaluated for consideration along with the preferred plan.

The DWMP interventions have been assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Specific guidance has been developed for what constitutes either a neutral, minor, moderate or significant positive or negative effect for each of the SEA objectives. These 'definitions of significance' have helped to ensure a consistent approach to interpreting the significance of effects and will help the reader understand the decisions made by the assessor. Assessment matrices have been completed to capture the assessment of each measure in a consistent manner.

The SEA Regulation and regulations require that the cumulative effects of a plan or programme are taken into account. This includes the cumulative effects of the draft DWMP in combination with other plans and programmes and the cumulative effects of individual measures within the draft DWMP, which in combination represent the proposed approach.

The results of the assessment have informed the selection of drainage and wastewater management options taken forward in this final DWMP.

7.2.4 Summary of Effects

High-level intervention effects

Generic assessments of each of the 17 option types (Section **Error! Reference source not found.**) have been undertaken with commentary on the likely effects of each option type. As the assessments are generic and relate to the broad option types rather detailed schemes, where a potential effect is identified, there are a range of uncertainties identified, owing to the fact that for the generic options the scale and location of the option, proximity to sensitive receptors and sensitivity of potential receptors, are not specified. As such no likely significant positive or negative effects have been identified in the generic assessments of the option types, however, in general the probability of adverse effects increases for those option types which are likely to include or relate to physical development than those which do not.

For example, the generic assessments of the option types within the Customer Side Management and Indirect Measures management areas (which largely relate to behavioural or policy changes) in general identify less potential for negative effects than to those option types within the Combined and Foul Sewer Systems, Surface Water Management, and Wastewater Treatment management areas (which largely relate to physical development and assets).

Preferred programme of interventions

Assessment of 20 level 3 draft drainage strategies organised by the four L2 management areas (Bristol Avon, Dorset, Hampshire Avon, and Somerset) was undertaken. But it transpired, that the measures had or will be implemented by 2025, so we have removed these. The approach did show that the SEA and HRA process was successful.

Infiltration Reduction Plans

The DWMP includes a series of commitments outlined in Infiltration Reduction Plans. These are specific operational plans but are related to the implementation of the short-term to long-term measures in the level 3 drainage and wastewater strategies. They include a series of measures such as investigation of sewer capacity, monitoring and infiltration sealing. It is noted that they are commitments within the DWMP and have therefore been assessed. The assessment has been informed by the generic, high level interventions assessment outlined above. In line with the high-level assessments, no likely significant positive or negative effects have been assessed. Where a potential effect is identified, there are a range of uncertainties identified, owing to the fact that these are largely dependent on the scale and location of the option, proximity to sensitive receptors and sensitivity of potential receptors

Cumulative Effects

Schedule 2 (6) of the SEA regulations requires that the cumulative effects of a plan or programme are taken into account. This includes the cumulative effects of the DWMP in combination with other plans and programmes and the cumulative effects of individual measures within the DWMP, which in combination represent the proposed approach.

The extent to which the DWMP options can act cumulatively is dependent on a number of variables. These include the nature, location and timing of option implementation, the number that are either within a level 3 drainage area, a level 2 catchment or across the network area, and the interaction of these options with other plans or programmes. The effects are also dependent on the sensitivity of receptors, their extent and the receiving environment to the effects of the proposed options whether operating alone, or cumulatively.

Construction activity, unless of significant scale and concentrated in specific localities and occurring concurrently is unlikely to lead to cumulative significant effects on receptors, as it is anticipated that the effects of the options can be managed through the application of the mitigation hierarchy and a range of construction mitigation practices. However, for some of the schemes, as they represent significant engineering works and capital investment, there will be individual and cumulatively significant positive and negative effects in terms of SEA Objectives 6 ‘Greenhouse Gas Emissions’, 8 ‘Economic and Social Wellbeing’ and 11 ‘Waste and resources’.

Operationally, the schemes in the drainage strategies seek to increase the resilience of the water and sewerage network, reduce discharge frequencies, reduce the risk of flooding, reduce nutrient loading on watercourses, address bathing water quality issues, and seek to increase WRC treatment capacity across the Wessex Water area to accommodate future growth in the catchment. Therefore, they should at minimum do no harm to the water environment or communities in which they are located, and preferably make a (significant) contribution to enhancing the quality of each locality, by reducing the adverse effects arising from flooding, poor water quality and nutrient load within rivers.

There may be specific instances where at present, due to uncertainty of specific strategy measures and scheme design or location, the operational effects may be considered uncertain, and potentially negative; however, as proposed schemes are still evolving, there

is further opportunity to complete investigation and refine scheme design as well as consider further assessment.

The HRA concluded that the DWMP (if adopted as proposed) will have no adverse effects on the integrity of any European sites, subject to appropriate consideration of residual uncertainties 'down the line' through the design and planning process and, ultimately, at project level. To ensure this, it is recommended that the final version of the plan includes a direction for potential effects on European sites to be appropriately considered throughout the design and planning stages for each option (and their component schemes).

7.2.5 Consultation

The draft DWMP environmental report was issued for consultation to the SEA consultation bodies (the Environment Agency, Historic England and Natural England) as well as customers' and other stakeholders.

The consultation on the draft DWMP and SEA was held between the 1st July to 1st October 2022. Thank you for your feedback. All the feedback from the consultation has been included in Annex H – Statement of response, with our responses.

Please see Appendix C for the updated Environmental report, which includes the DWMP 'Strategic environment assessment post adoption statement'.

8. Our best value plan

This section describes our approach to developing our best value plan and then sets out what our core best value plans are in each area.

There remains a lot of uncertainty in wastewater planning, and so the following chapter discusses our approach to adaptive planning.

8.1 Developing our best value plan

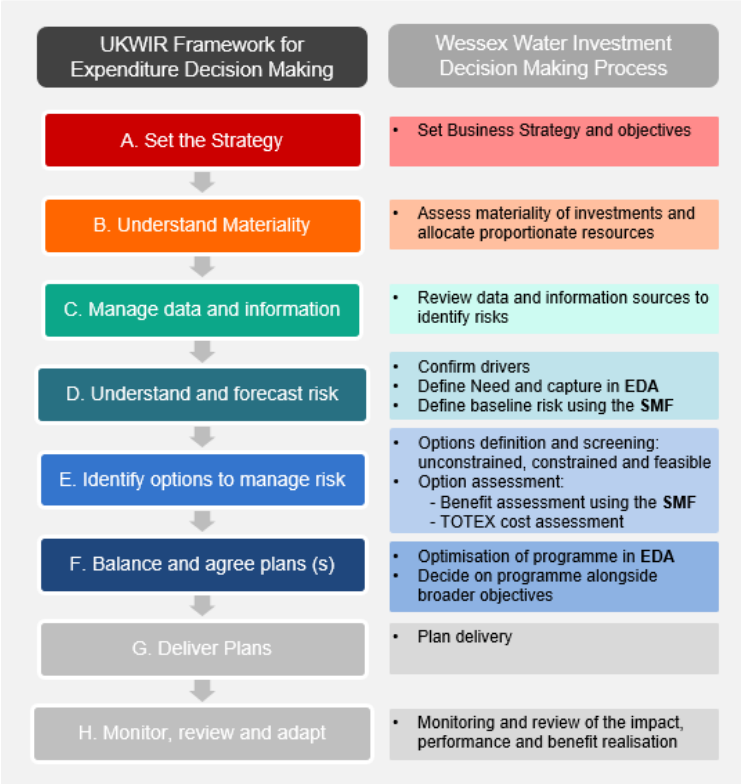
8.1.1 Our approach to developing a best value plan

Wessex Water has developed an integrated and consistent approach to investment planning and processes, aligned to the principles of the UKWIR Framework for Expenditure Decision Making (FEDM).

This involved the development of:

- A decision-support approach which enables objective comparisons of investment options across business areas drawing on common valuation criteria to support investment decision making. The defined approach utilises a capitals-based Service Measure Framework (SMF) consistent with best practice across the industry.
- A decision-support and optimisation tool - Enterprise Decision Analytics (EDA); which will support Wessex Water in taking a data-driven approach to, and enable the optimisation of, asset investment planning and expenditure.

Figure 47: Aligning investment decision making with the UKWIR framework



The investment planning processes using the EDA Tool and the SMF across the business enables a consistent and auditable approach to investment planning and decision making. By making improved decisions, this will lead to better outcomes for Wessex Water, its customers and the environment.

The guidance around the DWMP framework recognises the translation of the DWMP into the business plan, where it is considered within the context of other investment programmes and constraints (e.g. affordability), may require elements of the DWMP to be re-focused and re-prioritised to deliver outcomes within the broader business, customer and stakeholder constraints. The overarching alignment of the DWMP process within the context of the development of the Wessex Water business plan is outlined in the following diagram. An iterative process is proposed, whereby interim Best Value Portfolios (e.g. WINEP) are developed and subsequently optimised within the wider business plan and updated to reflect broader organisation drivers and constraints

Figure 48: Alignment of best value DWMP and our business plan

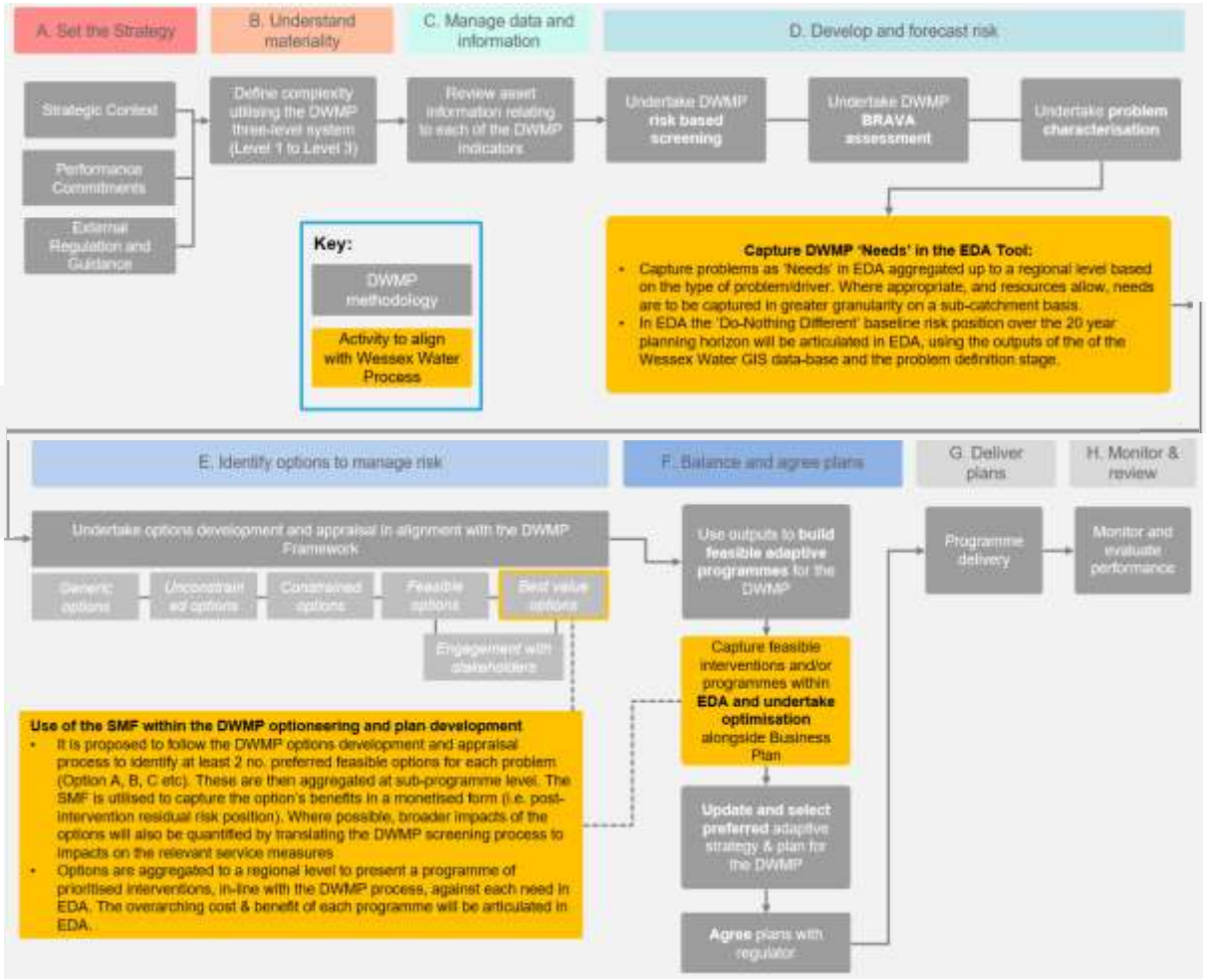
Within the DWMP process, to ensure alignment between the DWMP framework and our internal investment decision-making process, the process outlined in the flow-chart (Figure 49) is followed at sub-programme level. It involves the use of the Wessex Water EDA and SMF to support the DWMP optioneering and programme optimisation across the broader business

During the optioneering process we considered the following criteria for screening options during the optioneering process:

- Stakeholder and customer acceptability
- Technical feasibility
- Ability to achieve desired outcomes / anticipated benefits of implementation
- Environmental impacts*
- Societal impacts*
- Resilience
- Planning and regulatory constraints
- Timing for delivery
- Costs & benefits*.

The asterix in the above list shows which elements use the SMF tools for the benefits.

Figure 49: Alignment of best value DWMP and our business plan



The DWMP framework highlights existing guidance available for the monetisation of benefits related to storm overflows through the SOAF Water UK (2017)1 guidance. The technical framework suggests 'this can and should be more widely adopted' for all feasible options. This approach involves a detailed benefits assessment which looks to qualitatively and then quantitively capture the benefits prior to monetisation. It is recommended Wessex Water follow this process, utilising the SMF to support in final monetisation of benefits. These outputs will be captured within EDA.

A review of the recommended valuation approach utilised in the SOAF guidance is described on the following page in Table 7. Broader benefits beyond the service measures of the SMF can be captured through the 'Avoidable Cost' service measure which allows for a specific input of annual benefits (£s) by the user and is intended to be utilised for more detailed costs or benefits

An example where we used multiple benefits to establish the best value option is our storm overflow programme. Where we undertook detailed optioneering, the following 3 options were found for the storm overflow optioneering which used our hydraulic computer models to evaluate:

- How much attenuation would be needed to improve performance (m^3 of underground storage)
- How much separation would be needed to improve performance (% of modelled impermeable area removed; were modelled)
- A hybrid solutions evaluating 10%, 25% or 50% of separation and providing a slightly smaller attenuation tank.

Where other options were feasible then they were modelled and compared as well.

The estimated capex, opex and monetised SMF benefits (embodied carbon, operational and other SMF benefits – see Figure 51), were used to compare the 30 year cost for each solution. The option with the best value was selected.

EDA contains a profile of costs and the associated benefits of environmental and social impacts of the intervention, over an appropriate timespan for each sub-programme.

8.1.2 Programme appraisal

The DWMP has identified a significant investment requirement that is needed to meet the expected levels of service which will need to be delivered over many decades. The investment programme therefore needs prioritisation over time along with a further step-up in investment to address storm overflows and WRC programmes.

As mentioned, we have corporate systems (EDA) and other decision support tools (DST) to prioritise and optimise investment, using the principles of the expenditure decision-making framework (UKWIR report 14/RG/05/40) where appropriate. The DSTs can be used to create different programmes considering capital costs, operational costs, carbon costs and other capital costs (social, natural etc) to prioritise no-regret solutions.

The risks and benefits are derived from our Service Measure Framework (SMF). The SMF is a tool that assigns monetised ‘value’ to the service risks and the benefits on the investment would bring.

The timing of schemes delivery can be affected by policy (e.g., storm overflows) so some schemes are entered with a ‘must construct by’ date, which gives this priority. Other more discretionary schemes (e.g., hydraulic flooding programme) will therefore be later in the programme, as budgets are constrained within each 5-year cycle.

Our core plan is presented which achieves the expected Defra policy to reduce storm overflow discharges to an operating frequency of less than 10 discharges per year by 2050 using best value solutions (grey or green) and no harm in sensitive environments.

The core plan contains investment needs that are ‘must do’s’ and need to be included in the PR24 plan, such as WINEP WRC and storm overflow improvements. These will take priority over other discretionary programmes, such as hydraulic flooding and sewer rehabilitation.

Analysis of different investment options, such as considering if the options are only required due to prospective development or potential climate change implications have been considered. In these cases, adaptive pathways may allow some minor improvements in the short to medium term, deferring major investment until it is needed.

We need to reconcile the balance between affordable bills and current and future needs across the entire business, taking into account our customers’ views on acceptance and willingness to pay. To do this requires a business plan, not just a DWMP.

The DWMP has provided the evidence that will lead to a larger investment programme than historical investment on sewerage infrastructure. As well as the continued improvements of our WRCs to improve water quality of the continuous discharges, to meet the new nutriant neutrality requirements, and we are expecting a significant investment requirement to improve our intermittent discharges storm overflow performance.

Our approach to programme appraisal for each planning objective is provided in this section of the report.

8.1.3 Decision support tools

We need decision support tools to analyse the huge number of the costs and benefits of all the different solutions (grey or green). For example, there are four thousand hydraulic flooding needs that we have identified as being significant.

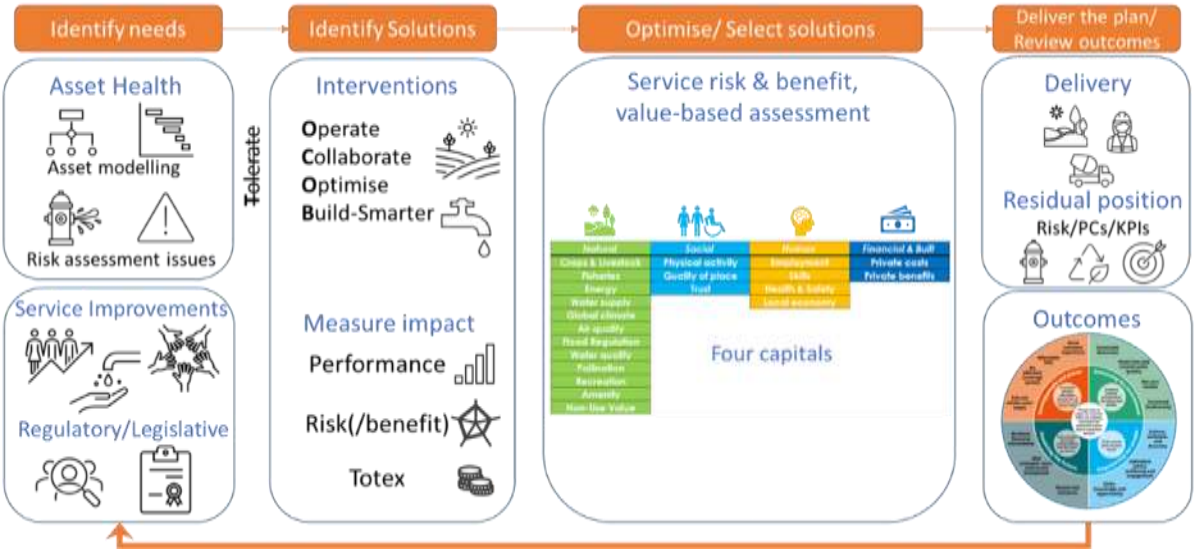
Our corporate DST for investment planning is the Enterprise Decision Analytics (EDA) from Arcadis. EDA was discussed in Section 8.1.1 summarised in the following section. The DWMP investment needs and benefit values have been entered into EDA at a regional (Level 1) level of detail for each sub-programme of work. This will allow comparison against other areas of the company at a high level of granularity.

For our draft DWMP we have also used another DST, Optimatics, to allow us to look at the flooding and storm overflow sub-programmes at a more granular level of detail, as described below.

<u>Arcadis EDA</u>

The following figure presents an overview of our new asset and investment management strategy which is being implemented utilising the EDA (Enterprise Decision Analytics) decision support tool to enable optimal, data-driven decisions that balance complex factors for an optimal asset investment plan.

Figure 50: Investment process



This enables a consistent approach across the business for how we plan, manage and make-decisions on our investments, using service-based and value-based decision making. It uses a forward-looking approach to project the change in risk, to inform when the risk should be mitigated, and uses a hierarchy of interventions to identify appropriate solutions.

We utilised the outputs of the DWMP problem definition stage (including the risk-based screening, BRAVA assessment and supporting modelling) to capture the baseline (pre-intervention) risk position, over the 25 year planning horizon, in the form of aggregated 'Needs' in the Wessex Water EDA Tool. Figure 51 maps the key base metrics from the risk-based screening to the service measures to illustrate elements that can be translated across to the SMF.

The risk reduction and benefits added of each solution is quantified and assigned value using the Service Measure Framework (SMF). The SMF monetises risk and benefits using four capitals: Natural, Social, Human and Financial/Built.

When an optimisation is run in EDA, solutions are evaluated to determine the best-value options and associated optimal timing for implementation, that also effectively contribute to the programme-level risk reduction and performance targets required, within given financial constraints.

We have included the construction costs, carbon costs and the monetised benefits from our Service Measure Framework (SMF). The SMF is a tool that assigns monetised 'value' to the service risks and the benefits that the investment would bring. Benefits include natural capital, social capital, human capital and financial/built capital.

Service measures for the wastewater business include:

- WRC compliance – numeric
- WRC compliance – descriptive

- WRC compliance – numeric flow
- Pollutions
- Land use
- River quality
- Bathing water
- Storm overflow compliance
- Internal sewer flooding (all causes)
- External sewer flooding (all causes)
- Blockages
- Sewer maintenance and repairs
- Health and safety

For our final DWMP and our PR24 business plan we are using this new corporate investment management system to evaluate best value at either asset or programme level, as most appropriate.

Figure 51: Alignment of needs and service measures

Risk-based assessment criteria	Applicable Service Measures	Applicable impact categories	Unit of Measure
Catchment characterisation score	N/A		
Intermittent discharge - impacts on bathing or shellfish waters	Bathing water	Shellfish water deterioration in classification	Nr of impacts
		Bathing water deterioration in classification (excellent to good)	Nr of impacts
		Bathing water deterioration in classification (good to less than good)	Nr of impacts
		Blue Flag Beach	Nr of impacts
Continuous or intermittent discharge (impacting on sensitive receiving waters)	Intermittent discharge compliance	Non-compliance with consent conditions	Nr of failures
SOAF investigations	Capture environmental impacts through broader service measures identified; e.g. pollution incidents, bathing water and river quality		
Capacity assessment framework (CAF)	Capture through the resulting service failure or impacts; e.g. pollution incidents, bathing water and river quality etc.		
Internal sewer flooding	Internal sewer flooding	Internal flooding of residential basement / cellar	Nr of properties
		Internal flooding of residential property	Nr of properties
		Internal flooding of social infrastructure (e.g. schools, hospitals)	Nr of properties
		Internal flooding of commercial and industrial properties (e.g. businesses and industry)	Nr of properties
External sewer flooding	External sewer flooding	External flooding within residential property boundary (e.g. garden)	Nr of properties
		External flooding of social infrastructure (e.g. schools, hospitals)	Nr of properties
		External flooding of commercial and industrial properties (e.g. businesses and industry)	Nr of properties
Pollution incidents (CAT 1-3)	Pollution incidents	Category 1 pollution incident - Major incident	Nr of incidents
		Category 2 pollution incident - Significant impact	Nr of incidents
		Category 3 pollution incident - Minor impact	Nr of incidents
		Category 4 pollution incident - No impact	Nr of incidents
WwTW quality & DWF compliance	WRC compliance numeric effluent & flow	Internal threshold failure or Near Miss	Nr of failures
		PPC Compliance failure	Nr of failures
		Compliance failure (LUT consent standard exceedance)	Nr of failures
		Compliance failure (Upper Tier compliance failure (sanitary determinants)	Nr of failures
		Compliance failure (UV disinfection)	Nr of failures
		Sample failure (Nutrients / Hazardous pollutants)	Nr of failures
	WRC compliance - numeric flow	Failing Dry Weather Flow (DWF)	Nr of failures
		Failing Full Flow to Treatment (FFT) (intermittent)	Nr of failures
		Failing Full Flow to Treatment (FFT) (hydraulic incapacity)	Nr of failures
		Failure to record/report flow/sample correctly	Nr of failures
Risks from inter-dependencies between RMA systems	Capture through the resulting service failure or impacts; e.g. pollution incidents, bathing water and river quality etc.		
Planned residential developments	Capture through the resulting service failure or impacts; e.g. pollution incidents, bathing water and river quality etc.		
WINEP investigations	River quality	Length of river affected (WINEP)	Length of river improved
		Length of river affected (Non-WINEP)	Length of river improved
	It is suggested Wessex Water consider the expansion of this service measure to capture the relevant status of the improvement to watercourse quality, i.e. bad to poor, poor to moderate, moderate to good. This may allow for greater granularity to differentiate between interventions during the optioneering and programme optimisation phases.		
Sewer collapses & blockages	Reporting only: Sewer collapse and blockages		

Optimatics DST

For the draft DWMP we used the Optimatics decision support tool (DST) to help us prioritise the DWMP hydraulic flooding needs in a detailed level of granularity. Like EDA, this tool allows us to view different benefits (carbon, natural capital etc) against the costs of the solutions.

The values (cost, carbon, capitals etc.) of all the hydraulic flooding options for both the grey and green solutions were imported into Optimatics. The data was then analysed with hundreds of different combinations assessed to achieve the desired outcomes (e.g., halving hydraulic flood risk by 2050).

Figure 52 below shows an output from Optimatics, with each dot representing a different combination of the solutions to meet the criteria set. Different plans have significant variation in cost and benefits and residual risks.

Figure 52: Optimatics output showing different optimised flooding programmes

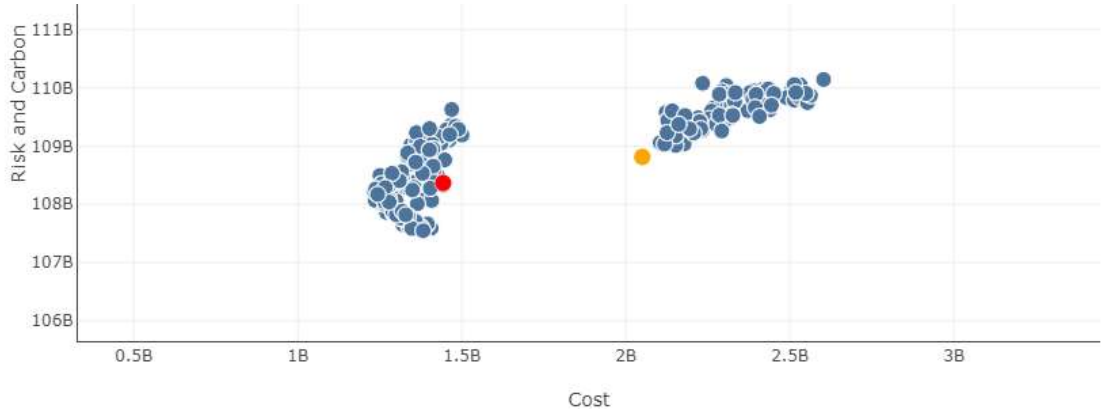


Figure 54 shows a decision support tool of constrained investment requirement per 5-year AMP cycle (8 to 13).

Figure 53 shows an example of an optimised long-term programme of prioritised flooding schemes that could be addressed under the hydraulic flooding adaptive pathway (see section 9.6).

Figure 53: Prioritised flooding schemes that have been appraised

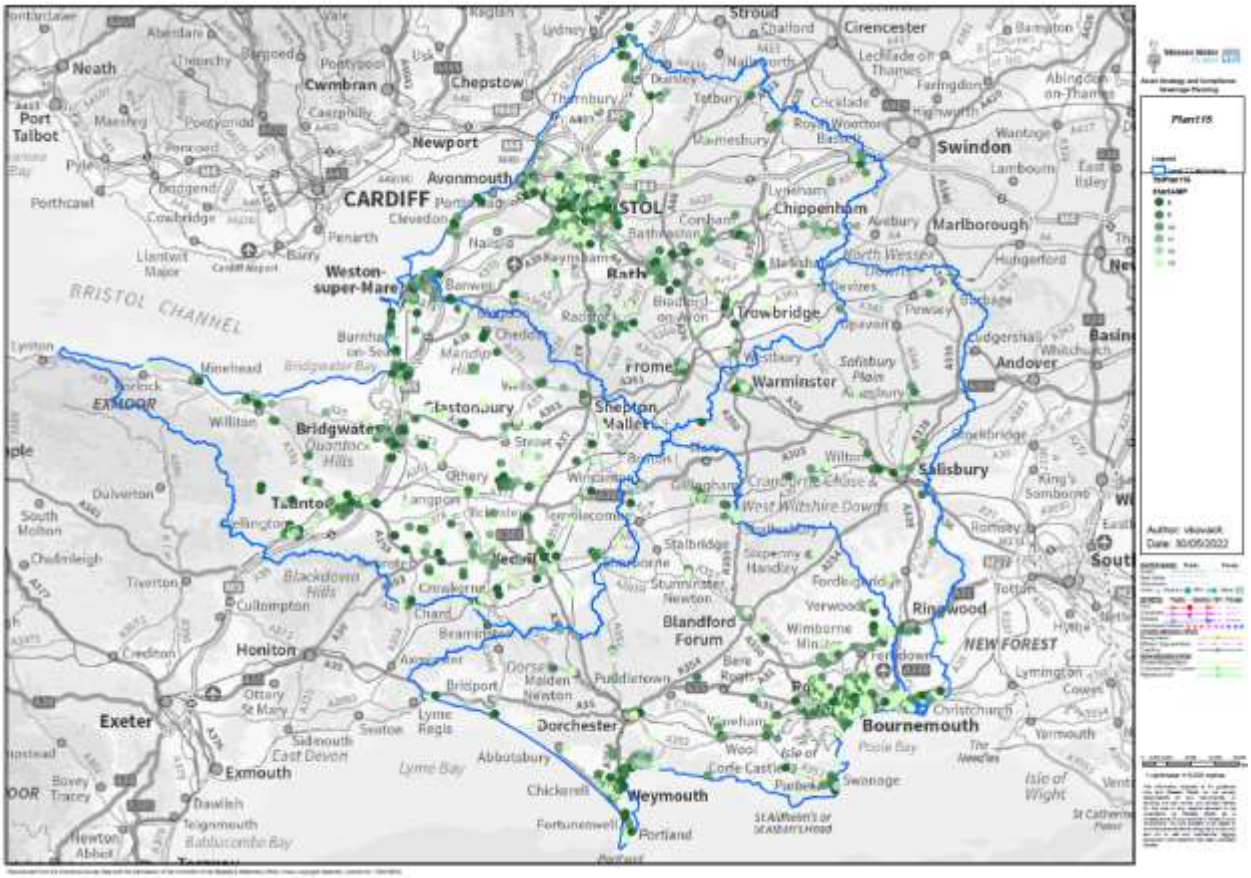
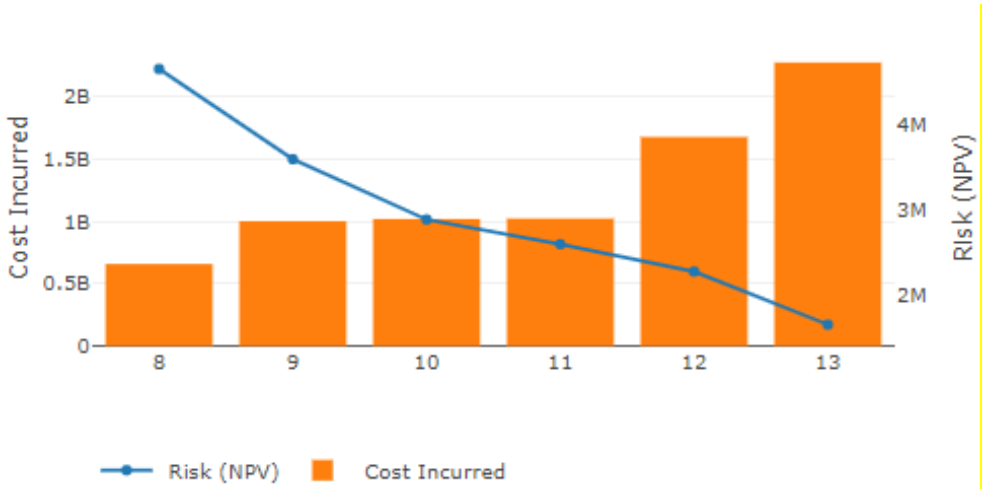


Figure 54: DST example of constrained investment requirement per 5-year cycle (AMP8 to AMP13) – note this is an example and not our plan.



8.1.4 What does base buy

Base expenditure is the funding water companies have historically spent on undertaking their day to day activities to maintain and operate our assets. Our DWMP assumes that we will continue with the same level of base spend, plus any operational budgets associated with the enhancement programme, so that those new or improved assets can also be maintained and operated going forward.

Base expenditure includes activities such as:

- maintain and operate our water recycle centres so they treat the sewage to the correct standard
- maintain and operate our sewers and pumping stations
- jetting to proactively clean sewers to reduce blockages
- proactive sewer rehabilitation, to target investment to prevent collapses
- reactive expenditure, for example dealing with 13,000 sewerage incidents (e.g. blockage clearance) per year
- Proactive sewer sealing to reduce the amount of groundwater entering our sewers and manholes

If no base expenditure, the number of incidents would increase exponentially, for example external flooding incidents would increase from 185 incidents per month to over 50,000 per month by 2030.

We want a step change in the service we provide, so are including enhancement funding in this DWMP which is in addition to our current base. Our draft plan mentioned base expenditure in the following areas, where we want a step change:

- Escape of sewage prevention, including pollution prevention. This includes a large programme of sewer monitoring so we have smart sewers. See section 8.5.
- Sewer rehabilitation. See section 8.8.
- Sewer sealing to prevent groundwater inundating sewers. See section 8.9.

We have expanded those sections to explain the implications of not spending base. Enhanced expenditure is investment to make a step change in our performance, for example the performance of a storm overflow to achieve new government obligations. Enhanced expenditure is normally associated with the Water Industry Environmental Programme (WINEP) which is a list of schemes that are required to improve the water quality of waterbodies or the improve our environment. The improvement needs listed on the WINEP are agreed between water companies and the Environment Agency, and the funding allocated by Ofwat.

8.1.5 Nature based solutions

We want to deliver more nature based solutions, for example keeping rain water where it lands rather than draining into sewers, storing flood water in wetlands so it reduces impact of flooding and improves water quality and biodiversity, swales and ditches for road drainage, replacing concrete with grass , trees, and ponds. We have included more focus on nature based solutions and where options are best value or best cost benefit ratio they have been included in the final plan.

We proposed both a catchment and nature based approach to meet nutrient neutrality requirements as part of our advanced water industry environment programme (A-WINEP) submission. This was not accepted as the legislation requires improvements at specific works, to stringent permits not achievable through nature based solutions. The quantum of WRC improvements required in AMP8 has meant that many of our nature-based solutions – typically more appropriate for reduced levels of treatment and at small, rural WRCs – are being deferred for delivery in AMP9

We have also tried to add wetlands onto the WINEP to address groundwater inundated sewers that cause storm overflows to discharge the clean water back into the environment. The decision of whether this is an acceptable way of dealing with groundwater inundated overflows is being decided by the government. We have an adaptive pathway for the implications that the nature based solution is not accepted.

The final options that were put forward as part of the storm overflow improvement programme identified a hybrid of options to deliver the required outcomes. A few improvement scheme by 2030 have been selected the separation solution (green nature based). We have also found that best value solutions can be a hybrid solution - a combination of attenuation tank to store the majority of the excess water, but carry out separation opportunities, using nature based solution where beneficial, as well.

We will continue to work closely with councils to ensure developers construct sustainable drainage solutions, preferable nature based. We have been doing this for decades, and have an example of partnership working in Marrisal Road, Bristol, that reduced the flood risk and was delivered more efficiently by working with partners.

8.1.6 Partnership working

Owing to the integrated nature of drainage and wastewater infrastructure with other components of flood risk management, our final DWMP fully supports partnership working given that it is essential in helping meet the outcomes for the PR24 Business Plan.
As part of our Final DWMP we are proposing a step change in the level of investment towards partnership schemes. This supports the ambitions of OFWAT and the Environment Agency detailed in their 'Joint approach for how water companies should consider flood and coastal resilience in the context of their statutory roles and duties'.

Further engagement with stakeholders has been progressed between the draft and final DWMP to get greater detail and clarity of schemes and opportunities that are likely to materialise or progress during the AMP8 Business planning period and beyond.

This engagement has taken the form of:

- ongoing updates to multi-stakeholder briefings from across the Wessex Area and updates presented to catchment partnership meetings with time for Q&A (to update Level 1 and Level 2 and 2b stakeholders)
- focused discussions about specific Level 3 catchments at either regular established partnership meetings or specific meetings to discuss particular L3 catchments.
- meetings with a selection of community groups and representatives.

Partnership projects that form part of the submission for the Final DWMP will provide a vast array of multiple benefits. The key drivers for the work are being progressed by two main outcomes of (i) flood risk and (ii) water quality improvements. It is important that the partnership projects demonstrate benefits to drainage and wastewater assets and infrastructure that are the responsibility of Wessex Water.

Proposed partnership solutions will look at opportunities to consider wider, long-term benefits to communities and the environment, using a systems and catchment-oriented approach to deliver integrated solutions that provide multiple benefit. Alternatively, investment in Wessex Water assets and infrastructure can also be used by stakeholders as match funding for other funding sources to demonstrate requirements for investment in other areas of the catchment to achieve shared outcomes.

Flood Risk Partnership projects

Flood and Coastal Erosion Risk Management (FCERM) partnership opportunities include:

- Projects that align to flood risk management projects that have Flood Defence Grant in Aid funding allocated that are due to be delivered on the Environment Agency's Medium-Term Plan.
- Further development of sewerage and surface water strategies to develop a greater understanding of risks and to identify and develop collaborative schemes delivering multiple benefits. Further project development will be required with LLFAs and stakeholders in a range of locations during AMP 8 and potentially install short term options. Locations for these strategies are still being agreed with stakeholders.

- Opportunities to reduce surface water flood risk and by attenuating flows also can deliver a reduction in the frequency of storm overflows operation. This demonstrates the multiple outcomes that can be achieved through partnership working.

- The DWMP resilience assessment identified projects that provided increased flood resilience to Wessex Water assets. Further work will be done to identify potential alignment of sites identified through this assessment with projects being progressed with the partners. It will also identify any more localised solutions and assessments that are required at the local scale.

Approximately 50 additional areas have been identified by RMAs where future partnership opportunities and development of surface water strategies may materialise during AMP8.

Details of these projects are still under development. Proposals will be scoped with LLFAs / RMAs, contributions and actions agreed to deliver outcomes including increased resilience of the sewer network and improving water quality.

Partnership projects to deliver water quality improvements
Four projects have been developed by three Catchment Partnerships within our area: Bristol Avon, Dorset and Hampshire Avon. They build on work undertaken by the individual partners over many years, often in isolation, to gather data, water quality information, engage local communities and deliver interventions on the ground and in-river.

The projects are focussed on the delivery of environmental outcomes over a ten-year period, typically targeting the achievement of regulatory requirements aligned with the Habitats Regulations, Water Framework Regulations or protection of drinking water sources. Whilst each partnership project covers a different catchment many of the issues and interventions are common. Details of the projects are provided in **Error! Reference source not found.**.

It should be recognised that partnership projects that have also be recognised on the WINEP to deliver water quality are also listed on the DWMP partnership projects table. It must be emphasised that both flood risk and water quality partnership projects recognise their primary drivers but aim to achieve multiple environmental benefits where possible.

8.1.7 Continuous water quality monitoring (CWQM)
The Environment Act includes a new duty on WaSCs to undertake:

- Monitoring quality of water potentially affected by discharges from storm overflows and sewage disposal works

This is referenced in the SODRP as "The Environment Act 2021 requires the water industry to measure the water quality both up and downstream of these assets. This monitoring framework will give clear evidence to the public on whether improvement schemes are achieving the required outcomes, and where further upgrades may be required."

The initial CWQM guidance was published in July 2022 (after our draft DWMP submission), with more detailed technical guidance to be published later that year. In our draft DWMP we assumed the level of investment needs based on the discussions in the build up to the publication of the initial guidance. The detailed technical guidance was published by Defra for consultation in April 2023 which closed 23rd May. The conclusions are unknown for this fDWMP. We included "holding lines" in the WINEP submissions. Our holding lines assumed a significant investment, both capex and even more significantly Opex. See Table 6.

We are awaiting final guidance, which will be published after Defra have considered the outcome of the consultation. No timetable has been set. Under current guidance this will be a significant programme for Wessex Water in AMP8 due to the prioritisation of discharges to chalk streams, eutrophic sensitive areas and sites of nature conservation, and the large numbers of these in the Wessex Water area.

It will require us to install permanent monitoring kiosks on private land, with all the issues of access and health and safety on installing sondes in rivers. Significant uncertainty about how this programme will be implemented remains, for example the distance between outfalls that can be grouped together as 'clusters' is yet to be confirmed; this would mean that in more urban areas monitors aren't need at every discharge point. But, even if this clustering is relaxed from, say 250m to 1km, there are still significant implications as the number of required monitoring sites does not halve.

Our final DWMP submission for CWQM is the same as the draft DWMP.
The scale of this programme within the Wessex region is approximately 5 times that the EA currently undertake nationally. It will require a new delivery model.

Table 6: CWQM indicative costs

CWQM (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Capex	137	168	0	0	0	305
Opex	41	51	51	51	51	245
Totex	178	219	51	51	51	550

The bill impact of the indicative totex costs provided in Table for CWQM is £22 per year for each average household by 2030.

8.2 WRC improvements

Options have been developed to ensure both quality and dry weather flow compliance at our WRCs. We typically use a 20-year design horizon when providing additional capacity, to account for reasonable growth projections without creating excessively oversized assets. This is also the approximate asset age of mechanical and electrical equipment.

For each WRC need the baseline risk position was established. A process review and design was undertaken for any upgrades, to allow a high-level schedule of works to be developed that could be used for costing (capital and operational) and carbon (embodied and operational). This also assisted with benefit valuations.

Each non-compliant WRC for quality discharge parameters is considered of equal weighting under our Environmental Performance Assessment, irrespective of the impact of the non-compliance. As with all things, we take a risk/benefit-based approach about the timing of any investment, and through our programme appraisal we have identified when solutions need to be implemented. For WRCs at risk for both quality and DWF flow compliance the timings for any improvement may be the same or may be many years apart (including beyond 2050). Given their inter-relatedness, however, the solutions are often comparable.

As appropriate, a range of options have been considered for each need. Given net zero targets, with appropriate valuations and weighting of carbon and other service measures, the best value options are being promoted. Although it would be noted that in the vast majority of cases these are also the least cost options.

We regularly update the Environment Agency about our current DWF compliance position. For sites at risk of DWF permit exceedance our typical approach is a cycle of investigating, in-catchment flow monitoring, sewer sealing to reduce/remove infiltration (if any), followed by further investigation/monitoring. We are aware that there is increased focus from the EA on DWF compliance and going forward there sometimes may not be sufficient time do a cycle (or cycles) of investigating/monitoring/sealing before a WRC-based improvement needs to be made. This has been factored into the prioritisation and phasing of the flow compliance schemes.

For larger WRCs there are more opportunities for phased improvements with 5- or 10-year cycles of improvement, however, to return to a small WRC every 5 years with piecemeal upgrades is not cost effective, as well as being disruptive to the local community. Having greater clarity on future improvement needs at WRCs allows us to better plan investment.

Our AMP7 WINEP is our largest environmental programme to date – between 2020 and 2025 we will have made significant upgrades to over 85 of our 398 WRCs, alongside extensive monitoring and investigations to inform subsequent improvements. We support the use of sound science in decision making processes.

Many of the options and proposals developed for the draft DWMP have been superseded through the emergence of new legislation and/or changes to regulatory guidance. Indeed, at the time of development of this final DWMP there still remains significant uncertainty regarding both the scope and scale of the WINEP for AMP8 and beyond.
We are very aware of elevated nutrient (phosphorus and nitrogen) levels causing eutrophication, which is particularly affecting the following designated sites within our area.

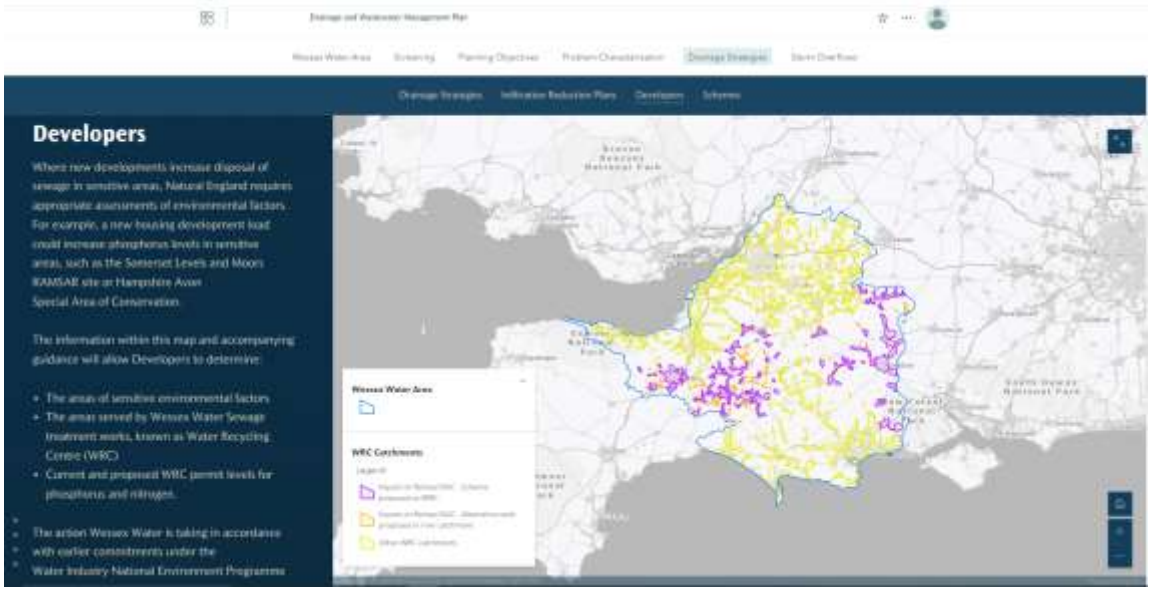
- Hampshire Avon SAC
- Poole Harbour SPA/Ramsar
- Somerset Levels & Moors Ramsar
- Chesil and the Fleet SAC/Ramsar/SPA

Any development within these catchments is required to be nutrient neutral. We are working with the Environment Agency and Natural England in the development of the AMP8 WINEP on best value solutions at/linked with WRCs (and any other discharges to the environment, such as storm overflows) as part of our ‘fair share’ in helping address this issue.

Based on the draft of the Levelling-up and Regeneration Bill (LURB) currently going through Parliament and following the latest guidance from the EA (as issued 23 December 2022), it is anticipated that the LURB will place a new statutory duty on water companies to upgrade WRCs ≥2,000 population equivalent to achieve ‘technically achievable limits’ (TAL) for phosphorus and/or nitrogen in these nutrient neutrality areas. The TAL has been determined by the EA as 0.25mg/l for phosphorus and 10mg/l for nitrogen.

To assist developers and other stakeholders, on our DWMP portal (Figure 55) we have provided details of whether the WRC discharge has an impact on the sensitive area alongside our current and future nutrient permit limits at all our WRCs (as per our agreed approach to delivering the AMP7 WINEP requirements). We are working with local councils, developers and other third parties in the support of both short and long-term mitigation measures across the nutrient neutrality affected areas.

Figure 55: Information available for developers on our public website



We note that we are already investing heavily in the Somerset area in AMP7 to agreed phosphorus limits with the Environment Agency and Natural England. In many cases, however, these improvements are not appropriate to achieve more stringent permits required under the LURB, and we will need to re-upgrade WRCs, including potentially abandoning newly built processes.
The Environment Act has targets of reducing nutrient pollution in water by reducing phosphorus loading from treated wastewater by 80% by 2037 (against a 2020 baseline). Our AMP7 enhancements mean we are already making good progress towards this target, although as in some catchments we did significant removal upgrades in AMP6 (before the 2020 baseline) these and other sites will need to be upgraded to achieve stringent permit limits. Defra published their Environmental Improvement Plan at the end of January 2023, which provided an interim reduction target of 50% by January 2028. We are still working through the implications of this on our proposals.

Both the Environment Act and LURB restrict our activities to our wastewater discharges, meaning that any nutrient credits from our existing catchment measures cannot be used to offset removal at a WRC. The LURB – as currently drafted – is also very WRC-specific, severely limiting the options for anything other than ‘grey’ solutions. We do not support this narrow focus, and in recent years have been developing a strategy named Outcomes Based Environmental Regulation (OBER), that we believe will revolutionise regulation of the industry. At its heart, the OBER concept gives water companies the opportunity to make greater environmental improvements using markets, so the burden is not passed on to bill-payers. However, to be effective, it requires appropriate sharing of risk alongside phasing of needs and associated improvements amongst many stakeholders so that we can break out from the current 5-year AMP cycle.

The options developed for the draft DWMP were principally to ensure either quality or flow compliance with existing (at the end of AMP7) permit limits, or pro-rata tightening of existing limits (under a maintenance of load approach), with cost allowances for assumed WINEP

requirements. We are continuing to engage with the Environment Agency in the development of the WINEP for AMP8, and have refined these cost allowances for this final DWMP, but emphasise that many WRC-related aspects are subject to change. Indeed, many of the options developed for this DWMP – particularly those where needs have been identified in the medium to long term – may be completely superseded as they either may not be suitable to achieve other future objectives, or a better value solution may be more appropriate given both growth and quality enhancement drivers.

Table 7: WRC indicative costs

WRC Improvements core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Capex	1,385	585	199	180	244	2,593
Opex	43	195	257	273	295	1,063
Totex	1,427	780	456	453	539	3,656

The bill impact of the indicative totex costs provided in Table 7 for improvements at WRCs is £52 per year for each average household by 2030.

8.3 Storm overflow improvements

Storm overflows have been an integral part of our sewer system design. Storm overflows are designed to prevent property flooding during heavy rainfall, by acting as a relief valve allowing excess storm water to be released to the river or sea. Excess flow from the storm overflows that enter the environment are very diluted due to the large volumes of rainwater in the sewer and by the receiving river or sea, which will also be swollen by the heavy wet weather.

However, political pressure of this sewage being discharged into the environment and the desire for cleaner rivers (potentially with some being designated for swimming in) will require significant improvements. Bills are likely to increase to fund storm overflow improvements.

Last year, at the time of writing our draft DWMP, the government were consulting on storm overflows[3]. This has subsequently been included in the Environment Act and the governments Storm overflow discharge reduction plan (SODRP) has been published[108]. The Environment Agency has converted the SODRP into drivers for enhancement funding through the WINEP.

The SODRP requires companies to improve the performance of storm overflows so they do not discharge more than 10 times a year and they do not cause adverse ecological harm.

The SODRP and WINEP guidance promote improvement at High Priority sensitive environmental areas, with the following profiles for storm overflow improvements:

- 38% of overflows that need improvement that discharge to or close to high priority environmental sites are to be improved by 2035, with a further 38% by 2035, and the remainder improvements by 2045
- 14% of overflows that need improvement need to be improved by 2030
- All overflows are to have fine screens and on average discharge less than 10 times a year by 2050.

High Priority sensitive environmental areas are:

- direct or near to Bathing water
- Shellfish water
- Protected environments, including SSSI, SAC, eutrophic sensitive areas, chalk streams, Ramsar and waters currently failing ecological standards due to storm overflows (RNAG).

Our response to the consultation in our draft DWMP was that this step change in requirements would be challenging and not achievable with the industry supply chain, as well as potentially not being affordable.

Since the draft DWMP, Ofwat has announced that transitional funding (early start) can be used in 2023/24 so that we can start to work on this significant programme early. This has made the task more achievable, but is still a challenge.

We developed a prioritisation matrix to reflect the different environmental drivers and the known frequency of discharge (Figure 56). The minimum target in the SODRP is to improve 38% of the storm overflows that fall in the red category by 2030. The number of improvements to storm overflows at bathing water has reduced since the draft DWMP following the EA driver guidance having a maximum 1km distance for that driver to apply. We included some big spillers that were further away in our draft DWMP – these now have 10 spill drivers.

Figure 56: Storm overflow prioritisation

Environment amenity	Unit of frequency	Average EDM or Modelled discharge count (12/24)							
		00	<1	<2	<3	<5	<10	<20	<40
Designated Bathing Waters - Coastal	/BS	6	9	11	6	14	6	4	-
Designated Bathing Waters - Inland	/BS	-	-	-	-	-	-	-	-
Designated Shellfish waters	/Year	2	5	3	1	8	4	3	3
Recreational use	/Year	-	-	-	-	-	1	1	2
Reason for not achieving good ecologial status (RNAG)	/Year	6	4	2	1	3	12	4	19
Chalk stream	/Year	7	5	2	1	3	12	8	15
Sensitive Areas (protected area) prioritised by Natural England	/Year	7	6	5	4	6	12	16	15
Sensitive Areas (protected area) - SSSI, RAMSAR, SAC	/Year	3	5	2	2	1	6	19	16
Sensitive Areas (protected area) - Eutrophic	/Year	10	3	4	4	6	13	19	31
Frequency >=10 spills per year	/Year	-	-	-	-	-	-	140	158
Non-sensitive sites (spill<10 or Blanks)	/Year	53	31	31	28	48	74	-	-

Our draft DWMP included 4 scenarios for storm overflows: a ‘core’ scenario, a ‘full’ scenario, an ‘unconstrained’ scenario and a ‘sound science’ scenario. Feedback from our consultation

on the draft DWMP showed most support for the core scenario, and no support for the sound science scenario. This influence our final core plan.

In this final plan our 'core' plan includes a larger storm overflow improvement allowance than our draft plan, so that we will be able to deliver more than the minimum SODRP requirements by 2030. We also have the ambition to deliver more nature based solutions to address these overflows.

The following section provides some background on the government's decision to base the targets on 10 spills per year or no harm. It also contains useful comparisons between green and grey solutions, that are referred to in the following chapter.

8.3.1 Setting storm overflow targets and costs of improvement

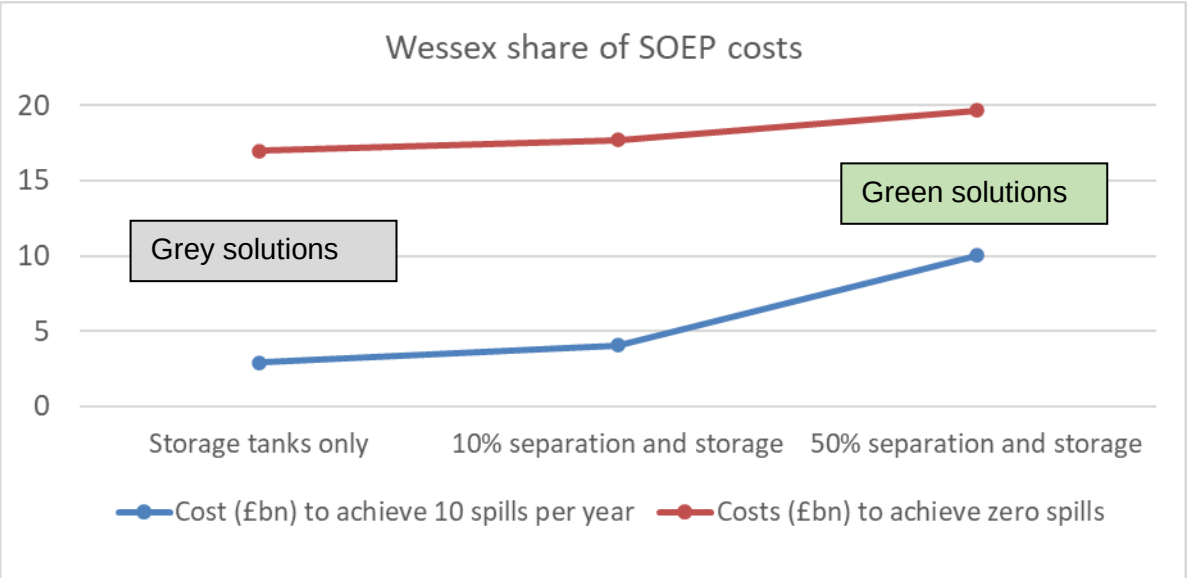
Ideally, storm overflows targets should be based on impact. However, this is complicated and will take many years to establish, so Defra's SODRP uses frequency based targets.

Defra Storm overflow evidence project

Defra appointed a consultant (Stantec) to undertake the Storm overflow evidence project (SOEP)[25] in 2021 and a follow-up study to produce the SOEP addendum[24], published in March 2022.

The SOEP report estimates costs to bring storm overflow discharge performance to 10 discharges per year in England using the 12/24 spill count rule. Wessex Water's proportion of these costs is 11%. Figure 57 shows the improvement costs (average Capex costs) taken from the SOEP report for various levels of service and solution types for inland storm overflows in the Wessex area. The storage tanks solution (grey) is significantly lower cost than the green (separation) nature-based solutions.

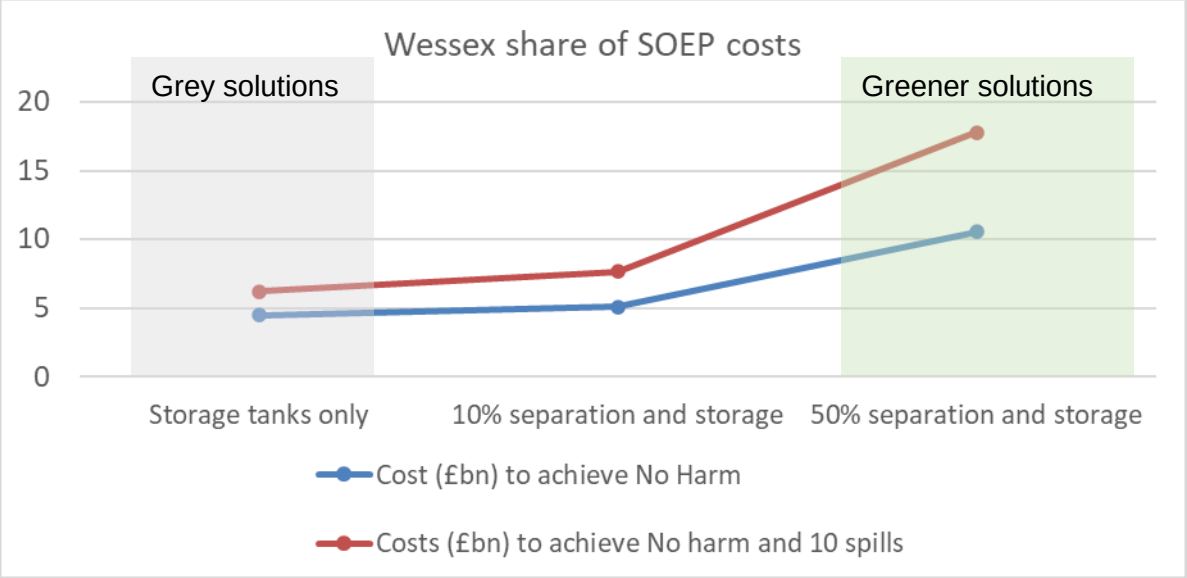
Figure 57: Wessex Water costs to reduce overflow discharges to 10 and zero spills



The SOEP addendum tightens up the performance of the inland storm overflows that are in high amenity location (such as SSSI, chalk streams etc) to a lower threshold than 10 discharges per year. This follows the principle of dilution mentioned in the Urban Pollution Manual (UPM). It may require an improvement to 5 discharges per year (to achieve a fundamental intermittent standard of 99%).

Because Wessex Water has a high proportion of environmentally sensitive areas of outstanding beauty and high amenity areas, the findings suggest that Wessex Water's share of the storm overflow improvements is significantly more than other regions in the south of England. Figure 58 shows the costs for the Wessex area to improve storm overflows to achieve no harm and 10 spills elsewhere, for grey and green solutions.

Figure 58: Wessex Water costs to reduce overflow discharges to reduce harm



The SOEP addendum report suggests the Wessex Water investment needed to reduce harm from storm overflows would be c£5 billion using grey solutions. The costs would be significantly higher if we applied sustainable / nature-based solutions, based on current understanding of benefits and the benefits are currently not matching that level of investment. An UKWIR project is underway to inform Cycle 2 DWMP.

The SOEP costs are only inland overflows, and do not include bathing water improvements. Wessex Waters estimate of costs for all types of storm overflows are provided in the following section.

Wessex Water analysis of storm overflow costs

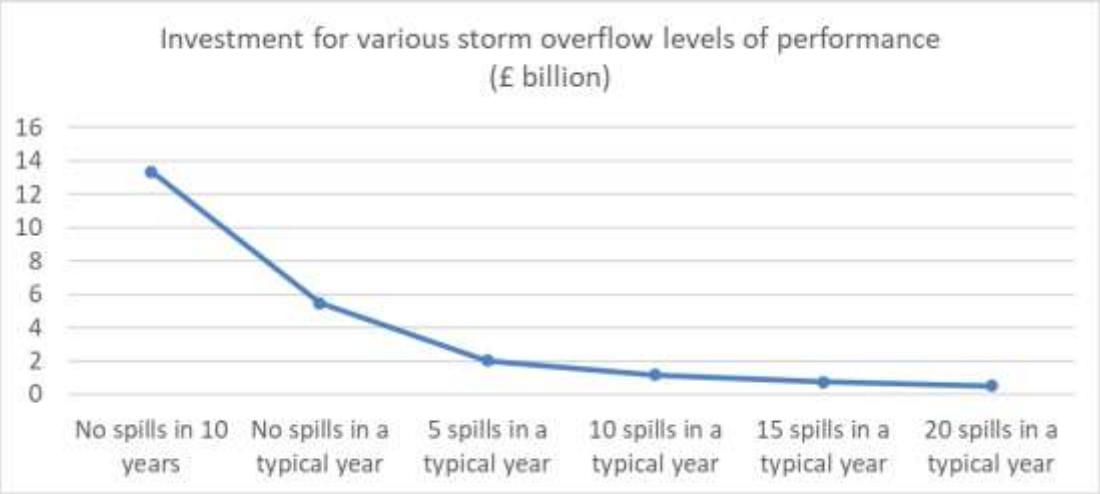
As well as being informed by the SOEP, Wessex Water used our hydraulic computer models to determine the volume of storage required and the amount of separation that would be needed.

We simulated a 10 years of rainfall series to see how much discharge volume occurred at each modelled overflow. By ranking the discharge volumes per site, we can estimate the scale of storage required to achieve different spill frequencies. The model then applies a

cost curve to the volume based on the storage volume. We also looked at varying amounts of separation (10%, 20% and 50%) to see if that improved the storm overflow to the required performance, or whether attenuation would still be needed.

Figure 59 shows that over £12 billion would be needed to prevent storm overflow from discharging in a decade (i.e. effectively eliminating storm overflows). To prevent spill in a 1 in 30-year storm would be significantly more expensive, as the curve is exponential.

Figure 59: Indicative investment for various storm overflow levels of performance



Note: The above graphic and costs were taken from the draft DWMP and does not include all storm overflows.

8.3.2 Nature based solutions for storm overflow improvements

We want to deliver sustainable nature based solutions, and we will do these where best value has been identified. Many solutions will have a hybrid of nature based solutions and attenuation tanks.

The SOEP reports and our experience with the frequent spilling overflow investigations shows that attenuation (grey) solutions are normally lower cost than sustainable solutions. Grey solutions are also more likely to be constructable within the short times scales proposed for improvements by 2030. Grey solutions (such as underground storage tanks) are tried and tested, so are almost guaranteed to achieve the target reduction in spill frequencies.

The green nature-based solutions may however give lower carbon and have additional benefits such as wellbeing to customers for living in a greened environment. Green solutions can offer more such as a beautiful environment for people and they help to manage water at source, returning it to the environment in more natural and sustainable way. Our service measure framework (SMF) does not give a large, monetised value to these benefits, so currently the nature-based solutions are generally not the best value solutions.

WaterUK are investigating the benefits of separation schemes using nature based solutions. This will inform future cycles of the DWMP and also our decisions when we investigate the options before construction.

The quantity of individual nature-based solutions would be enormous to reduce storm overflow performance sufficiently – our modelling shows that just doing a bit of separation makes little difference to the spill performance. Significant proportion of roads would need to be redrained (permeable paving, soakaways, swales etc) and roofs would need to be fitted with water butts or raingardens. This option is not just a water company issue. It will require a society change, so customers are encouraged to stop putting surface water into the foul/combined sewers.
For the storm overflows for improvement by 2030 we have undertaken computer modelling to understand the improvements needed. The options (nature based and attenuation) were costed (capital and operational) as was the carbon (embodied and operational) and other benefits identified. The best value schemes were found using the 30 year costs and benefits. Six of the best value schemes are using separation as the best option. Many schemes will be hybrid solutions.

When projects progress through the detailed design phase, we will consider the feasibility of options in more detail and chose the most appropriate solution on a case-by-case basis.

Where overflow discharges are very dilute, due to groundwater inundation, then nature-based solutions become more feasible and are the preferred solution. We have added 36 wetland treatment schemes on the WINEP for nature based solutions. Unfortunately these have been given 'pending' status, which means they may not get funded. The treated discharges may still need to be reported as storm overflow discharges and included in our EDM annual returns. So there is uncertainty in this area.

There is also uncertainty on exactly what no ecological harm will require. We have assumed 5 spills per year, but this will be confirmed during the storm overflow investigations which need to be completed by 2027. We are awaiting the update to the Storm overflow assessment framework[107], as this could change the number of UPM investigations we will need to undertake.

8.3.3 Core costs for storm overflow improvements

The £3bn in our core long-term plan for storm overflow improvements, according to our models, would allow all storm overflows to be improved to an average of 8 discharges per year (6% when including all storm overflows). Some would be improved to 10 discharges per year and others at more sensitive areas reduced to perhaps 5 discharge per year. Our core plan should be sufficient to reduce harm from storm overflows, unless the investigations how we need to improve to a higher standard.

Table 8: Storm overflow improvements in the core plan to meet SODRP

Storm overflow improvements (number)	2025 to 2030	2030 to 2035	2035 to 2040	2040 to 2045	2045 to 2050	**Total**
Bathing & shellfish waters SO improvements	33	0	0	0	0	33
High priority environmental SO improvements	100	128	29	0	0	257

SO Improvements for frequency (10 discharges/yr)	15	8	105	142	139	409
Screen only improvement				141	175	**316**
Total hydraulic SO improvements in AMP (excludes screen only)	**148**	**136**	**134**	**142**	**139**	**716**

As discussed above, we will use nature based solutions where best value, rather than attenuation or other grey solutions.

The core plan assumes a requirement to achieve the new obligation of continuous water quality monitoring (CWQM), although this is not included in the data tables. This is because CWQM is currently not on the WINEP and the government currently have a consultation on this due to the significant cost implications (capex and especially opex). We have put assumed costs in this report, but not in the data tables. The capex figures for CWQM are provided in Table 6.
The Opex figures are significant for CWQM, due to the need to change all the probes frequently, as summarised in the following sub-section.

When installed, the monitors will provide the raw data for the National Environment Hub, which will be the national real-time reporting platform for this information.

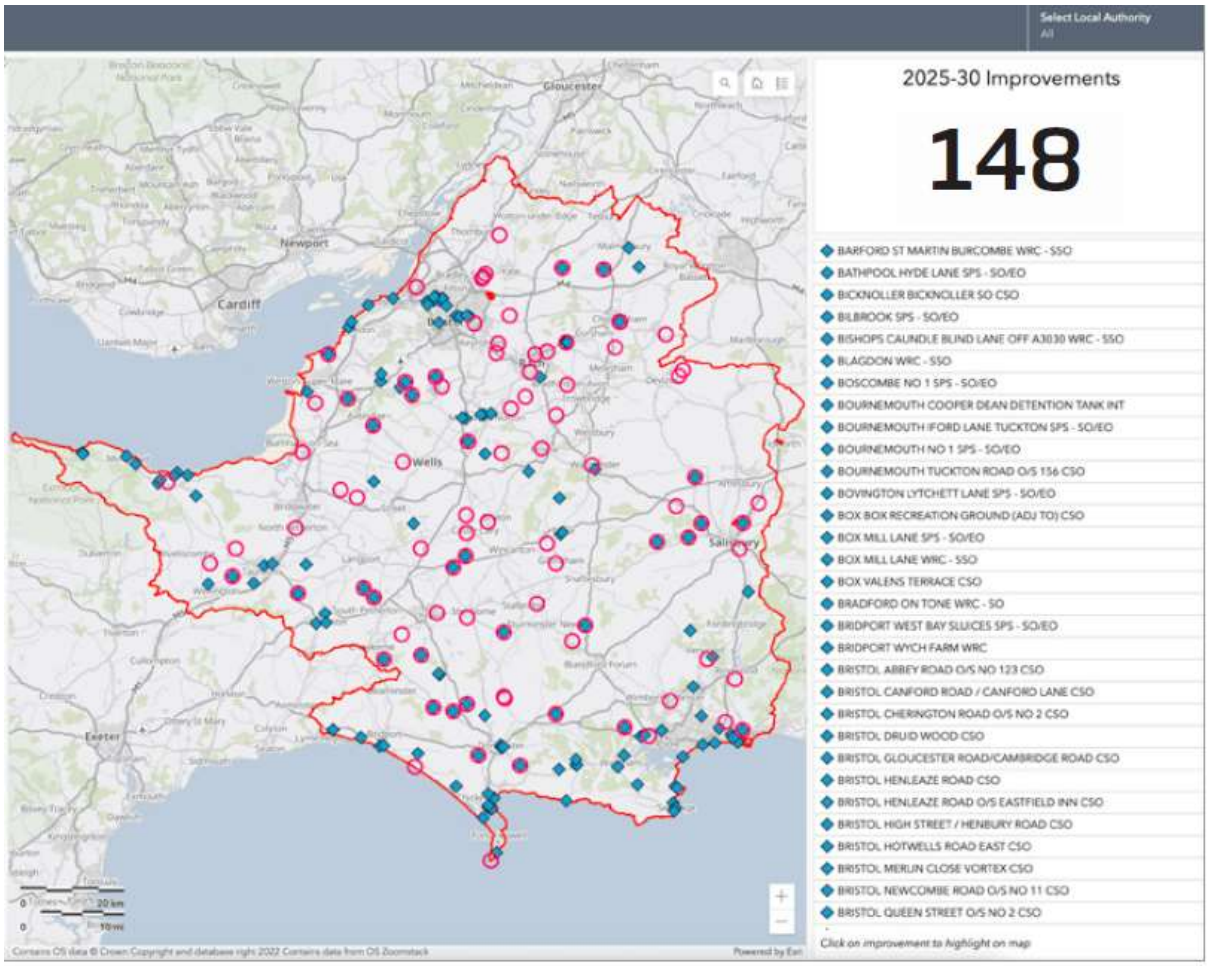
These costs exclude reducing seasonal groundwater inundation which can cause prolonged overflow discharges. We have water quality evidence that concludes groundwater induced storm overflow discharges do not harm the waterbodies. The water quality of the discharges is like the final effluent of a WRC.

Table 9: Storm overflow indicative costs in the core plan to meet SODRP

Storm overflows Core plan (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Bathing & shellfish waters SO improvements	176	0	0	0	0	166
High priority environmental SO improvements	349	537	107	0	0	1115
SO Improvements for frequency (10 discharges per year)	38	23	332	522	436	1338
Screen improvement	0	0	0	206	206	412
Storm overflow investigations	30	30	0	0	0	60
Storm overflows (WINEP) inland Bathing water	0	0	0	0	0	0
Total	593	590	439	728	642	3091

The bill impact of the indicative totex costs provided in Table 9 for the statutory storm overflow reduction programme is £31 per year for each average household by 2030.

Figure 60: Proposed investment in storm overflows during AMP8 (2025-2030)



8.4 Flooding in a storm (hydraulic flooding risk)

One of our outcomes is to have an effective sewerage system. To do this we would ideally eliminate all escape of sewage (flooding due to rainfall, blockages, storm overflows etc.).

However, we know that certain locations are vulnerable to flooding during heavy rain, and we do not have full control of our customer behaviours. So rather than eliminating flooding, we have set our outcome to halve the impact of flooding.

8.4.1 Hydraulic flooding

The flooding in a storm planning objective is a measure of hydraulic flood risk. It is calculated by counting the properties that are close to manholes which are predicted (by our hydraulic computer models) to flood during a large storm event. It is focussed on hydraulic flooding (i.e. when the network capacity is overwhelmed by intense or prolonged rainfall).

With climate change we will see increased rainfall intensities. Our predictions of this metric suggest hydraulic flooding risk will increase by 42%. This is similar to the Ofwat prediction from their 2011 report by consultants, Mott Macdonald.

The impact of hydraulic flooding is a concept Wessex Water developed 10 years ago. Our risk grid performance commitment uses the impact and frequency to generate an overall risk score, as shown in Figure 61. The impact scores were generated from our PR09 customer research and confirmed by the recent DWMP customer research (Appendix B).

Figure 61: Report of hydraulic flooding risk grid

Flooding Risk Matrix: Number of Properties / areas (excludes S105A)			Impact						
			Very Low				Very High		
			Fields (Surface water) Minor Garden (S/w) Roads (Surface water)	Major Garden (Surface) Fields (Combined)	Road (Combined) Minor Garden (Combined)	Major Garden (Combined)	Internal	Nr of Properties /areas above the line of acceptable risk	Total Risk Score
			2	3	5	8	10		45803
Probability	Very High	5 2:10yr	15	32	221	145	45	458	12755
		4 1:10yr		16	275	129	53	473	10908
		3 1:20yr			18	8	345	371	10764
		2 1:30yr				63	452	515	9796
	Very Low	1 1:50yr					158	158	1580

Our flooding risk grid performance commitment, only includes hydraulic flooding incidents that occur (i.e. based on incidents, not computer predictions).

For PR29 we would like to improve this by having all properties (domestic and commercial) plotted on the grid, in both frequency and impact categories that are predicted by our computer models.
Our current models can predict the frequency of flooding, but they cannot currently accurately predict the impact. To calculate the impact would require 2-D models; these models route the flood volumes overland to see if it would cause flooding people's houses to flood (internal), or their gardens (external inside boundary) or elsewhere externally.

To achieve this, we will include a programme of 2-D modelling in our PR24 plan. These will not be detailed 2-D models (which would require individual kerb lines and walls surveying and monitored). But they will include the general topography (available through LIDAR) of the ground to see where flooding may occur and may become deep enough to f people's houses.

We will work with the EA and LLFAs to see if a joint programme of modelling can be undertaken, with partnership funding, to enable these overland flows models to be produced.

It could be that Wessex Water would want to host these partnership models, so we can ensure they are to a consistent and high standard.

The results of these model could become 'open source' – as indeed could the models themselves, so there are risks that need to be understood before we progress this.

Only 10% of flooding incidents reported to us as are associated with hydraulic overload. Hydraulic overload is very unlikely to repeat within the same year, although it unfortunately can happen. Occasionally frequent hydraulic flooding can occur, like recently in Chard, when in 2022 we have seen two major rainfall events within the same year. In 2021 we saw a 1 in 24-year rainfall event in May and in June we a 1 in 100-year event followed by further storm (1 in 1 year) in October.

90% of flooding incidents are due to 'other causes', including blockages (wet wipe misuse), roots or collapses. The following section on flooding impact is heavily influenced by 'other causes' rather than 'hydraulic' although where hydraulic flooding is a problem this is extremely distressing for the homeowner. The mental wellbeing of being flooded is not understood and should carry more benefits – especially if due to heavy rainfall (hydraulic).

8.4.2 Flooding impact

A water industry task and finish group have been developing a new 'flooding impact' metric with Ofwat, to try to reflect impact more than the current methodology (internal flooding and external flooding).
The concept of 'Levels' of flooding impact were proposed, as summarised in Table 10.

Table 10: Potential metric to measure impact of flooding (all causes)

Level	Classification	Customer area impacted
Level 1	A serious impact on people or property	• Repeat flooding incident affecting the internal living space • A flooding incident that causes school or hospital/care home to physically close a ward/department
Level 2	A significant impact on people or property	• Single flooding incident affecting an internal living space • Repeat flooding incident affecting internal other space
Level 3	An impact on people or property	• Single flooding incident affecting an internal other space • Repeat external flooding within curtilage
Level 4	An external impact on people or property	• Single external flooding

This metric by itself doesn't provide on overall score to evaluate performance.

8.4.3 What is in our core plan for hydraulic flooding

Solving hydraulic flooding is very expensive (over £100k per property) and improvements schemes are often not viable unless there are many properties that have flooded. Where making hydraulic improvements is not viable, we undertake mitigation measures, such as flood doors/gates and airbrick protection.

Trying to change customers' behaviours to prevent 'flooding other causes' is more affordable and has more benefits in reducing the vast number of blockages that we have to deal with annually. Our plan therefore focuses on reducing flooding 'other causes' in preference to hydraulic flooding.

Storm overflow improvements will drive the investment programme for network investment. Where synergies with hydraulic flooding can be resolved at the same time, this will be undertaken. However, where flooding is predicted but not an actual confirmed issue, then this will be lower priority for investment.

Table 11 provides different levels of investment to address hydraulic flooding.
The low scenario is the AMP7 level of investment.

The medium scenario doubles the low scenario, acknowledging we need to invest more, but not to resolve all the hydraulic issues.

The high scenario is based on solving all known internal or external flooding issues and those predicted to be a significant risk. Many of these were optioneered during the DWMP ODA stage.

The preferred options for many of these would be to introduce new storm overflows to resolve the flooding issues. Unfortunately, these overflow options were not taken forward as in the current political climate would not be feasible.

Table 11: Hydraulic flooding investment

Hydraulic flooding investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Hydraulic flooding (base expenditure)	0	0	0	0	0	0
Low Hydraulic flooding scenario (enhancement expend	20	23	25	25	25	118
Medium hydraulic flooding (enhancement expenditure)	40	45	50	50	50	235
High hydraulic flooding (enhancement expenditure)	200	225	250	250	250	1175
Unconstrained (enhancement expenditure)	440	495	550	550	550	2585

We need to continue our hydraulic flooding programme of known problems, but with an investment programme that is affordable and achievable. The medium scenario is included in our core plan.

Table 12: Effective sewerage flooding core plan indicative costs

Effective sewerage flooding core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Flooding – capacity and separation schemes to reduce hydraulic flooding	40	45	50	50	50	235
Flooding – Smart network (in-sewer monitors)	20	40	40	10	10	105
Flooding – Blockage reduction	30	30	30	30	30	150
Flooding – Infiltration reduction (flooding)	10	20	20	20	20	90
Total	**60**	**135**	**140**	**110**	**110**	**580**

The bill impact of the indicative totex costs provided in Table 12 for our flooding programme is £5 per year for each average household by 2030.

8.5 Flooding (other causes) and pollution

We have grouped three planning objectives together in this section, because the activities associated with them overlap and can benefit each other:

- internal flooding
- blockages (which tend to cause external flooding)
- pollution

When sewage escapes from our systems, it can lead to environmental damage such as high levels of silt or a high organic load that can affect flora and fauna in watercourse or can flood homes and businesses.

Our pollution incident reduction plan (PIRP)[91] is a quarterly report that we produce to show our progress in reducing to zero pollutions. The preventing the escape of sewage programme is about how much activity goes on and how successful we will be in changing customer behaviours.

Our model suggests that to see a 10% reduction in blockage numbers every AMP, then an additional £10m totex is required. This would see the annual numbers of blockage reducing from 13,000 a year (currently) to 7,500 a year by 2050.
To see a 20% reduction in numbers of blockages then over £30m totex will be required. To see a 50% reduction per AMP will require hundreds of millions of totex.

Our pollution reduction model shows that for a 20% reduction in pollution incidents per AMP, then a totex cost of £50m would be required. To see a 50% reduction per AMP, which will effectively eliminate pollutions would cost hundreds of millions of totex.

Our preventing the escape of sewage programme is focussing on this, and has activities grouped in the following types.

- telemetry data and analysis
- people and process
- assets and maintenance
- customers and stakeholders

Telemetry data and analysis

We have successfully trialled and demonstrated the capability of artificial intelligence (Storm Harvester) using network monitoring telemetry and we are now extending this capability across the whole of our region.

The above intelligent sewer trial was using EDM data at storm overflows, to ensure that we are not discharging unless it rains heavily. However, we would need to expand the monitoring to our entire 35,000km of sewers to get a full picture of our network performance.

Monitoring every manhole is not realistic with the current technology, so we need to target where we know, or think are the riskiest locations where flooding or pollutions could occur.

We use historical incidents (e.g. repeats), our computer model predictions and our sewer risk models to target higher risk locations.

The core plan includes installing more telemetry and using smart systems. The pace we do this at needs to be sustainable. We don't want to start collecting information before we have the systems and people in place to analyse and react when things go wrong. This is going to take time, so the AMP8 investment is smaller than AMP9 and AMP10 when most of the in-sewer monitors will be installed.

By AMP9 technology may have advanced so we can take advantage of low-cost equipment and communications.

People and process

This workstream focusses on our staff and our contractors to make sure that human error does not lead to sewage escapes.

For example, last year we analysed data and noticed that some internal flooding incidents were caused by us jetting the sewer, whilst attempting to clear blockages. The blockage itself did not cause internal flooding, but when we jetted the sewer to clear the blockage, the system backed up and the high-pressure jet caused flooding from toilets.
We have set up a training rig to train our staff and contractors. To date 165 staff have been re-trained to minimise the chance of jetting activates causing internal flooding.

Assets and maintenance

Last year we inspected almost 60km of sewers, which is only 0.2% of the asset base.
We need to undertake more inspection and maintenance, not only to prevent collapses (see 10.9) but to repair sewers to prevent escape of sewerage. For example, joints between

sewer pipes are vulnerable to allowing roots to enter the sewer. These roots can prevent rags and sewage flowing down the pipe and so cause blockages. By lining the sewer to prevent the roots returning, there will be less likelihood of a future blockage.

Our sewer risk model has been expanded to include this analysis of serviceability as well as structural failure.

Customers and stakeholders

Our engagement with customers has increased, particularly on matters relating to sewer misuse, fats oil and grease (FOG) and wet wipes, all resulting in fewer incidents. This is described in section 8.16.

Table 13: Effective sewerage Pollution core plan indicative costs

Effective sewerage Pollution core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Pollution reduction (excludes smart networks and blockage reduction – see effective sewerage)	30	30	30	30	30	180

The bill impact of the indicative totex costs provided in Table 13 for pollution reduction is £2 per year for each average household by 2030.

8.6 Sustainable drainage (growth)

Making sure that we allow development to occur without putting extra flood risk to others is essential. We are working closely with planning authorities to ensure developers follow the surface water hierarchy and build sustainable drainage.

We use our computer models to check the capacity of our sewers for all major developments. Where there is a detriment, we can develop options to mitigate.

There is uncertainty of timing of developments, so we apply a percentage probability to each site and multiply that by the costs required to make the offsite reinforcements. Currently the scheme costs likely for PR24 are £15m.

Table 14: Effective sewerage growth core plan indicative costs

Effective sewerage growth core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Growth – Sustainable development (growth)	15	15	15	15	15	75
Growth – First time sewerage (s101a)	5	5	5	5	5	25
Total	**20**	**20**	**20**	**20**	**20**	**100**

The bill impact of the indicative totex costs provided in Table 14 for network development is £1 per year for each average household by 2030.

8.7 Partnership working

Partnership working is where Wessex Water can use funding to contribute towards another risk management authority delivered scheme, or vice versa. We do this where there are benefits to our customers.

We are working closely with our partner and stakeholders and are expecting that this DWMP will encourage more partnership working going forward as we give more visibility to our needs. Partnership working is discussed in section 8.16.5 and Annex A to Annex D.

Table 15: Partnership working core plan indicative costs

Partnership working core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Partnership working	20	20	20	20	20	100

The bill impact of the indicative totex costs provided in Table 15 for partnership working is £1 per year for each average household by 2030.

8.8 Collapses and rising main bursts

This investment needs for long term stewardship of our infrastructure assets as introduced in the planning objective in section 4.12 It covers both sewer collapses and rising main bursts.

There is some funding in base capital maintenance for this metric, which is broken down in Table 16. In the core plan, we are effectively proposing to double the investment in this area. This is needed as we are not currently replacing the deterioration rate (which research says we should be investing 8 times as much). We proposed closer to the deterioration rate (see section 11.6).

Table 16: Collapse and bursts investment

Collapse investment in core plan (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	AMP13
Sewer collapses (base expenditure)	19	19	19	19	19	19
Sewer collapses (enhanced expenditure)	20	20	20	20	20	20
Rising main bursts (base expenditure)	6	6	6	6	6	6
Rising main bursts (enhanced expenditure)	15	15	15	15	20	30
Collapses (base) £m	25	25	25	25	25	25
Collapses (enhancement) £m	35	35	35	35	40	50

8.8.1 Collapses

Our business plans for 2010 to 2025 recognised that a step change in investment is needed, although our plans did not result in any significant shift, due to bill impacts and other company investment priorities.

Our sewerage infrastructure deterioration modelling clearly demonstrates that the rate of deterioration of sewers to beyond their serviceable life exceeds the current rate of replacement / rehabilitation. This is confirmed by the following research:

- UkWIR research[3] in 2017 suggested that 8 times current investment for sewer infrastructure is needed for intergenerational fairness of not leaving a legacy to future generations.

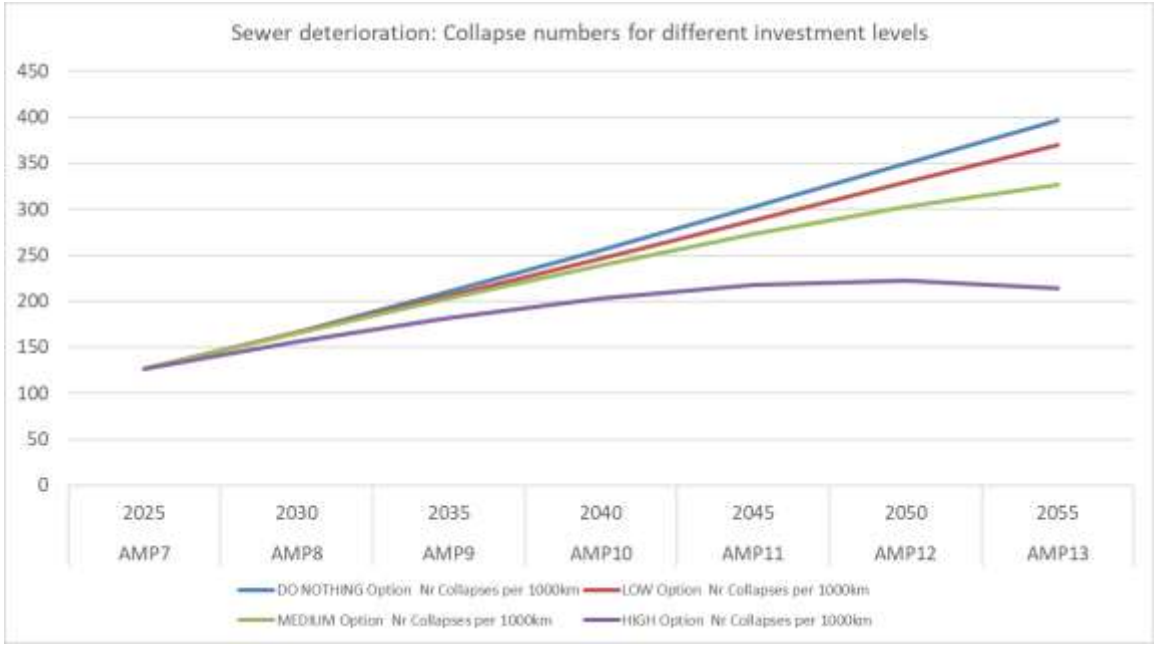
- The 2022 WaterUK report 'Options for a sustainable approach to asset maintenance and replacement' also concurs with more investment needed for the sustainability of future performance and legacy.

We are only replacing 0.2% of our assess stock annually, by annually investing £3.8m in proactive sewer inspection and replacement.
If we continue at that rate, then c£100m investment would have been achieved by 2050. However, our deterioration modelling suggests that the number of collapses will more than double.

Figure 62 shows the results of our sewer deterioration model. This shows the number of collapses for different levels of investment. These are:

- Do no proactive rehabilitation
- A low scenario (which is the current level of proactive investment)
- A medium scenario (i.e. double the current level of investment, increasing by 30% each AMP, so by 2050 there will 8 times the current investment)
- A high scenario (i.e. 4 times the current level of investment, increasing by 30% each AMP, so by 2050 there will be 16 times the current investment)

Figure 62: Sewer collapse rates for different levels of investment



[3] UKWIR project 'Long term Investment in Infrastructure', 2017

The end of AMP position and the costs associated with the scenarios are provided in Table 17. This shows that if we carry on just spending out current base expenditure, then we will see a doubling of the number of collapses by 2050. The investment will only avoid 50 collapses by 2050.

The medium investment scenario will see a slight some improved level of service from the base. This proposes to double the investment (£18m base and £20m enhancement) in AMP8 and then a further 30% increase every AMP. With this scenario there will be almost 130 avoided collapses by 2050 compared to the do-nothing scenario.

The high scenario is to have 4 times as much investment, and then increasing by 30% an AMP. Our deterioration modelling suggests that would be sufficient to match the rate of deterioration. It will however it will take until 2050 to reach this stable number of collapses.

Table 17: Investment levels for collapse scenarios shown in Figure 62

Number of Collapses (per AMP)	AMP8	AMP9	AMP10	AMP11	AMP12	AMP13
Do nothing	166	211	256	302	349	397
Low investment (carry on with Base)	166	206	247	288	329	370
Medium investment (Enhancement)	164	199	233	264	290	309
High investment (Enhancement)	153	174	190	197	193	173
Investment for collapses (£m per AMP)	AMP8	AMP9	AMP10	AMP11	AMP12	AMP13
Do nothing	0	0	0	0	0	0
Low investment (carry on with Base)	19	19	19	19	19	19
Medium investment (Base and Enhancement)	39	52	70	94	126	167
High investment (Base and Enhancement)	80	106	140	185	242	318

Our core plan has the medium investment scenario for collapses for a decade (i.e. £19m from base and £20m from new enhancement). This is effectively doubling the proactive sewer rehabilitation programme, but only prevent 4 collapses in AMP8. This is an area that will be challenged in our PR24 process and is likely to be reduced. After that we have include an adaptive pathway decision.

By combining the sewer collapse and rising main burst investment together, we can then decide which programme should receive more investment in AMP10 and beyond.

8.8.2 Bursts

Our PR14 base expenditure for rising main replacement was less than £6m per AMP and allowed for replacing about 2.4km of rising mains a year.

Our deterioration modelling shows that that is not sustainable. Our rising mains are old and in need of replacing, as we feel we are at a cliff edge and numbers will significantly increase if we don't proactively invest. We should be replacing 8 times the level of investment, as shown in Table 18 – this is a step change.

Figure 63 is a copy of a graphic we provided in our 2018 cost adjustment claim WSX06 (which was unsuccessful) in our PR19 business plan to have a higher allowance for rising main replacement. It shows that we should be replacing 20km of sewers a year, whereas our base funding allows only 2.4 km per year of replacement.

Figure 63: Rising main deterioration requirements

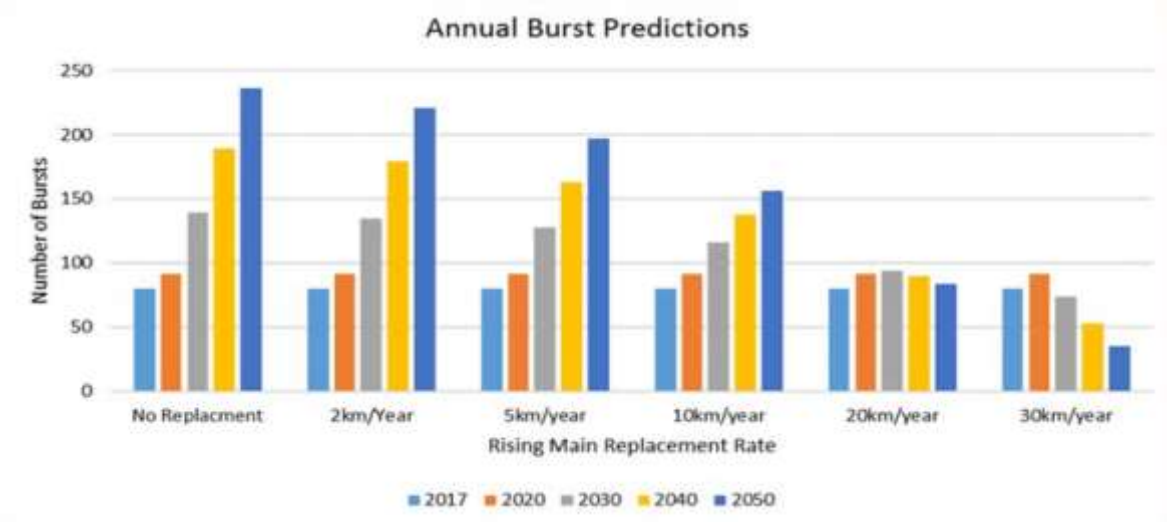


Table 18 provides detail of how our current base investment needs to be increased significantly to stay stable to have less bursts.

Table 18: Investment levels for rising main scenarios

Investment for rising main bursts (£m per AMP)	AMP8	AMP9	AMP10	AMP11	AMP12	AMP13
Base	6	6	6	6	6	6
Stable number of bursts (base and enhacement)	45	45	45	45	45	45
10% reduction (base and enhacement)	56	56	56	56	56	56
40% reduction (base and enhacement)	68	68	68	68	68	68

The £1m a year baseline would result in a significant increase year on year of burst numbers as the pipelines approach the end of useful life. This would have significant effect on the reactive repair budget and potential pollution incidents. At the other end of the spectrum an investment of £11.6m per year would result in being able to proactively target the rising mains with the highest likelihood of burst and also any that have had a burst in the preceding year. At the end of AMP12 we would have replaced 85% of our assets and massively reduced our exposure to pollution risk from rising main failures. It should, however, be noted that the number of failures due to poor construction are likely to increase, as the amount of oversight and skills in this particular activity would be very stretched by this investment.

The two intermediate profiles show an obvious reaction to funding. But these also have the largest amount of variability. Sitting somewhere between do-nothing and do-all. There would have to be careful selection of rising mains programme to ensure both cost effective and efficient replacement, along with an understanding that there will always be mains that fail before they can be replaced.

It is proposed that base spending is doubled (enhancement) for sewer rehabilitation and rising main replacement, the performance reported reflects this.

Our core plan assumes the base investment will be funded and allows an additional £15m per AMP for enhancement investment. This is not enough to remain stable. We have applied an adaptive pathway for asset heath, which will reach the levels required for asset deterioration, and ground water inundation prevention.

Table 19: Asset health collapse and bursts core plan indicative costs

Asset health core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Collapses (sewer rehab / rising mains)	35	35	35	40	50	195

The bill impact of the indicative totex costs provided in Table 19 for collapse and burst improvements is £2 per year for each average household by 2030.

8.9 Groundwater inundation

The Wessex area is vulnerable to seasonal groundwater flooding. Our sewers are below ground and any cracks in the public or private assets can inundate our sewers. We have a programme of inspection and making our assets watertight, as described in section 5.13 and 8.3.13.

This is an ongoing programme to prevent flooding, and we are expanding the programme to include sewers upstream of storm overflows that discharge during seasonally wet periods. The groundwater enters the foul and combined sewers, mixes with sewage, and is then discharged back into the environments.

Our infiltration reduction programme of inspections and work are tabulated on our website.

Table 20: Asset health groundwater inundation core plan indicative costs

Asset health core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Groundwater inundation (non-WINEP storm overflows)	10	15	20	20	20	85

The bill impact of the indicative totex costs provided in Table 20 for storm overflow inundation sealing resilience is £1 per year for each average household by 2030.

8.10 Resilience

Our assessment into resilience identified 248 sites that are potentially at risk of flooding from an extreme rainfall event (1 in 1000 years environment Agency flood extents of flooding from

rivers and sea). We appraised 124 of these to estimate the mitigation costs. We extrapolated this sample to the 248 sites and estimated that this will cost £55m.

The programme of these will be spread out over several AMPs, choosing the highest priority sites first.

The shoreline management plans highlighted two schemes that should be constructed with the next decade. Further consideration is required of any implications of the Shoreline Management Plan Refresh that will be progressed in 2022.

For more details see technical Appendix D.

Table 21: Resilience core plan indicative costs

Resilience core plan potential investment (£m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Resilience	5	15	15	10	10	55

The bill impact of the indicative totex costs provided in Table 21 for is resilience investment is negligible by 2030.

8.11 Summary of our best value plan

Our DWMP has ambitious plans to protect public health and enhance the environment, creating value for the people we serve. This is so we can continue to give all customers excellent standards of service by providing environmental services that protects health, improves the environment and provides customers with good value for money, despite pressures of climate change and the tightening of environmental standards.

Our final DWMP includes the following investment by 2030:

- Continue to maintain and operate our assets to high standard
- Improving our water recycling centres (WRC) by investing £1.4 billion to ensure we treat the effluent to the tightening standards and accommodate growth
- Improving the performance of 148 storm overflows by investing £550m
- using nature based solutions where best value
- Monitoring the water quality impact of our WRC and storm overflow discharges which could cost almost £100m
- Increase investment to reduce groundwater from inundating sewers and manholes.

To achieve the above extra investment (£1.5 billion more than our current spend), bills may need to increase by £100 per average household per year. Our business plan will detail our improved affordability measures to help those that cannot afford this increase.

Table 22: Summary of core plan indicative totex costs (£m)

	AMP8	AMP9	AMP10	AMP11	AMP12	Total
WRC improvements	1,427	780	456	453	539	3,655
Storm overflow improvements	544	577	608	723	637	3,089
Continuous water quality monitoring	178	219	51	51	51	550
Pollution prevention	30	30	30	30	30	150
Effective sewerage flooding	60	135	140	110	110	555
Effective sewerage growth	20	20	20	20	20	100
Partnership working	20	20	20	20	20	100
Collapses and bursts	35	35	35	40	50	160
Groundwater inundation	10	15	20	20	20	85
Resilience	5	15	15	10	10	55

9. Adaptive planning

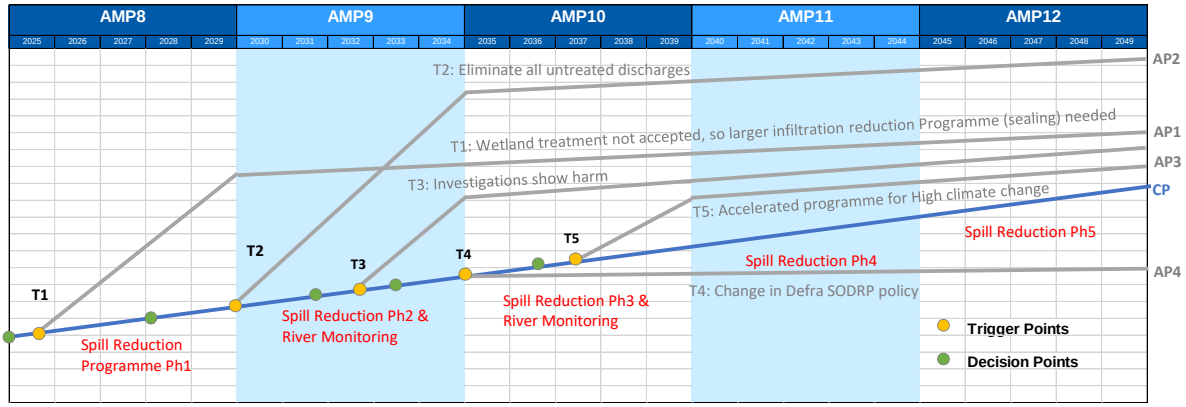
Our best value plan, detailed in Section Our best value plan8, is our core plan. It has our best estimate of what is required by 2030 and has a line of sight for delivery of the long term plans. However, there are current uncertainties (such as continuous water quality monitoring and investigations) and may future uncertainties (such as climate change).

Adaptive pathways will allow our DWMP and long term delivery strategies to adjust more efficiently to reflect new information, options and experiences to address the current and future uncertainties that may be realised going forward.

This section explains our adaptive plans and more detail is provided of some of these in the data tables, Appendix F.

Adaptive plans will allow us to move away from the core plan following triggers to identify that need for change and decision points to change the direction. **Figure 64** maps the roadmap for an adaptive plan. The trigger points are normally mid-cycle and the decision points are likely to be the final determination of the business plans or developing future cycle DWMPs.

Figure 64: Storm overflow adaptive plan



9.1 Preferred plan

Our preferred plan is different to our core plan (detailed in Section 8) regarding the level of ambition of storm overflows. The core plan achieves the governments storm overflow discharge reduction plan, using no/low regret solutions. The preferred plan completely eliminates untreated discharges in line with our current strategic direction statement by 2050. This will require an additional £9billion to achieve and some of the previous schemes will need to be revisited by undertaking more surface water separation or proving additional storage or capacity.

The triggers to decide this are:

- our customer willingness to pay about affordability
- whether we can offset the carbon footprint
- the governments review of their SODRP in 2027.

Decision points will be the final determination of the business plans or the update to our Strategic direction statement.

9.2 Climate change and growth adaptive plan

Climate change and population growth is happening and researchers say there's now a 66% chance we will pass the 1.5 ºC global warming threshold between now and 2027[110]. We are therefore already at the low climate change scenario of 1.5ºC to 2ºC referred to in Ofwat's Long term delivery strategy[109].

Current best practice when designing schemes is to allow for known growth and a 20% increase in design storm intensities to account for climate change. So our core plan already contains a mid-climate change scenario.

The high climate change forecast would result in more intense rainfall leading to more flooding and more storm overflow discharges, requiring bigger solutions that will cost more.

We have used our hydraulic computer models to predict how much larger the solutions would need to be for the high climate change scenario. For flooding, the risk of flooding in a storm shows that for the high climate change scenario 30% more properties would also be at risk of flooding. For storm overflows, the models predict a 36% increase in discharge volumes for the mid climate change scenario compared to the baseline and a 46% increase for the high scenario.

Sensitivity of growth projections are much lower with only 1% variation, which is not that material, compared to climate change implications. If we are successful in our supply water control to reduce per capita consumption flow rates (see our Water resource management plan), then this could mitigate increases in growth numbers.

The trigger for this adaptive plan will be the global temperature increasing towards 4ºC. The decision could be made if temperature keep increasing at the DWMP or business plan submissions.

9.3 Asset health step change (groundwater)

Our strategy for dealing with storm overflows that discharge groundwater back into the environment is to treat the flows using wetlands, as described in section 8.3. This is the most pragmatic solution.

If this strategy is not accepted by our regulators, and will not count towards spill reduction, then we will need to undertake significantly more investment in infiltration sealing. This will need a step change in investment on both public and private assets.

The trigger point for this is when the decision is made by regulators as to whether treated spills need to be reported as discharges in the EDM returns and the SODRP metric.

9.4 Wet wipes being banned adaptive plan

If wet wipes were banned or made to be rapidly degradable, then the number of pollution and flooding incidents would reduce considerable. The industry is pushing for this, as described in Section 8.5 This would be a cost saving adaptive pathway.

The trigger and decision point would be the change in legislation to ban wetwipes.

9.5 Additional treatment requirements at WRCs

Enhancements identified at WRCs are related to growth provision and meeting quality requirements, the latter principally as identified through the WINEP. The WINEP is a 5-yearly process, developed collaboratively between water companies and regulators, to identify specific environmental measures that water companies need to take to meet their environmental legislative requirements and related government priorities. Given this, it does not include for speculative or changing regulatory requirements other than those known at the time of development.

The PR24 WINEP only includes enhancement requirements at WRCs up to 2030, with the exception of meeting phosphorus removal targets by 2035, as described in the Environment Act. Following DWMP guidance, we have only included spend to meet growth requirements or other known regulatory requirements. Our forecast spend included in this DWMP thus significantly decreases beyond 2030 and again from 2035. It should, however, be anticipated that there will be new requirements affecting WRCs in subsequent WINEP cycles.

This adaptive pathway considers:

- Additional nutrient (phosphorus) removal
    - Our plan includes for phosphorus removal to ‘technically achievable limit’ (TAL) of 0.25mg/l P at WRCs ≥2,000 population equivalent in designated nutrient neutrality areas. The current wording of the Bill going through Parliament excludes all <250pe, with those between 250 and 2,000 excluded by default, although the Secretary of State can require their improvement. Our adaptive pathway includes for all WRCs >250pe in nutrient neutrality areas required to achieve P TAL.
    - Our PR24 proposals include improvements to meet our fair share under the polluter pays principle for waterbodies to achieve the Water Framework Directive’s ‘Good Ecological Status’ for phosphorus. Our adaptive pathway includes for all WRCs >1,000pe discharging to inland waterbodies to achieve P TAL, in an aspiration to go beyond our fair share expectations and/or to work towards achieving WFD ‘High’ status.
- Disinfection of WRC discharges
    - Our plan does not include for improvements at WRCs should any waterbodies be designated as inland bathing waters. Significant investment may be needed at WRCs and storm overflows for Wessex Water to improve our assets, but farmers and trade will also need to make improvements too. There are a number of rivers in our region used by members of the public for wild swimming, and we are promoting all investment to be based on sound

science, so our PR24 plan includes for collecting more water quality data, and using artificial intelligence to innovate and make sure we invest wisely. This adaptive pathway includes for the provision of disinfection processes at WRC discharges upstream of candidate inland bathing water sites, under a phased approach across AMP9 and beyond, prioritising those WRCs with low dilution ratios. These potential sites are those planned to be monitored in AMP8, plus an allowance for newly emerging locations in future years.

In recent years there has been an increased focus on the levels of microplastics and emerging contaminants (such as PFOS, PFAS, pharmaceutics) in the environment. Microplastics in wastewater are mainly from clothes washing, car tyres and macroplastics breaking down. A UK Water Industry Research (UKWIR) project has confirmed that existing treatment processes effectively remove 99.9% of microplastic particles from treated wastewater using a robust approach to sample and detect microplastic particles. We need more scientific evidence about microplastics, so we are contributing to research with other water companies, through UKWIR, on 'known unknowns' about microplastic sources, pathways, behaviour, fate and abundance within water and wastewater treatment.

Given the level of uncertainty in the need and appropriate technologies to meet any treatment expectations, our adaptive pathway does not include for any improvements to meet future requirements related to these areas. In many cases it could require complete rebuilding of WRCs – including those being upgraded in the coming years for other drivers – and we would seek to work with regulators and stakeholders on the timing of any improvements.

The trigger and decision points will be related to future iterations of the WINEP and business planning cycles.

9.6 Reduce hydraulic flooding risk

Our computer predictions have shown there are almost 5000 locations that are at significant risk of flooding. These are computer predictions and most of them are not substantiated by actual reports of flooding.

Those that are predicted to flood frequently (every 5 years) are more likely to be actual problems than those that are only predicted to flood every 50 years.

To address these flooding issues, the feasible options contained a blend of both traditional and nature based options.

As stated in Table 11 the cost to address this scale of flooding would be £2.5 billion.

9.7 Other adaptive plans

The above adaptive pathways were included in our data table.

We are starting to think of other adaptive plans that we could include in future cycles of our DWMP. These have not been included in our data tables for cycle1, but we will develop these for cycle 2 DWMP and possibly the long term delivery strategy.

9.7.1 Sea level rise adaptive plan

Sea level rise as a consequence of climate change is predicted to occur by 2100. This is a long way off, but could have significant implications, especially in low lying conurbations like Weymouth and Poole.
Many surface water sewers and storm overflows may need to become pumped in the future, to give a positive discharge, against the higher sea and river levels.

We are currently working in partnership in Bristol looking at the implication of sea level rise and higher river levels due to higher flood defences. We review the shoreline management plans and work closely with the Environment Agency to check our strategies align with other stakeholders strategies.

Trigger point would be a notable rise in average sea levels, or a notable increase in temperature, which would indicate sea levels will rise going forwards.

9.7.2 New technology adaptive plan

Technological development and adoption can play a significant role to increase efficiency by reducing costs and improving outcomes.

An example of this we are hoping for is technology to monitor and communicate the performance within our 35,000 km of sewers. Low cost monitoring is becoming more available, but the communication element and the battery technology requires a significant improvement.

Artificial intelligence is becoming more useable in processing data. See our StormHarvester smart system in Section 8.5. We have also recently innovated in using AI to automatically code CCTV footage. This will save costs allowing us to inspect more sewers.

10. Publishing our plan and next steps

10.1 Reporting and communicating our plan

Our DWMP website and a DWMP portal are available online, so customers, developers and stakeholders have visibility of our DWMP. The website has the DWMP reports and the DWMP portal contains more information, including over 200 drainage strategy summary reports, storm overflow performance data, 17 infiltration reduction summary reports and a regional infiltration reduction report.

The 5 reports we have produced available to download from our DWMP website (here)[83] are:

- a customer-facing document
- a non-technical summary
- a technical summary
- the plan, including annexes (short technical appendices)
- technical appendices
    - Customer research
    - Environmental report (SEA and HRA)
    - Resilience

Over 200 drainage strategy reports are also available on the geospatial DWMP portal. The new DWMP data tables and commentary are also downloadable appendices.

10.1.1 Customer-facing document

The customer-facing document is a brochure summarising why the plan has been developed, what it represents, how it has been produced and a high-level summary of what the company is proposing to deliver in the near, medium and long-term to maintain levels of service.

10.1.2 Non-technical summary

The non-technical summary outlines the plan in an easily accessible and readable format. It includes the background, high level drivers and levels of service against which risk is assessed, the stakeholder and customer engagement process, links to other plans, the evidence base and proposed solutions at the appropriate level of detail.

The audience is envisaged to be stakeholders and partners and organisations external who are planning and managing, infrastructure, flood risk and the environment.

10.1.3 Technical summary

The technical summary builds on the non-technical summary, by going into more detail. around the approaches taken in developing and producing the plan. This will include approaches to uncertainty, scenario planning and adaptive pathway approaches where appropriate, and the cost benefit analyses. It is envisaged that the technical summary will

provide greater detail on the outputs of the assessment and the mechanisms used to derive the final preferred near, medium and long-term plan, underpinned by engagement.

10.1.4 The plan

The plan is this report that you are reading. It is a full report intended for key stakeholders and regulators to gain a better understanding of our drainage and wastewater infrastructure and plans.

Additional data generated through the creation of the DWMP is provided through our DWMP portal (see section 10.1.6 and Appendix A). This portal provides details which include:

- Risk based catchment screening results
- BRAVA results
- Problem characterisation results
- Infiltration reduction plans
- Drainage and wastewater strategies (level 3 reports)

These are described in section 6 and Appendix A.

10.1.5 DWMP Appendices

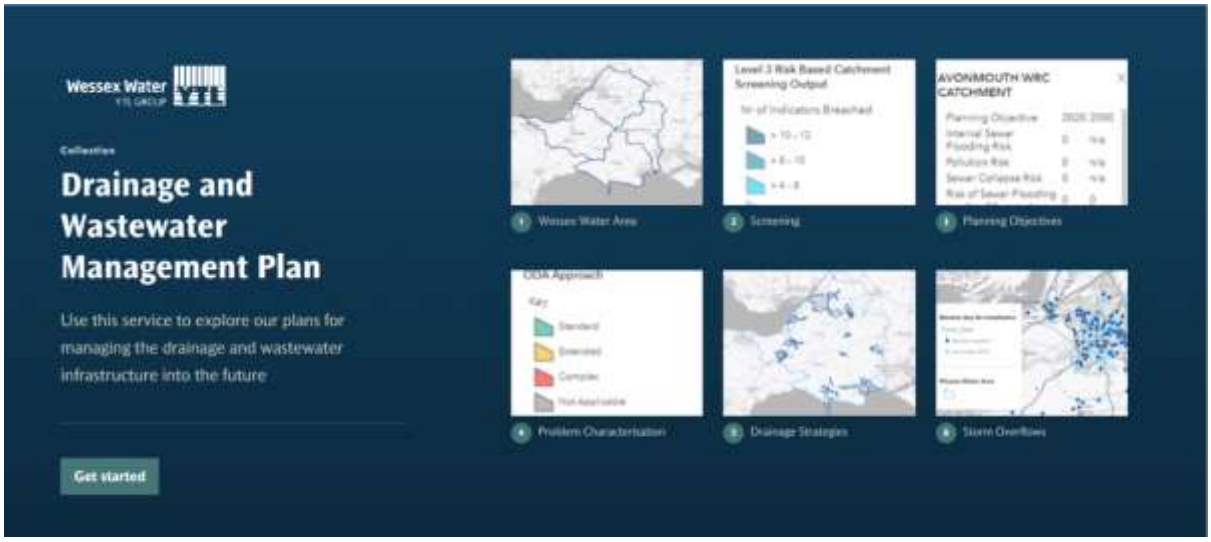
The eight appendices that are downloadable from our website[83] are:

Wessex DWMP Appendix A - The DWMP portal and Drainage strategies
Wessex DWMP Appendix B – Customer research
Wessex DWMP Appendix C – Environmental report
Wessex DWMP Appendix D – Resilience
Wessex DWMP Appendix E – Board assurance statement
Wessex DWMP Appendix F – DWMP data table
Wessex DWMP Appendix G – DWMP data table commentary
Wessex DWMP Appendix H – Glossary and references

10.1.6 The DWMP website and portal

The Wessex Water DWMP website[83] (Figure 65) contains a brief summary of our DWMP and access to the DWMP portal. The DWMP portal is geospatial platform that contains the results and outputs from our DWMP.

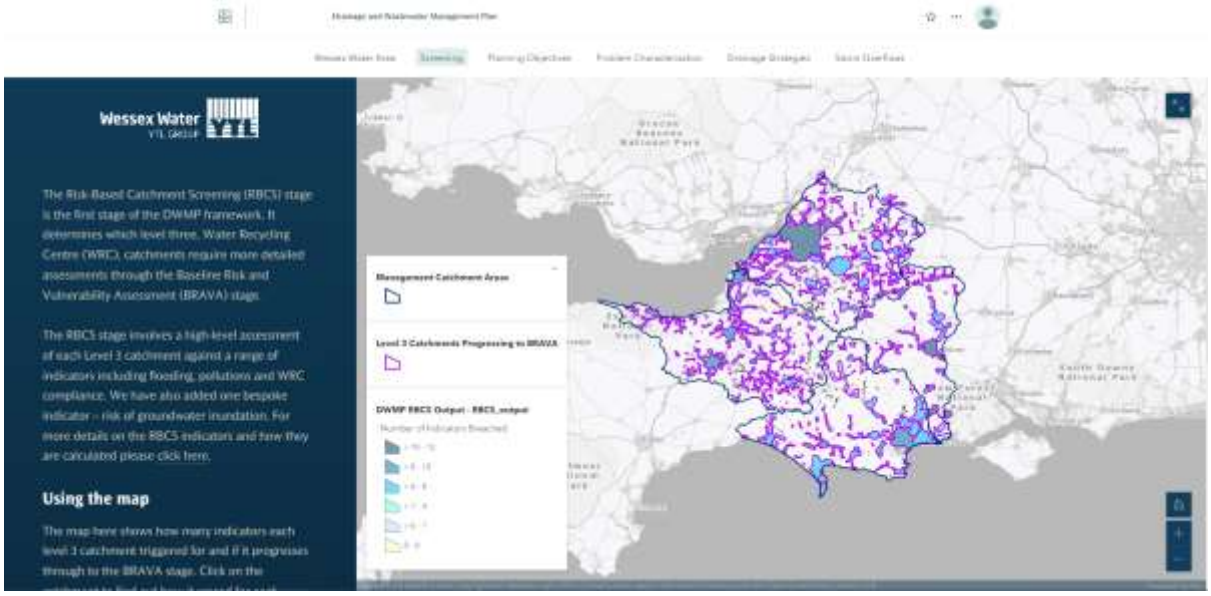
Figure 65: Wessex Water's DWMP website



Risk based catchment screening results

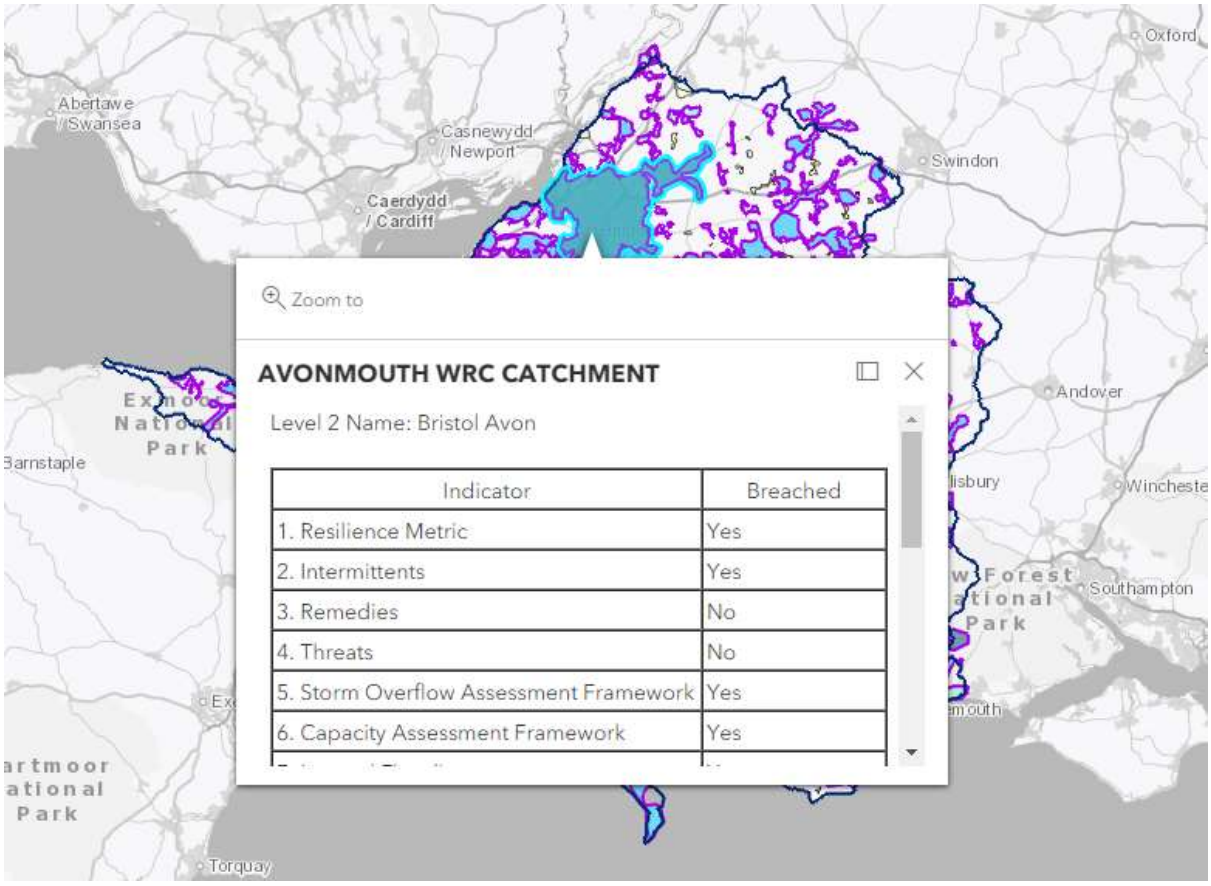
The 'screening' tab refers to the risk-based catchment screening results. For each of the level 3 (WRC catchment) areas you can see the results of the RBCS process including which of the 18 indicators were breached in the catchment. A breach doesn't mean a failure – it just indicates a risk. Figure 66 shows an example of the RBCS results on the portal.

Figure 66: RBCS results



Clicking on a level 3 (WRC) catchment area brings up a pop-up box to show which of the 18 indicators were 'breached' during the RBCS stage. This does not mean failure, but there is a risk.

Figure 67: RBCS results



Planning objectives (BRAVA results)

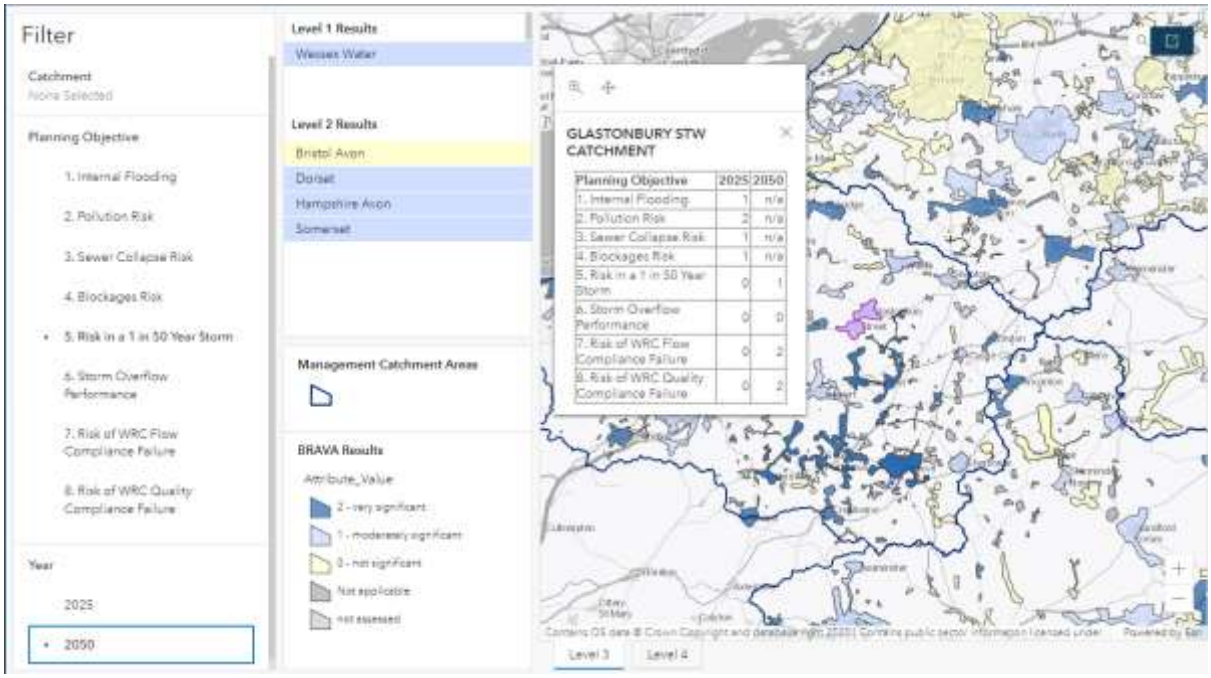
The Baseline risk and vulnerability assessment (BRAVA) stage of the DWMP assessed the level of risk for each level 3 WRC catchment that progress through the RBCS screening stage. Each of these level 3 catchments, were assessed whether the catchment contained risks for the 12 planning objectives, now and in some cases in the future.

Figure 68 shows an example of our geospatial portal which contains the details of the BRAVA results on the Planning objectives tab.

The filter pane on the left, allows you to select which planning objective results to view on the map. Some allow you to also select either the baseline position or the future position, so you can see regionally how risks increase over time.

Again clicking on a catchment brings up a pop-up box with each planning objective risks now or in the future for the selected level 3 WRC catchment.

Figure 68: Planning objectives (BRAVA) results

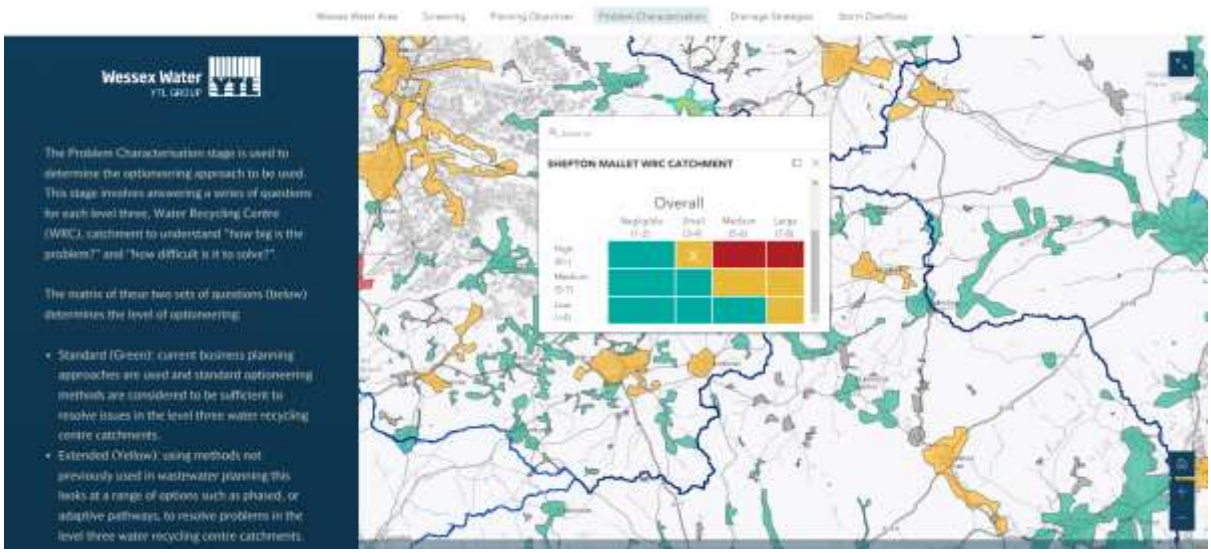


Problem characterisation results

The problem characterisation stage asks, “how big is the problem?” and “how difficult is the problem to solve?” for each of the level 3 catchments assessed as having risk in BRAVA. The results are plotted on a matrix and decides what level of optioneering is require for each catchment; standards, extended or complex.

See section 7.6 for more information and Figure 69 which shows an example of our geospatial portal which contains the details of the problem characterisation results. Again results are available at level 3 WRC catchment level.

Figure 69: Problem characterisation results



Drainage and wastewater strategies (level 3 reports)

The drainage and wastewater ‘strategies’ tab contains over 200 drainage strategy summary reports. They give background information for each reported catchment, including development likelihood. The strategies summarise what we are doing in the short, medium and long term in each level 3 catchment reported. Figure 70 shows the drainage strategies tab on the portal.

Figure 70: Wessex Water’s DWMP portal showing local Drainage Strategies

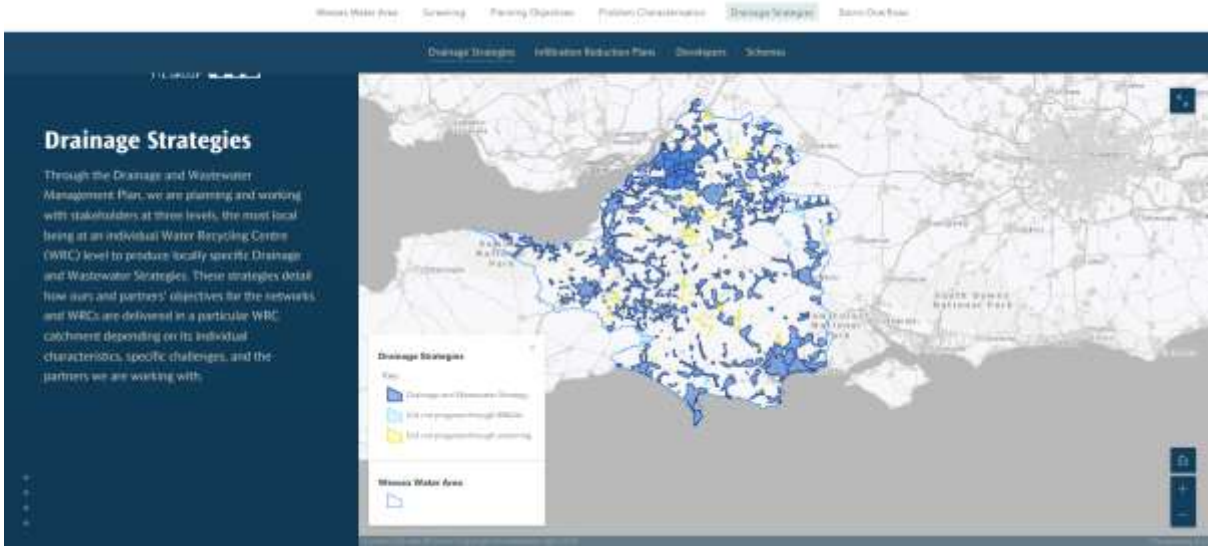
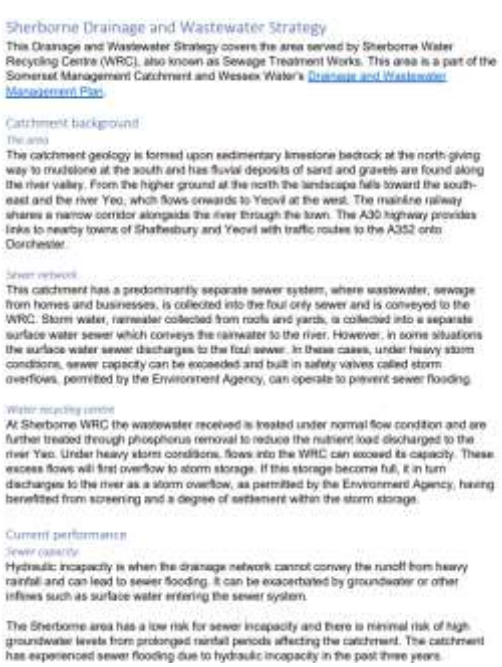


Figure 71: Wessex Water’s DWMP portal showing local Drainage Strategies (2)


Sherborne Drainage and Wastewater Strategy

This Drainage and Wastewater Strategy covers the area served by Sherborne Water Recycling Centre (WRC), also known as Sewage Treatment Works. This area is a part of the Somerset Management Catchment and Wessex Water's Drainage and Wastewater Management Plan.

Catchment background

The area

The catchment geology is formed upon sedimentary limestone bedrock at the north giving way to mudstone at the south and has fluvial deposits of sand and gravels are found along the river valley. From the higher ground at the north the landscape falls toward the south-east and the river Yeo, which flows onwards to Yeovil at the west. The mainline railway shares a narrow corridor alongside the river through the town. The A30 highway provides links to nearby towns of Shaftesbury and Yeovil with traffic routes to the A352 onto Dorchester.

Sewer network

This catchment has a predominantly separate sewer system, where wastewater, sewage from homes and businesses, is collected into the foul only sewer and is conveyed to the WRC. Storm water, rainwater collected from roofs and yards, is collected into a separate surface water sewer which conveys the rainwater to the river. However, in some situations the surface water sewer discharges to the foul sewer. In these cases, under heavy storm conditions, sewer capacity can be exceeded and built in safety valves called storm overflows, permitted by the Environment Agency, can operate to prevent sewer flooding.

Water recycling centre

At Sherborne WRC the wastewater received is treated under normal flow condition and are further treated through phosphorus removal to reduce the nutrient load discharged to the river Yeo. Under heavy storm conditions, flows into the WRC can exceed its capacity. These excess flows will first overflow to storm storage. If this storage become full, it in turn discharges to the river as a storm overflow, as permitted by the Environment Agency, having benefitted from screening and a degree of settlement within the storm storage.

Current performance

Sewer capacity

Hydraulic incapacity is when the drainage network cannot convey the runoff from heavy rainfall and can lead to sewer flooding. It can be exacerbated by groundwater or other inflows such as surface water entering the sewer system.

The Sherborne area has a low risk for sewer incapacity and there is minimal risk of high groundwater levels from prolonged rainfall periods affecting the catchment. The catchment has experienced sewer flooding due to hydraulic incapacity in the past three years.

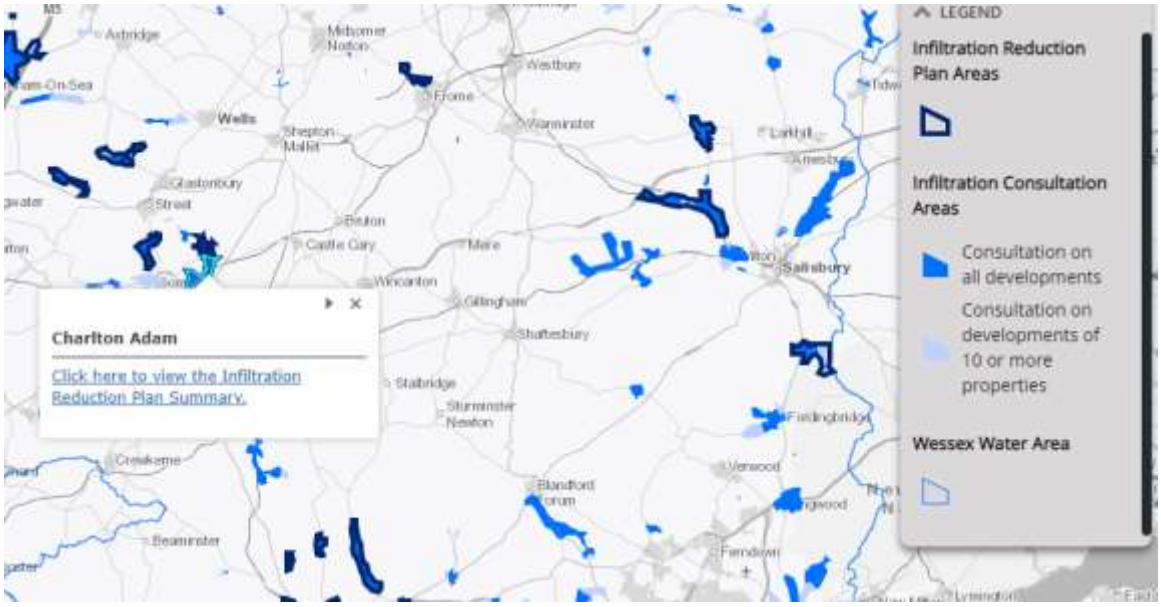
Bristol level 3 catchment (Avonmouth WRC) serves almost 1m customers. To add more detail we have created level 3b drainage strategy reports for 10 sub-catchments in Bristol (Figure 72).
You may need to click on the right arrow to see the more local drainage strategy.

Figure 72: Wessex Water's DWMP portal showing local Drainage Strategies (2)

Infiltration reduction plans

The infiltration reduction tab on the portal allows you to click on a catchment (dark blue) to see the infiltration reduction plan summary in that catchment, as shown in Figure 73. If there isn't a report, then the regional report also briefly details how much sewer inspection and sealing has been undertaken and when we are next planning on going more work.

Figure 73: Example of how to view the infiltration reduction plans



Storm overflow performance

The portal also contains other useful information like storm overflow historical performance, as shown in Figure 74. This data is also available in a downloadable excel file containing the historical performance of storm overflow where available.

Figure 75 shows the functionality that if you zoom in, the view changes and the size of the overflow indicates spill frequency and the colour weather the overflow is influenced by groundwater inundation or just surface water.

Figure 74: Storm overflow performance – regional view

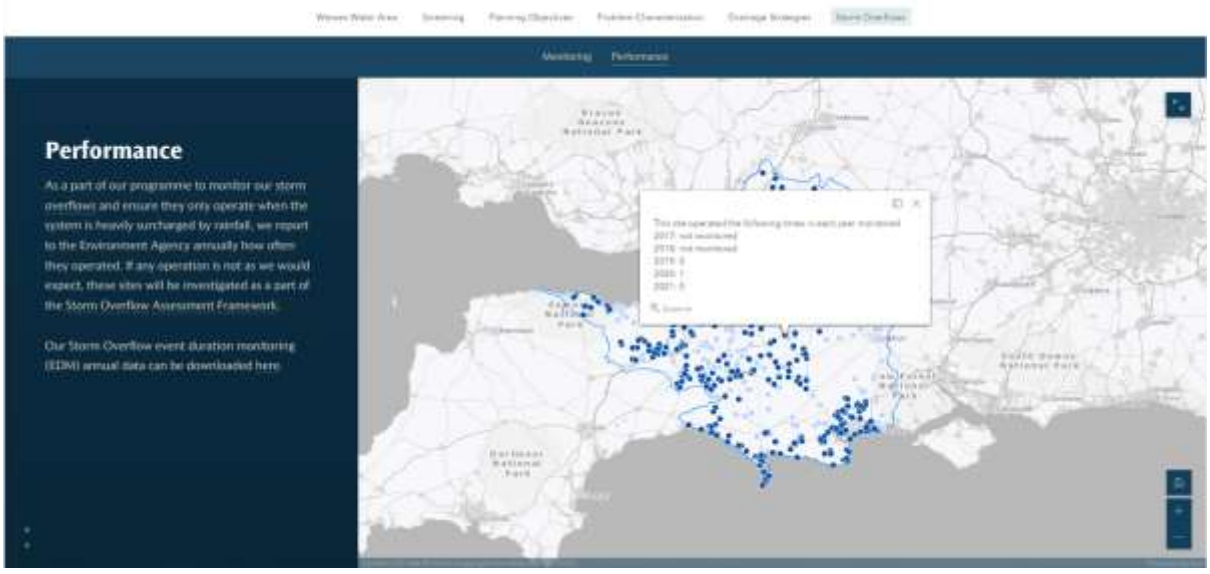
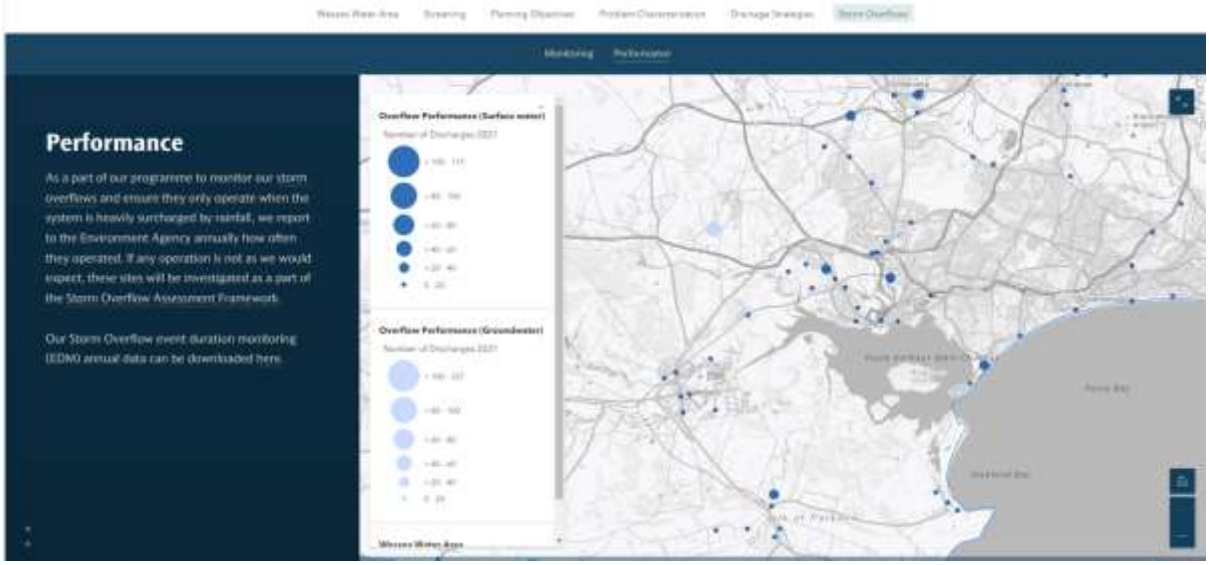


Figure 75: Storm overflow performance – zoomed in view



10.2 Next steps

This was the first time we have delivered a DWMP. It has been a challenging journey due to the complexities of the nature of discrete sewerage systems and changing expectations.

We are working with WaterUK on the cycle 1 to cycle 2 review group to have lessons learned and make further improvements for getting more consistent DWMPs across all companies.

We review our DWMP annually to check for adaptive path change requirements and whether large previously unknown developments are being proposed. We will fully update the DWMP in 2028 or before if needed.

Annex A: Glossary and References of related documents

This Appendix is also available to download as a separate document for ease of reading and reference. Please go to our DWMP website technical appendices.

Glossary of terms

Acronym	Full	Description
12/24	12/24-hour spill counting technique for overflows defined by the EA	The storm overflow spill frequency calculation uses this to say roughly how many days a year storm overflows discharge.
AMP7, AMP8 etc.	Asset Management Plan	5-year Asset Management Plan starting in AMP7 (PR19) started in 2015, AMP8 (PR24) starts in 2025 etc.
BaNES	Bath and North East Somerset	BaNES is a unitary council area
BACP	Bristol Avon Catchment Partnership	
BART	Bristol Avon Rivers Trust	
BCP	Bournemouth, Christchurch and Poole	BCP unitary council
BRAVA	Baseline Risk and Vulnerability Assessment	A stage in the DWMP framework that assesses of the risks for each sewer catchment to understand the current system performance and future vulnerabilities against various planning objectives
CaBA	catchment based approach	
CAF	Capacity assessment framework	A 21st Century drainage/WaterUK that assesses the available and future capacity within a sewer system to cope with current and future pressures.
Capex	Capital expenditure	
CBA	Cost benefit analysis	
CBR	Cost benefit ratio	
CCTV	Closed-circuit television	CCTV equipment used for inspecting sewers etc.
CCWater	Consumer Council for Water	Statutory consumer body for the water industry. CCWater represent the interests of our customers.
CIPP	Cured in Place Pipelining	
CIWEM	Chartered Institution of Water and Environmental Management	
Consent	See ‘Permit’	

Creep	Urban creep	Development at a small scale that increases impermeable areas, e.g. where over time gardens are paved over to make driveways.
CSO	Combined Sewer Overflow	These are now called storm overflows
DAP	Drainage Area Plan	DAPs were the name of previous planning frameworks before the DWMP
DCLG	Department for Communities and Local Government	Now called the Ministry of Housing, Communities and Local Government (MHCLG).
DEFRA	Department for Environment, Food & Rural Affairs	Government department covering the water and environment sectors
DST	decision support tools	
DWF	Dry weather flow	DWF is the average daily flow to a wastewater treatment works during a period without rain. It can be expressed as an average flow or a daily volume. DWF normally excludes seasonal groundwater inundation.
DWMP	Drainage and wastewater management plan	Long term planning framework setting out how water companies must extend, improve, and maintain a robust and resilient drainage and wastewater system. The Environment Act calls this the Drainage and sewerage management plan. DWMP are produced in partnership with other stakeholders.
DWMP portal	Drainage and wastewater management plan portal	The Wessex Water geospatial viewing platform hosted on our website
EA	Environment Agency	WaSC environmental regulator
EDM	Event duration monitoring	This equipment monitors storm overflow spill durations to calculate the 12/24 spill counts
ELMS	Environmental Land Management Scheme	
EO	Emergency Overflow	An overflow which is Permitted to operate when assets fail
FCERM	Flood and Coastal Erosion Risk Management	
FE	Final Effluent	Treated discharges from WRC to the environment
FFT	Flow to full treatment	Flow being treated by the WRC
FIO	faecal indicator organisms	these are types of bacteria found in mammal intestines that are both common, easy to cultivate and survive well outside of their natural environment
FRMP	Flood risk management plan	EA produce FRMP in partnership with other stakeholders

FSO	Frequently spilling overflow	Storm overflows that are deemed to be spilling too frequently. The threshold of frequent is being reviewed by Defra.
FOC	Flooding other causes	Flooding of properties or areas by sewage that is not the result of hydraulic overload (rainfall) but caused by other issues such as blockages (e.g. due to wet wipes, fat, oils and grease), tree roots or mechanical failures
FOG	Fats, oils and grease	FOG should not be put down sinks because when it cools it coagulates and clogs up sewers causing flooding and odour issues.
FTS	First time sewage	Section 101a of the industry act requires, and if viable, for sewerage companies to connect wastewater from private properties which are or could be causing pollution.
GIS	Geographic Information System	Geospatial viewing software. An example is our DWMP portal on our website.
GO	generic options	
HACP	Hampshire Avon Catchment Partnership	
Hydraulic capacity	Hydraulic capacity	Hydraulic incapacity that could be a hydraulic flood risk
Hydraulic model	Hydraulic computer model of the sewerage network or WRC	Computers are used to replicate sewer network performance in DWF and typical or extreme rainfall scenarios. They are used to predicted what options would resolve storm overflow and flooding risks.
HRA	Habitats regulations Assessment	
Hydraulic overload	Hydraulic overload	When a sewer is overwhelmed by incoming flows (rainfall/groundwater).
IDB	Internal Drainage Boards	
Level 1	Level 1	Wessex area
Level 2	Level 2	Catchment partnership area
Level 3	Level 3	WRC catchment area
ModeFronteer	ModeFronteer	
MCERTS	Monitoring certification scheme	Equipment that is calibrated and certified annually
LLFA	Lead local flood authorities	RMA Responsible for all local flood risk
MHCLG	Ministry of Housing, Communities and Local Government	Formerly called DCLG, has a role in to supporting local development and promoting economic growth
My Maintenance		WW job scheduling and recording system used across the sewerage network. Some functions have moved to WAM in recent years.
NFM	natural flood management	

NIC	National Infrastructure commission	The NIC assesses infrastructure needs, reported in the National Infrastructure Assessment, and recommends action to the government.
NIRS	National incident recording system	EA records of pollution incidents
NRV	Non-return valve	Valves that prevent backing up from surcharged sewers
ODA	Options Development and Appraisal	Stage in the DWMP framework to assess the options to the issues prioritised in previous stages.
OFWAT	The Water Services Regulation Authority	Body responsible for economic regulation of WaSC
OFWG	Operational Flood Working Group	Chaired by BaNES
Opex	Operational expenditure	
Optimatics	Optimatics	Optimatics DST
pe	Population equivalent	This includes domestic population and the flows from commercial properties and trade effluents (converted to population equivalent)
Permit	Environmental permit	Formerly referred to as consent, the EA document which sets out legal conditions associated with the operation of an asset, e.g. a pumping station, storm overflow, WRC etc..
PFF	Pass forward flow	Flow rate that is pumped forward to treatment (for pumping stations)
PFR	Property flood resilience	
PIRP	Pollution incident reduction plan	
PO	Planning objective	A performance or activity measure used in the DWMP framework
PHCI	Poole Harbour Catchment Initiative	
PR24	Periodic review 2024	Business plan submission to Ofwat in 2024 for the next 5-year AMP cycle (e.g. PR24 relates to the eighth submission, hence AMP8 covers 2025 to 2030)
Problem Characterisation	Problem Characterisation	Stage in the DWMP framework to ask how big the problem is and how difficult would it to resolve, at a level 3. Determines the level of optioneering required (standard, extended or complex).
Qnn	Percentage quartile	The nnth percentile (may refer to river flow, or pollutant concentration)
RAPID		WW's customer incident reporting and management system

RBC	River basin catchment	DWMP Level 2 area, which represent the watershed of a catchment.
RBCS	Risk Based Catchment Screening	An early stage in the DWMP framework top screen out catchments that don't have risk. Catchments with risk go to the BRAVA stage.
RCP	Representative Concentration Pathways	RCP represent climate changes predictions, as adopted by the Intergovernmental Panel on Climate Change (IPCC) and the latest UK Climate Projections (UKCP18).
RBMP	river basin management plans	
Rising mains	Rising mains	Pipes that convey pressurised flows from SPS.
RMA	Risk management authority	RMAs have specific responsibilities for flood and coastal erosion risk management. They are defined in the FWMA2010 and include a number of organisations such as the Environment Agency, lead local flood authorities, unitary (or district) councils, Internal Drainage Boards, Highways England and water and sewerage companies.
SMF	Service Measure Framework	
RNAG	reasons for the waterbodies not achieving good ecological status	
SiteID	Unique asset identification number	Wessex Water 5- or 6-digit identifier for sites, e.g. pumping stations, storm overflows, treatment works etc.
Storm overflow	Storm overflow	Storm overflows are permitted assets that act as relief mechanism to prevent flooding during heavy rainfall.
SODRP	Storm overflow discharge reduction plan	The government's Storm overflow discharge reduction plan[108]
Stormpac	Stormpac	Software for producing time series of rainfall data
SCI	Stour Catchment Initiative	
SMP	Shoreline management plan	
SOAF	Storm overflow assessment framework	Framework published in 2018 to address FSOs. This is likely to be superseded / updated by Defra's new policy.
SPS	Sewage pumping station	SPS lifts sewage from the low spot in a catchment through rising mains to another location.
SSO	Settled storm overflow	SSOs are usually storm tanks at a WRC but can be in the networks. The storage reduces the load of the discharge by setting the solids so cleaner water discharges.

STW	Sewage Treatment Works	STW are now known as Water Recycling Centres
SuDS	Sustainable urban Drainage Systems	SuDS are sustainable surface water management measures to keep rainfall close to where it lands, so it doesn't enter sewers. SuDS can mimic natural drainage through infiltration, attenuation, and passive treatment.
SWPS	Surface water pumping station	Pumps surface water flow, not sewage.
SWIMS	Sewage Waste Information Management Systems database	WW software that visualises the flow data at some WRC and SPSs
T&F	Task and finish	Task and finish group
Totex	Total expenditure	Includes capex and opex costs in a 5-year cycle
UDG	Urban Drainage Group	CIWEM UDG
UKWIR	UK water industry research	Water research
UPM	urban pollution management	Study uses water quality sampling data and computer modelling (e.g. UPM Rat, Sagis, SIMpol) to verify water quality impact of sewers
ViewPoint	Viewpoint is software package provided by Esri	A browser-based GIS used by WW for viewing sewer records and the portal
WAM	Work and asset management system	WW's service optimisation and asset lifecycle management system
WaSC	Water and Sewerage Companies	Water companies that provide both water supply and wastewater services to customers in their region.
WDRCS	West Dorset Rivers and Coastal Streams	
WIF	Waste Information Form	A summary of an incident managed with RAPID
WINEP	Water industry national environment programme	
WRFCC	Wessex Regional Flood and Coastal Committee	
WW	Wessex Water	The WaSC covering the Wessex area
WQM	Water quality modelling	
WRC	Water Recycling Centre	WRCs were formally known as sewage treatment works
WRMP	Water Resources Management Plan	Long term plan for the water resources side of the WaSC business.

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