WSX60 – Our drainage and wastewater management plan

Business plan 2025-2030

Wessex Water
YTL GROUP

FOR YOU. FOR LIFE.

This document contains our Drainage and wastewater management plan (DWMP), published in May 2023.

The full set of DWMP supporting documents – including a Non-Technical Summary Report and a Customer Summary Report – is published on our website.

The DWMP has informed our PR24 business plan requirements for wastewater networks strategy and investment. See Section 2 of WSX16 for further details as to how we have reflected the DWMP in our plan.

The Wessex area
Drainage and wastewater management plan (DWMP)

Final DWMP - May 2023

Wessex Water
YTL GROUP

1. Executive summary

Wessex Water has a privileged position as a provider of essential sewerage services to 2.8 million customers and to protect the highly sensitive environment within the Wessex area. We are proud to provide a service for customers, communities and the environment, and we desire to be an exemplar company, trusted to protect the environment and leave it in a better condition for future generations, while keeping services affordable and satisfying for customers.

This drainage and wastewater management plan (DWMP) sets out how, over the next 25 years, we will continue to invest more in our assets and the environment to ensure we have an effective sewerage system and ensure great river and coastal water quality.

Sewerage undertakers are preparing DWMPs on a five-yearly cycle in line with the DWMP framework[74] and guidance provided from the government (Defra), the Environment Agency, our environmental regulator, and from Ofwat, our financial regulator.

This is the first time the sewerage undertakers have produced DWMPs. Our draft DWMP was published in June 2022 and was subject to a 3-month consultation period to receive feedback from our customers, regulators, and other stakeholders. Annex H is our statement of response, which contains all the feedback and our responses. Your feedback is much appreciated and has helped improve this final plan.

This final DWMP will inform our investment programme for 2025 to 2030 and will set the line of sight to achieve our 25 year ambition also set out in our strategic direction statement[95].

This report is ‘the plan’ which describes our DWMP in detail, supported by the annexes and appendices. It describes why the plan has been developed, what it represents, how it has been produced. This executive summary section explains at a high-level what we are proposing to deliver in the near, medium and long-term to maintain agreed levels of service.

We have produced the following final DWMP documents (which increase in complexity and level of detail) which can be downloaded from our website:
- a customer summary
- a non-technical summary
- a technical summary
- the full plan (with annexes and links to technical appendices)

The technical appendices include the DWMP data tables and commentary.

The Wessex Water DWMP website[83] hosts these reports and a geospatial portal[82] (Figure 1) that contains a wealth of information, including storm overflow performance and almost 200 drainage and wastewater strategy summary reports. Drainage and wastewater strategies summarise our plans for the short, medium and long-term for each of the major towns and cities and explain what we are planning near you.

In response to the welcomed consultation feedback, the majority of these reports have been updated from the draft version to this final plan. Our plan has changed in response to the consultation and customer and other stakeholder engagement.

Figure 1: Wessex Water's DWMP portal showing availability of local drainage strategies

1.1 Why the plan has been developed

Climate change, population growth, increases in awareness of storm overflows (SO), tightening of environmental standards and changes in customer behaviours and expectations are putting increased pressures on drainage assets.

Drainage and wastewater management plans (DWMP) are to give visibility on how we are addressing these pressures on our drainage and wastewater systems for current and future risks. This is in line with the DWMP framework[74] which the water industry collaboratively produced in 2018.

1.2 What is a DWMP

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 sewerage long term planning.

It is a plan that identifies how we will extend, improve and maintain a robust and resilient drainage and wastewater system considering facing the pressures of climate change, population growth and growing customer and regulator expectations.

The strategic plan sets out the levels of investment required to achieve our outcomes, such as having an effective sewerage system and environmentally good water quality. It includes more investment than our draft so that we can achieve the new and tighter requirements regarding the Governments' Storm Overflows Discharge Reduction Plan requirements[108] and nutrient neutrality.

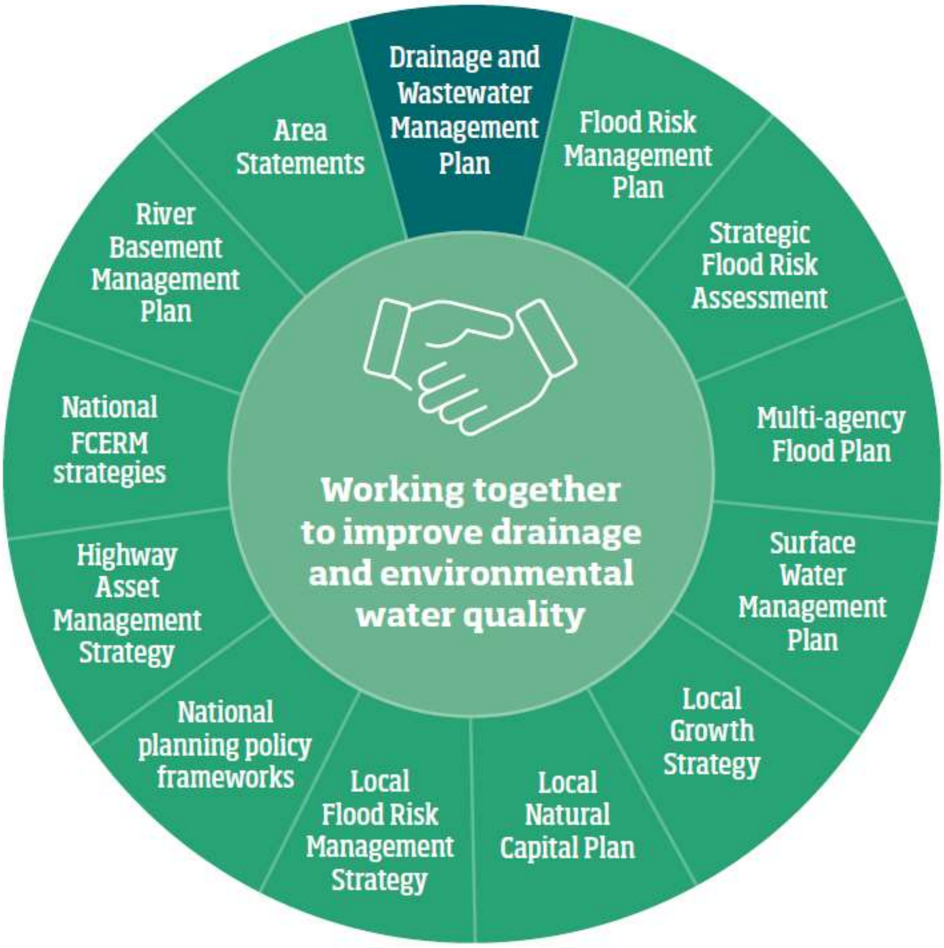
1.3 How we produced the DWMP

Throughout the development of the DWMP we have been working and engaging with numerous stakeholders, including customers, regulators (Ofwat, Environment Agency and Natural England) and flood risk management authorities (RMA), like Lead Local Flood Authorities (LLFA).

Engagement with other RMAs is essential for DWMPs because drainage responsibilities are complex - with several bodies responsible, often with some overlap. We need to continue working in partnership with our stakeholders to find opportunities to co-create water solutions for efficiencies in delivering our outcomes.

The DWMP therefore aligns with the other strategic plans, some are shown in Figure 2. The DWMP complements the other strategic plans by also giving visibility to Wessex Water's plans.

Figure 2: Alignment with other strategic plans



1.4 Where are we planning improvements

Wessex Water invests to maintain and improve its assets and performance. Given the challenges associated with climate change, growth and urban creep we recognise a significant investment is required in our assets. We consider the wider catchment area when considering where to deliver improvements. Our preference is to promote nature-based solutions to increase the resilience of drainage and wastewater infrastructure given the multiple outcomes that can be achieved in delivering water quantity, water quality, biodiversity and amenity benefits. However we also recognise that in order to achieve ambitious regulatory requirements, hybrid solutions involving a combination of storage and nature based and separation will be required. Please also see our Biodiversity action plan[111].

Over the next 25 years we are likely to undertake some work on the sewers in the area near you, if you are connected to the public sewerage system. This is because blockages can occur anywhere across any of our 35,000km of sewers due to sewer misuse, for example customers flushing wet wipes. We are planning to undertake more campaigns to make customers aware of and more responsible regarding:

- non-flushable items (wet wipes, nappies etc),
- fats, oil and grease (FOG) that can cause blockages
- not connecting rainwater (directly or indirectly) into the foul or combined sewer.

Business-as-usual activities such as the wet-wipe campaigns are funded through base expenditure, and we will have targeted increases in certain areas. Base maintenance will be detailed in our business plan submission in October 2023. The DWMP mainly includes enhancement investment which is needed to improve our performance by having a step change from base expenditure.

Water recycling centres (WRC) will continue to need to treat sewage effluent to a high standard, particularly for reducing nutrients like phosphorus and nitrogen, to achieve good water quality outcomes. Indeed, the plan has changed considerably since the draft. WRC investment in the draft DWMP was £500m by 2030, but with the tightening of Phosphorus limits, the final plan includes £1,400m by 2030.

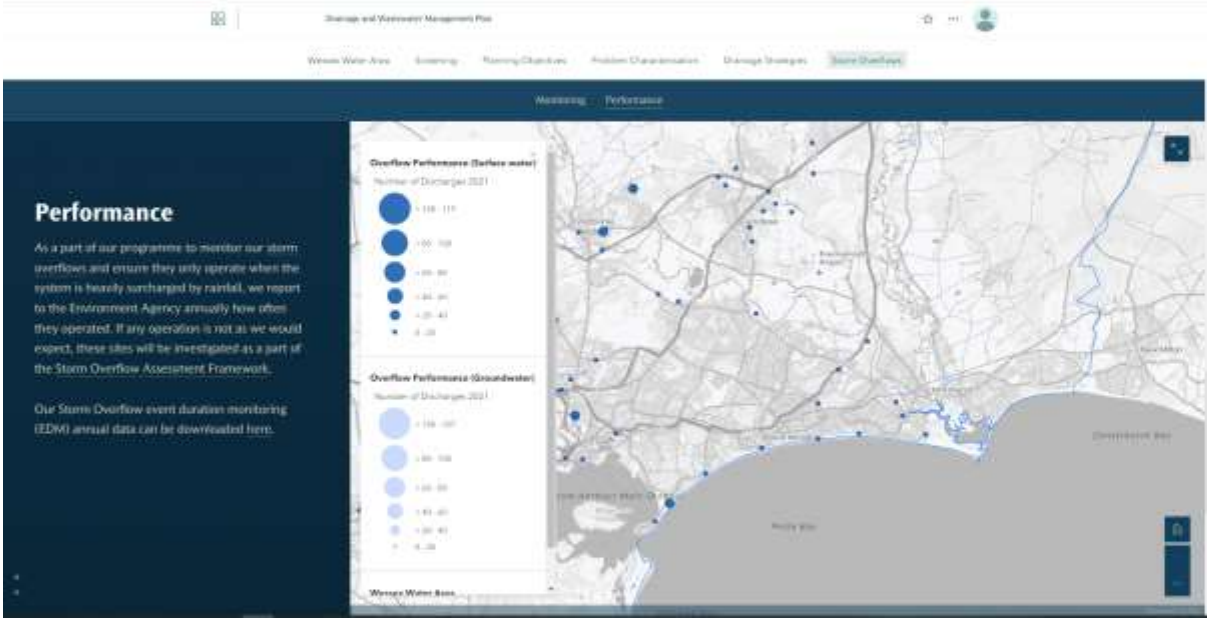
We are looking to use nature-based solutions rather than traditional grey infrastructure, where this is cost beneficial or best value. We recognise the multiple benefits that green solutions can deliver, such as biodiversity and reducing the amount of electricity and chemicals used.

Storm overflows are currently an important part of our drainage system – preventing flooding of properties and roads. There are 1300 storm overflows in the Wessex area, and many of these will need improvements to comply with the Government's storm overflows discharge reduction plan (SODRP) [108]. A large programme of storm overflow improvements has begun. This final DWMP contains more detail than the draft DWMP contained, because the SODRP has now been published and there is more certainty in the Water Industry Environment Programme (WINEP) for 2025 to 2030 requirements.

Why do storm overflows exist? Wet weather can increase the flow in a combined sewer, which conveys both wastewater from homes and businesses and storm water from roofs, yards and many highways. 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. Discharges from storm overflows into the environment are very diluted due to the large volumes of rainwater in the sewer and the receiving river, which will also be swollen by the wet weather.

As well as rainfall storm events causing increased flows, during prolonged wet periods, high groundwater levels can inundate private drains and public sewers, causing flooding and overflow discharges. Our DWMP includes investment to make more drains and sewers watertight, to reduce the risk of seasonal groundwater inundation.

Figure 3: Storm overflow performance



Our draft DWMP contained four scenarios, with different levels of ambition. The draft DWMP explored a range of sewer overflow improvement scenarios for consultation – these scenarios would require different levels of investment and would have had a range of impacts on customer bills. The consultation questions were aimed to obtain customer and stakeholder views and preference these levels of ambition verses the indicative bill increases. This has informed our final plan.

The core plan in our final DWMP is a mix of the draft DWMP core scenario and unconstrained scenario. Following the consultation comments and subsequent statutory requirement regarding nutrient neutrality, our final plan exceeds the levels of investment that we included in the draft DWMP unconstrained scenario for water recycling centre improvements.

The core investment plan has also been increased from the draft plan to be sufficient to outperform delivery of the SODRP improvements to the Environment Act's requirements. This improves storm overflow performance to discharge no more than 10 times per year on average by 2050, with a prioritised programme. Overflows discharging to sensitive waterbodies (e.g. bathing water, shellfish waters, chalk streams, designated environmental sites) need improving by 2045 and may require a higher standard so that the overflow has no local ecological harm. There is still some uncertainty with this aspect until we undertake detailed investigations (due by 2027) and the Storm Overflow Assessment Framework (SOAF)[107] is updated to reflect the new obligations.

We had ambition to go beyond the above improvements for storm overflows and included £250m extra on the PR24 WINEP, funded by savings from our proposed use of nature-based solutions for nutrient neutrality. Unfortunately, this was not agreed by regulators due to the specific wording of legislation, so this no longer forms our core plan.

Our DWMP core plan is our best value plan to achieve what we need to by 2030 and what we think is affordable beyond. There are many uncertainties, and we will need to adapt the plan in the future as these uncertainties materialise. We have applied adaptive planning to the core plan to consider the effects of uncertainty using Ofwat’s common reference scenarios and other areas of uncertainty. This looks at the future needs, regulatory changes, our outcome to eliminate untreated discharges, and the need to have to adequately adapt to climate change and meet the demands of population growth. Our approach to adaptive planning is discussed in Section 8.4.

There is also uncertainty about inland bathing waters, which are being promoted in waterbodies. Significant investment may be needed at water recycling centres and storm overflows for Wessex Water to improve assets, but farmers and private sewerage asset owners will also need to make improvements too. We are promoting all investment to be based on sound science, so are collecting more water quality data, and using artificial intelligence to innovate and make sure we invest wisely. In our final DWMP core plan, we have not included any improvement for inland bathing waters improvements, as the only currently designated inland bathing water in the Wessex area does not have any Wessex Water asset influence. We are however, planning to bring near real-time public health information to a number of popular riverine and coastal amenity locations.

To eliminate untreated discharges from storm overflows is an ambitious outcome. As set out in the plan there is a great deal that can be achieved through nature-based solutions, especially where groundwater inundation is a factor, or where surface water enters combined sewers. However, there are a large number of storm overflows where it would be very disruptive, may not be affordable (based on DWMP customer research, Appendix B, especially in the current cost of living crisis) and the carbon footprint would be enormous using current technology and approaches. For those reasons our level of ambition for improvements by 2030 is to comply with the SODRP, with a longer-term ambition to eliminate untreated discharges which will require innovative approaches to dealing with the issues as well as legislative and regulatory change to help deliver the best solutions.

1.5 Changes made in response to the consultation

Thank you to everyone who responded to the consultation on our first draft DWMP which was published in June 2022. Your feedback is much appreciated and has helped improve this final plan. The consultation closed in October 2022.

We have collated the responses to the consultation, and these are presented in Annex H - Statement of response. This includes all[1] comments received and refers to where these have been addressed in this final plan, or why they weren’t addressed in this cycle 1 DWMP.

In summary, the notable changes are:

[1] Excluding those that did not want their responses published

- Increased investment for **nutrient neutrality**, and other phosphorus-related improvements, which has increased investment by 2030 by £700m
- Investment in storm overflow by 2030 has been increased to ensure we deliver the government's **storm overflow discharge reduction plan**
- Updated the reports and drainage strategies to include more detail of the quantum of improvements on the **WINEP** for 2025 to 2030 improvements
- More focus on **nature-based solutions** where best value or best cost benefit ratio
- **Adaptive planning and common reference scenarios** have been incorporated, in a new chapter, including more detail on climate change sensitivity
- Explained **base expenditure** verses enhancement
- More detail on **partnership working** schemes
- Replaced the draft DWMP **scenarios** and replaced with **best value** (core) plan and adaptive plans.
- Updated the **environment report** (Strategic Environmental Assessment and Habitats regulations)
- Updated to include feedback from the draft DWMP consultation and included our responses
- Updated the final plan following more recent **customer and stakeholder engagement** which has informed this final DWMP and will inform our PR24 business plan submission.

Further details of updates between the draft and this final DWMP are provided in Section 2.2 and Annex H.

1.6 Our 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 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 standards
- Improving water recycling centres (WRC) by investing £1.4billion to ensure we treat the effluent to the tightening standards and accommodate growth
- Improving the performance of 148 storm overflows through a £550m investment programme
- Using nature-based solutions where best value
- Monitoring the water quality impact of WRC and storm overflow discharges which will 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 expenditure), 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.

Our DWMP core plan is our best value plan to achieve what we need to by 2030 and what we think is affordable beyond. There are many uncertainties, and we will need to adapt the plan in the future as these uncertainties materialise.

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.

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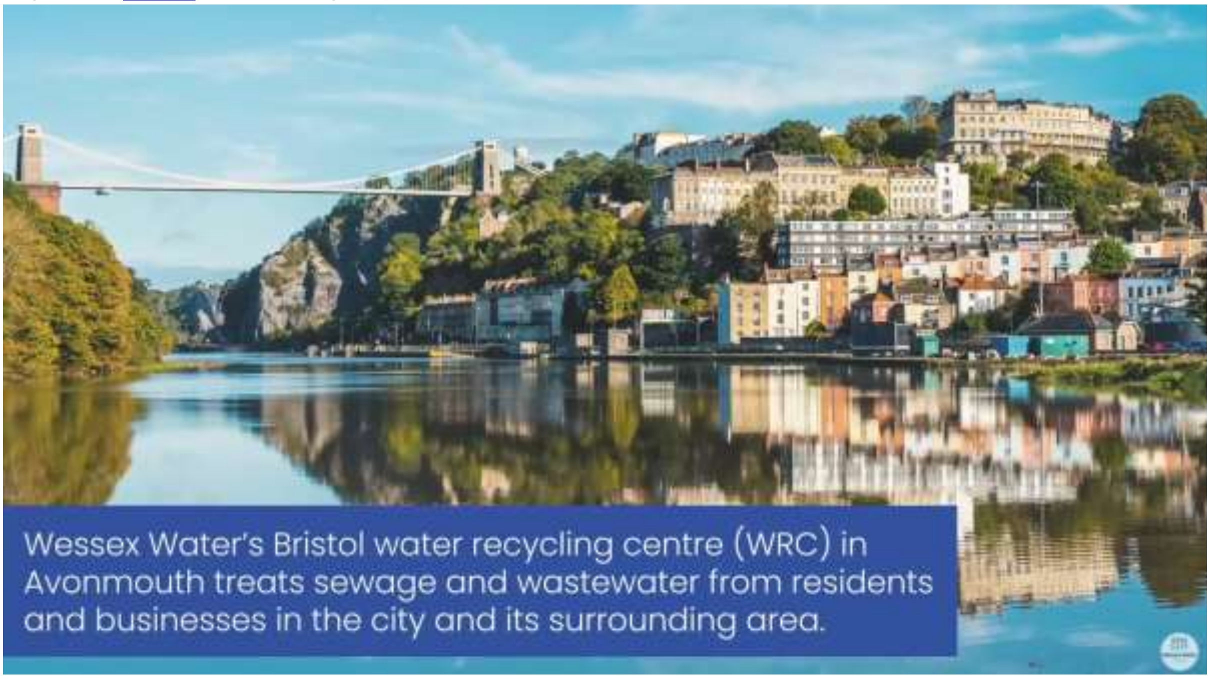
Figure 4: Video[78] showing improvements to our Avonmouth WRC, Bristol



Note: The reference numbers contained within [ ] in this document refer to the reference number of the hyperlink source. This reference number, the author and dates of the document or websites are provided in Appendix H, which also contains a glossary. It is also available to download as a separate technical appendix on the DWMP website[83].

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2. 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.

2.1 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 drainage assets.

The DWMP framework[74] was developed by the water industry and key stakeholders to provide a consistent approach across sewerage undertakers in England and Wales on how we address 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 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 that will ensure the sustainability of our drainage infrastructure, and the services it provides to customers and the environment.

The aims of the DWMP set out in the DWMP Framework[74] are to:

- set out the company's assessment of long-term drainage and wastewater capacity and the drivers, risks and scenarios being planned for
- provide a clear, transparent and consistent planning approach, with sufficient agility and adaptability to respond to long-term drivers for drainage and wastewater services
- assess where (largely drainage) infrastructure managed by other stakeholders may impose additional risks to drainage and wastewater services
- identify those options that offer best value to customers and the environment, ensuring robust, resilient and sustainable drainage and wastewater services in the long-term
- show how their long-term plans support economic growth, resilient communities and how they protect and enhance the environment, providing greater environmental resilience and long-term sustainability
- demonstrate a structured and auditable approach to identifying and developing options and presenting a robust investment plan
- facilitate the integration of partnership working and co-creation of solutions to understand the related works of others and deliver, where possible, integrated solutions that provide multiple benefits to achieve best value to the economy, society and the environment over the long-term
- facilitate innovation (instigated by identifying future challenges that will need new approaches to address them) and the development of affordable, sustainable investment plans
- promote informed debate about acceptability of different levels of risk
- provide greater confidence to customers, regulators and stakeholders in strategies identified, and resultant plans
- provide the basis for effective engagement with customers and stakeholders on levels of service, environmental performance and resilience, now and for the future and on the choices and costs to customers in providing that service.

To produce our first 5-year cycle DWMP, we are following the DWMP framework[74] and other guidance, such as the recently issued document DWMP Guiding principles for the water industry[6], which provides government and our regulators' priorities and expectations of the DWMP. This identifies the following key guiding principles:

- Be comprehensive, evidence based and transparent in assessing, as far as possible, current capacity and actions needed in 5, 10 and minimum 25-year periods. considering risks and issues such as climate change. Plans should also align, as far as possible, with other strategic and policy planning tools.
- Strive to deliver resilient systems - that will meet operational and other pressures and minimise system failures.

- Consider the impact of drainage systems on immediate and wider environmental outcomes including habitats and in developing options for mitigation to include consideration of environmental net gain and enhancement.
- Be collaborative - recognising the importance of sectors working together to consider current and future risks and needs and to deliver effective solutions, setting out how they will do this, how they have engaged with and responded to stakeholders.
- Show leadership - in considering the big picture for an organisation’s operational capacity to develop and deliver the plan, and mindful of linkages with other strategic planning frameworks.
- Improve customer outcomes and awareness and solutions and actions that provide both value for money and consider societal benefits.

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 (see Figure 24).

Figure 5: Wessex Water region and lead local flood authority areas

Wessex Water provides sewerage services to 2.8 million customers, Figure 5 shows the geographic area. This includes major cities including Bath and Bristol and many areas of outstanding beauty, like Poole Harbour. Figure 5 also shows the 10 lead local flood authorities (LLFA) that we liaise closely with to ensure flood risk is managed. We also liaise closely with the LLFA and local planning authorities to ensure that drainage is considered for development applications.

The production of a DWMP is not currently statutory for WaSCs to produce a DWMP, but Wessex Water do have an Ofwat performance commitment to deliver this first cycle DWMP. The Environment Act 2021 states that from April 2023 onward it will become a statutory requirement to produce a DWMP every 5 years.

2.2 Changes made in response to the consultation

We have made many changes following feedback from the consultation and other new obligations. This list is not exhaustive but contain the more significant changes.

2.2.1 Updated plan and reports as a result of the consultation

We received some good feedback from the consultation of our draft DWMP last year. We have listened and tried to incorporate as many changes as possible in producing this final DWMP. Some items will need to wait until the next cycle. Our statement of response to the consultation is provided in Annex H. This contains an explanation or links to where in our final plan we have addressed the feedback.

Our core plan has changed since the draft, with the biggest changes being nutrient neutrality and storm overflows, which are discussed below. There is more certainty with the WINEP, so our drainage strategies (c200) have been updated to mention the scale of storm overflow improvements and WRC improvements in the short and medium term.

The environmental report (Appendix C) has also been updated to reflect the larger investment programme by 2030 that is include in the core plan.

2.2.2 Nutrient neutrality

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, as understood at the time.

Since the publication of our draft DWMP, the WINEP has continued to be refined. One area of extensive change is that of 'nutrient neutrality'. Elevated nutrient (phosphorus and nitrogen) levels cause eutrophication, which is particularly affecting some designated sites within our region:

- Hampshire Avon SAC

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

Natural England require all development within these catchments to be nutrient neutral. Based on the draft of the Levelling-up and Regeneration Bill (LURB) currently going through Parliament, it is anticipated that the LURB will place a new statutory duty on sewerage undertakers 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.

We have increased investment for nutrient neutrality, and other phosphorus-related improvements, which means investment will rise from c£500m to c£1,400m by 2030.

Many of the options and proposals developed for the draft DWMP associated with improvements to WRC discharges 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 remains significant uncertainty regarding both the scope and scale of the WINEP for AMP8 and beyond.

2.2.3 Storm overflow discharge reduction plan
Investment in storm overflow improvements by 2030 has been increased to ensure we deliver the Government's storm overflows discharge reduction plan targets**.** Our draft plan included £450m for improvements, whereas our final plan includes £550m. There is still some uncertainty in this area, as discussed in Section 10.3.

2.2.4 What base buys
We have included a section (10.1.4) on base expenditure verses enhancement following a query from Ofwat. Our flooding, pollution and collapses section have been expanded to address this query.

2.2.5 Nature based approach
We have a desire to deliver more nature-based solutions. We have included more focus on nature-based solutions where best value or best cost benefit ratio has been included in the final plan.

We proposed a nature-based solution for nutrient neutrality which we proposed on the advanced water industry environmental environment programme (A-WINEP). But this was not accepted.

We have also included reed-bed/wetlands into the WINEP to treat storm overflows where groundwater has inundated drains and sewers.

2.2.6 Adaptive planning

To align more with Ofwat's PR24 long-term delivery strategies, we have added a section on adaptive planning. This includes more on the sensitivity of the common reference scenarios, including more detail on climate change sensitivity. See Section 11.

2.2.7 Partnership working

We have included more detail on partnership working schemes, following more working with stakeholders and alignment with the risk management authorities' medium-term plans.

2.2.8 Replaced scenarios with core and adaptive plans

Our draft DWMP included 4 scenarios, which included different levels of ambition. This was done to get feedback from customers and stakeholders during the consultation of the draft DWMP to their preference. This would allow us to decide which plan should be our core plan in this final DWMP. See Table 1 for the different levels of ambition. The sound science scenario is the same investment as the core, but delayed investment - this was not supported.

Table 1: Summary of the draft DWMP scenarios indicative costs

Indicative 25-year Totex enhancement expenditure (£m)	Core scenario	Full scenario	Unconstrained scenario	Sound science scenario
Environment – WRC	2,500	2,500	2,500	2,500
Environment – Storm overflows	3,000	12,000	18,000	3,000
Effective sewerage	880	880	3,750	880
Sewerage infrastructure asset maintenance	280	280	1,500	280
Total indicative cost	**6,660**	**15,660**	**25,750**	**6,660**

The majority of respondents expressed a preference for the core plan, rather than the other plans. Customers and stakeholders wanted us to invest sooner, rather than waiting for sound science to allow more informed decisions.

The core plan in this final DWMP therefore is based on the draft core plan but includes extra expenditure in nutrient neutrality and storm overflows, as these are now statutory obligations.

We have also undertaken a lot of work for the WINEP in deciding the best value solutions, rather than the lowest cost. This used 30-year whole life costs and the monetised carbon disbenefits and other benefits.

Our preferred plan is not really an adaptive pathway but a different level of ambition. Our Strategic Direction Statement (SDS) states our aim is to completely eliminate untreated discharges by 2050. This DWMP has identified that the cost and carbon implications of this are significant. In this first cycle DWMP we will prefer our SDS, but that may change following the affordability and carbon implications going forward.

We have included a new chapter, Section 11, on adaptive pathways. This is to address the uncertainty of the future regarding:

- Climate change
- Growth
- Technology
- Asset health
- Wet wipes being banned
- WRC uncertainties

2.2.9 Customer and stakeholder engagement

Since the draft plan we have continually engaged with our customers to understand their willingness to pay and their preferences. We have updated the final plan following this recent customer and stakeholder engagement which has informed this final DWMP and will inform our PR24 business plan submission. See section 6.9.

2.2.10 Great environment and biodiversity

Our environmental ambition matches that of the Water Industry Strategic Environmental Requirements (WISER)[17].

Drainage systems can have an impact on the environmental including habitats, aquatic ecology and water quality. Our WINEP contains agreed schemes to make improvements to our assets that we, or our environmental regulators (Environment Agency, Natural England) as well as other stakeholders, have identified as having an impact that needs improving.

WINEP schemes require that a cost benefit assessment has been undertaken. This includes evaluating the carbon impacts as well as the wider environmental outcomes and benefits.

The larger schemes, generally at WRCs, have also been subject to the Strategic Environmental Assessment and Habitat Regulation Assessments, as reporting in Appendix C.

The WINEP has many drivers including aquatic biodiversity, fish recovery and biodiversity. We are proposing a biodiversity outcome so we can align more with the WISER and local nature recovery strategies, especially where local authorities have declared ecological emergencies. Please also see our Biodiversity action plan[111].

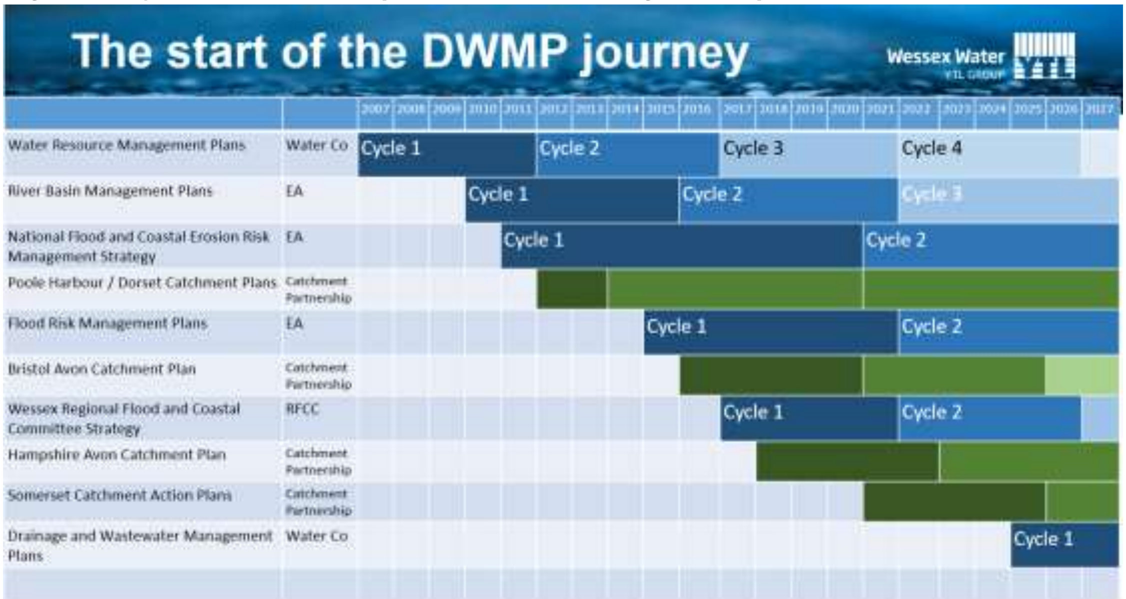
There are many waterbodies that are used for recreational use. Locals and campaigners for wild swimming have a desire for more inland bathing waters. However, these are not currently designated bathing waters, so we could not add the schemes onto the WINEP for improvement over the next 5 years. If they become designated, we will include on future WINEPs. We are investigating some potential locations for water quality, such as Warleigh Weir, near Bath. Please see section 5.1.1 for more background on this. We are due to appoint a River Recreation Liaison Officer who will focus on working with local groups and councils to identify appropriate inland recreational sites and/or formalise those which are currently used. This will enable us to gather data to help facilitate safer future use of inland locations for recreation and inform future investment requirements.

2.3 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, shown in Figure 2, with some being described further below in Figure 6 and Section 6.

Figure 6: Cycle of DWMP compared to other strategies and plans



2.3.1 Wessex Water: Water resource management plans

Water resource management plans (WRMPs) ensure that water resources are adequate to meet the present and future demands of customers. They contain plans to make sure that there is a reliable water supply for people and businesses and to protect the environment.

There are synergies between the DWMP and WRMP, where approaches could benefit both plans. For example, separating and storing excess rainfall locally reduces flood risk and provides water resources benefits. Another option that could benefit both plans could be to reuse final treated effluent as a water resource.

2.3.2 Government: 25 Year environment plan

The DWMP reflects the ambitious nature of the UK government's 25 Year Environment Plan[20] including environmental sustainability and resilience, support for nature recovery, use of natural capital in decision-making, use of a catchment approach and delivery of net gain for the environment. For this first cycle draft DWMP we are achieving ambitious targets, but some of these concepts are new and will evolve through to the final DWMP and future iterations.

2.3.3 Environment Agency: Water industry national environmental programme (WINEP) roadmap

The WINEP roadmap[19] sets out how the following strategic planning frameworks are beginning to align more closely, with the aim to bringing together collaborative programmes.

The following is an extract from the WINEP roadmap that shows the alignment ambition for the PR24 WINEP and other strategic planning frameworks:

> '***Actions for PR24 WINEP***
> *Government and regulators will use the WINEP methodology to show how the WINEP can achieve outcomes from other statutory planning frameworks.*
>
> *Water companies will work at a catchment level. They will draw together the long-term goals from other statutory planning frameworks to understand catchment objectives for the next 25 years. This will inform their WINEP proposals and business plans.*
>
> *Water companies will include actions from other planning frameworks in the WINEP where appropriate to make sure they align with PR24's long term strategies and adaptive planning approach*'.

2.3.4 Environment Agency: River basin management plans (RBMP)

River Basin Management Plans[14] (RBMP) establish an integrated approach for the protection and sustainable use of the water environment. They set the environment quality objectives for groundwater and surface waters (including estuaries and coastal waters) and summarise the programmes of measures needed to meet these objectives. As part of the DWMP we must ensure that current and future activities, such as the return of treated wastewater, support the achievement of these objectives and prevent deterioration in water bodies.

2.3.5 Environment Agency: Flood risk management plans

The Flood Risk Regulations 2009 and Flood and Water Management Act 2010[22] require the Environment Agency and lead local flood authorities (LLFA) to do a statutory review of flood risk management plans (FRMPs) every 6 years. The plans explain the risk of flooding from coastal, fluvial and surface water and set out how risk management authorities will work with stakeholders and communities to manage flood risk. They contain objectives and specific actions, known as measures, setting out how risk management authorities will manage and plan for significant flood risks between 2022 and 2027.

The plans will support achieving the goals of the National Flood and Coastal Erosion Risk Management Strategy[11] for England, for example by identifying integrated water management and nature based solutions.

The plans include a requirement for LLFAs to co-create in the production of DWMPs.

2.3.6 Environment Agency: Shoreline management plans (SMP)

The EA produce Shoreline management plans[16] (SMP) in accordance with their policy paper. The Wessex area is covered by four SMP; two on the north coast and 2 on the south coast. Coastlines change overtime due to many reasons including weather erosion and wave action. The SMP sets out the policies for coast defence which include options to advance the line, hold the line, managed retreat and no active intervention.

Where Wessex Water assets are near vulnerable coastlines, we need to be aware of the risks and liaise with the EA as necessary. See section 10.10 and technical appendix D for more detail.

2.3.7 Councils: Local plans

The eight unitary councils and two county councils in the Wessex region also have many initiatives including:

- Surface water management plans
- Local development plans
- Local flood risk management strategies
- Strategic flood risk assessments
- Green infrastructure strategies
- Climate emergency plans

These are discussed further in section 6.3.

2.4 Board Assurance Statement

The Board assurance statement is now available as a separate document, Appendix E, which is downloadable from our website[83].

2.5 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 (Figure 1) 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. Please also see Section 12.1 and Appendix A.

2.5 Structure of this document

This report is Wessex Water's DWMP 'the plan' which describes our DWMP in detail, supported by the annexes and appendices. It describes why the plan has been developed, what it represents, how it has been produced and what the finding of it were.

This plan is divided into sections as below:

- Section 1 contains an executive summary of the DWMP
- Section 2 introduces the context of the DWMP
- Section 3 provides further background
- Section 4 describes the different planning areas (levels of granularity)
- Section 5 explains the levels of service for various planning objectives
- Section 6 shows how the plan has been co-created with stakeholders
- Section 7 describes each stage of the DWMP framework
- Section 8 describes the options stage of the DWMP
- Section 9 summarises our environmental report
- Section 10 explains our best value plan delivering the options to deliver the right outcomes
- Section 11 details adaptive pathways that have been identified to enable the plan to be modified when different decision points and trigger levels are reached
- Section 12 summarises the material on our DWMP website and introduces 'where next' for cycle 2 DWMP.

There are numerous technical appendices to provide more evidence and support for this plan. These are provided in this document as Annexes, separate Appendices or incorporated into our geospatial portal[82] on our website[83] (e.g. drainage strategies).

To show our compliance from each requirement of Defra's DWMP Guiding Principles[6] and Ofwat's expectations[32], we have provided a checklist in Annex G that points to where in our plan we provide evidence or reasons for any deviation. Similarly, in Annex H, we include the final statement of response to the draft DWMP consultation.

3. Background and overview

3.1 Wessex area and outcomes

Wessex Water is the regional sewerage business serving 2.8 million customers in the Wessex area, as shown in Figure 5. 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[2]. 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 7, 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 7: 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

[2] Our next business plan (covering the period 2025 to 2030) is known as the Price Review 2024 or PR24.

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].

Figure 8: Wessex Water PR24 goals and long-term outcomes

3.2 Wessex Water's drainage and wastewater assets

Figure 9 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 9: Wessex Water wastewater asset statistics

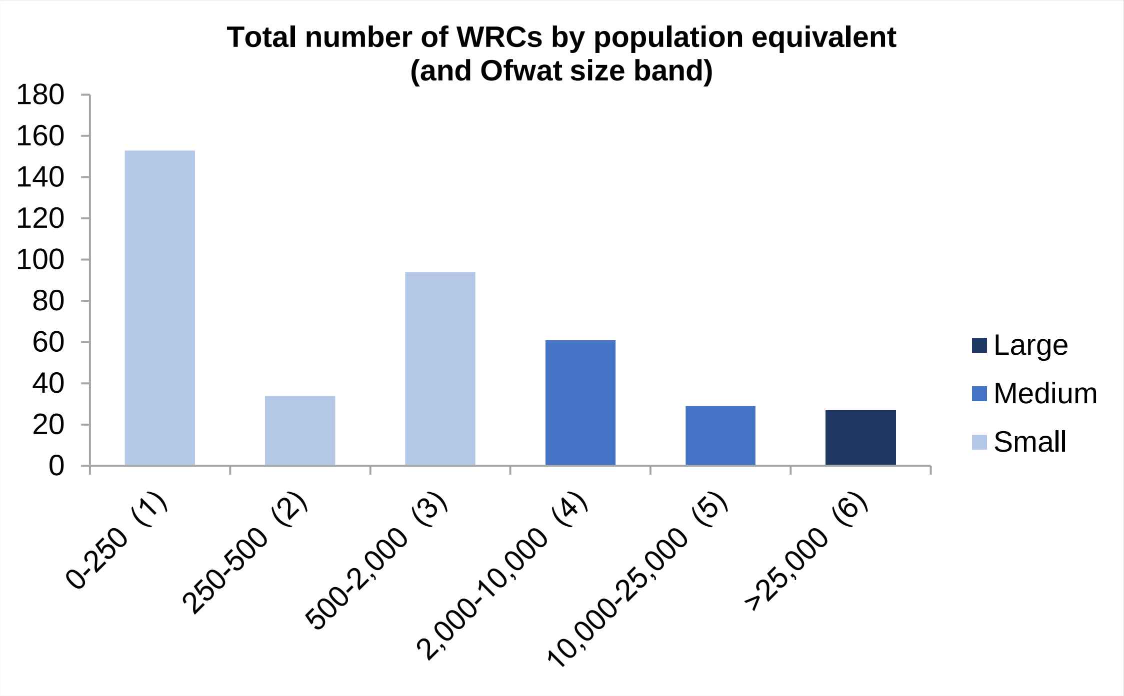
3.2.1 Water recycling centres

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 the scale, some of our smaller WRC catchements only serve a couple of houses.

Figure 10 shows the distribution of our WRCs, as per Ofwat annual 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.

Figure 10: Number and size of water recycling centres (WRCs)



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.

3.2.2 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.

A recent study by UKWIR estimated that private drains account for about 70% of the total length of drainage pipes nationally, meaning Wessex Water is responsible for only c30% of the entire network. This is a significant factor for situations where groundwater infiltration can affect sewer networks.

3.2.3 Storm overflows

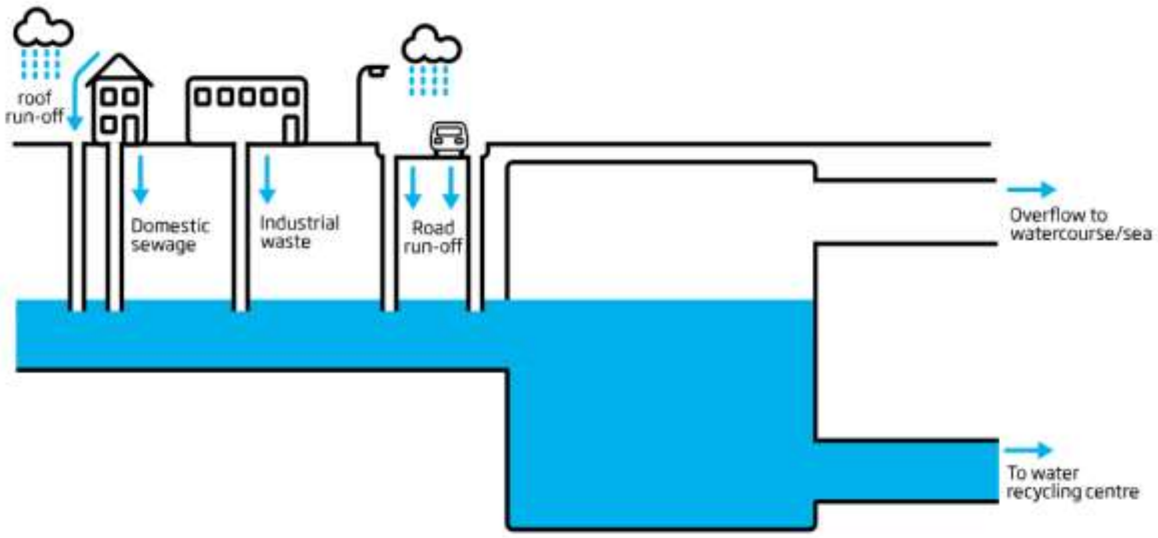
Storm overflows are currently an integral and an important part of our drainage system. Wet weather can increase the flow in a combined sewer, which conveys both wastewater from homes and businesses and storm water from roofs and driveways or paved areas. See our website for more information on storm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

Figure 11 is a schematic of how most sewage flows to treatment at a WRC, but when it rains heavily flow can overflow 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 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 11: Illustration of water sources that contribute to storm overflows



The current data linking storm overflow discharges 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 2023, stated that 9 of the 1074 reasons why waterbodies in Wessex Water's area do not meet WFD good ecological status are confirmed or probably due to storm overflow operation. These 9 reasons affect 7 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 Figure 12 shows a pragmatic solution to storm overflows 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 monitoring the quality of the discharge and discussing with the Environment Agency how to get this permitted as a treated effluent.

For more background information and what storm overflow improvements we are delivering by 2025, please see our Storm Overflows Improvement Plan – April 2023 update [94].

Figure 12: Case Study for nature-based solutions: Hanging Langford reed beds

Case Study for nature-based solutions: Hanging Langford reed beds

Hanging Langford lies in a chalk valley in Wiltshire straddling the river Wylye. In most winters, the water table rises to ground level causing localised flooding. When this occurs, the sewerage system effectively becomes a land drainage network as residents have no option to protect their properties

but to direct surface and groundwater down the sewer manholes. For many years Wessex Water, under emergency powers, had to pump out the sewerage system to the local river to provide a positive drainage system to the residents to stop downstream properties from flooding.

Upsizing the sewer network's capacity and the downstream water recycling centre to treat groundwater would have been an unsustainable solution and a new land drainage scheme would also not have solved the problem. Instead, and after many sewers in the catchment had been sealed, a large reed bed was constructed to treat the flow from the groundwater induced overflow. Sampling of the river upstream and downstream of the overflow has shown that there is absolutely no adverse impact on the watercourse resulting from this solution. In fact, the opposite is true – there is a net environmental benefit due the valuable habitat the reed bed provides for a range of species including dragonflies and warblers.

River water quality (left bottle) and influent to reed-bed (right bottle) showing the clarity of the 'raw sewage' that passes through the natural treatment process.

3.2.4 *Sewage pumping stations and rising mains*

Sewers rely on gravity to convey sewage from houses to WRCs. In addition to the gravity sewerage system, we operate 2,146 sewage pumping stations (SPS) that lift flows uphill 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 to wear than gravity sewers because of the cyclic pressures they are under at each pumping cycle. If failure of a rising main occurs, its impact is often more serious than when gravity pipes fail.

3.3 Long term planning

Long term drainage and wastewater planning is not new. We have been carrying out this for decades under the banner of 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 a re-evaluation of risks and reporting to be in a manner consistent across sewerage undertakers 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 13 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 13: 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 11.

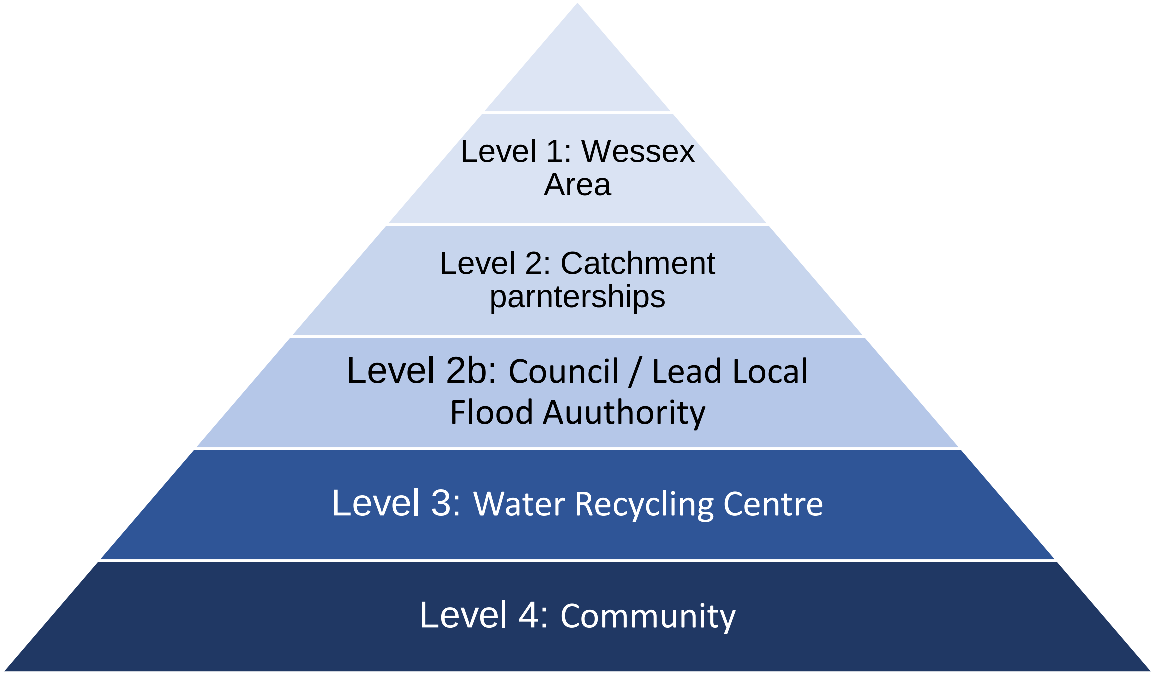
4. Planning areas

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 14).

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

- Level 1: Wessex regional area (Figure 15)
- Level 2: Catchment partnership areas (Figure 16)
- Level 2b: Lead Local Flood Authority areas (Figure 17)
- Level 3: Water Recycling Centre catchments (Figure 18)
- Level 4: Customers / community / parish council / town council areas.

Figure 14: Planning areas within the Wessex area



4.1 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 15, 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 15: Level 1 DWMP planning area – Wessex

4.2 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 16.

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 16.

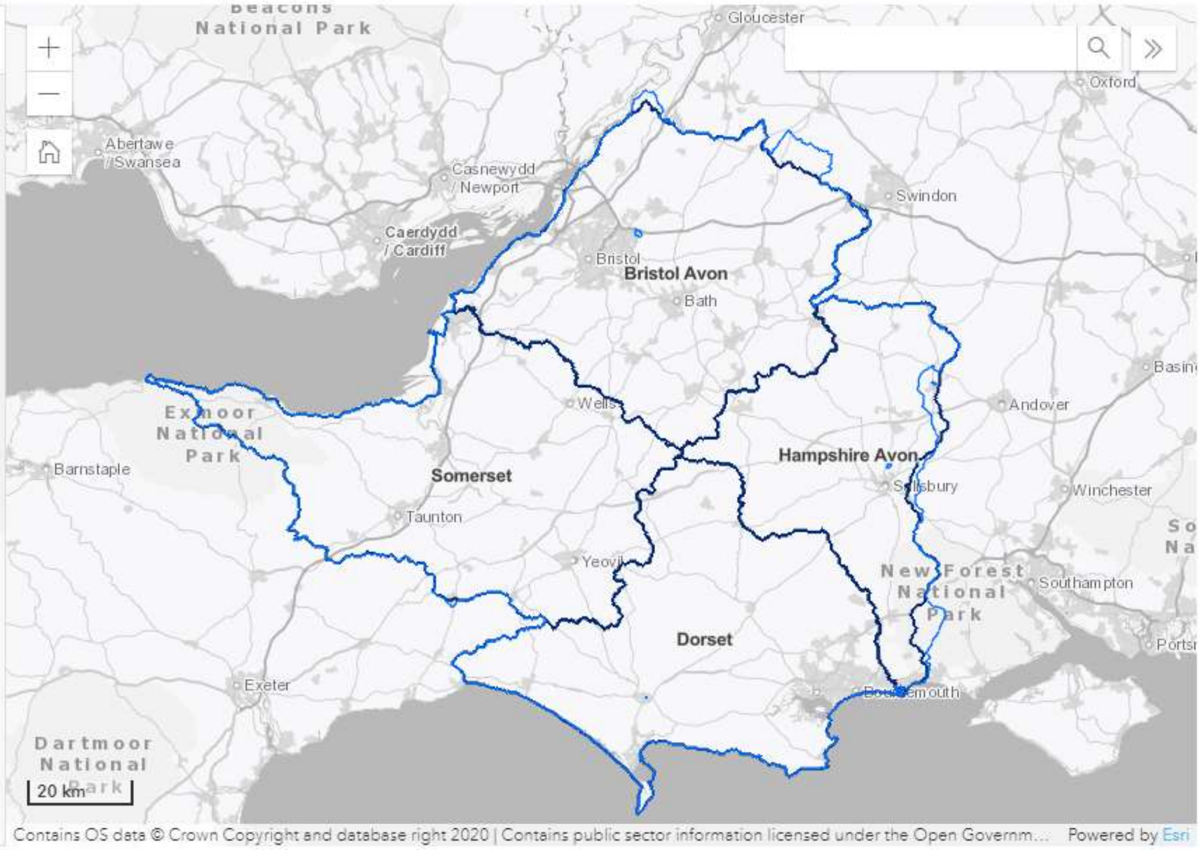
We work with all the catchment partnerships in the region and host two catchment partnerships, Bristol Avon and Poole Harbour, and co-host the Stour catchment initiative with the Dorset Wildlife Trust. Within West Dorset, there is no formal partnership for the West Dorset Rivers and Coastal Streams Catchment. 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 16: Level 2 DWMP planning area – catchment partnerships



4.2.1 Level 2b: Council areas

There are ten council areas that are within the Wessex Water area, as shown in Figure 17. 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 6.

Figure 17: Level 2b DWMP planning area – Council areas

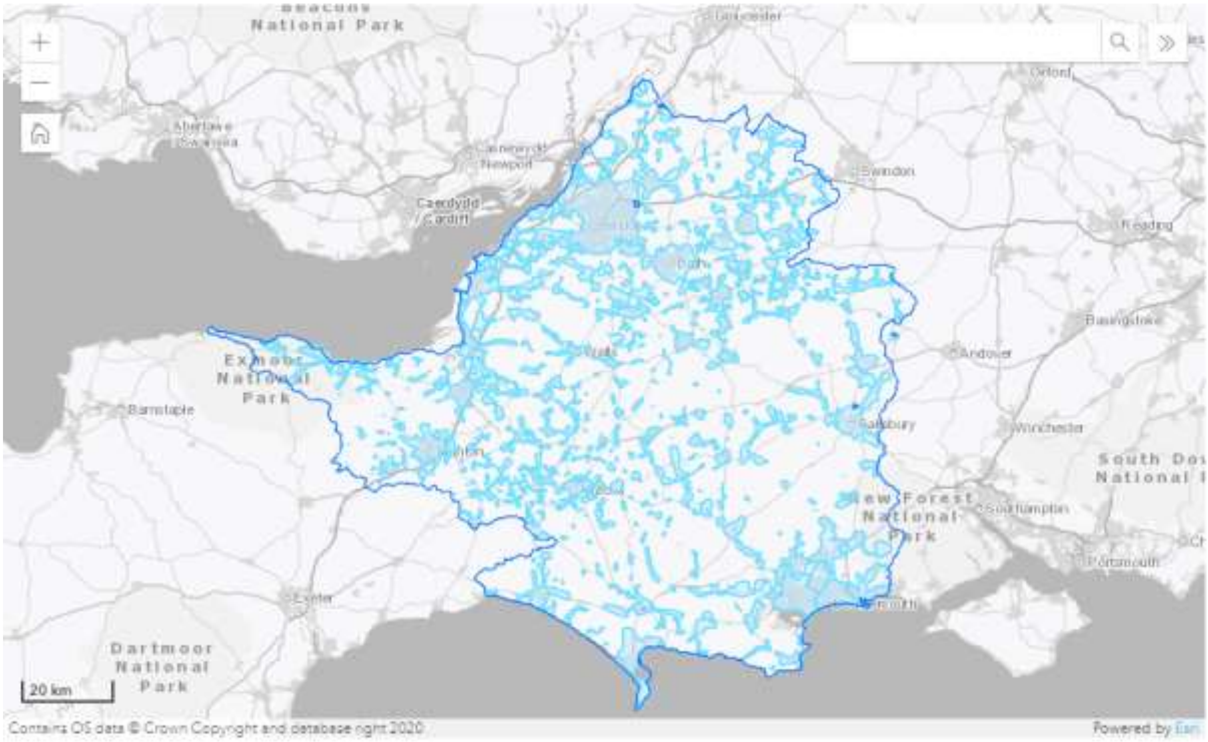
4.3 Level 3: Water recycling centre catchments

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 18.

Figure 18: Level 3 DWMP planning area – water recycling centre (WRC) boundaries



4.4 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.

5. Planning objectives and levels of service

Section 5.1 provides background and summarises the planning objectives and current and future levels of service. Each planning objective is then discussed in the following sections. Annex E is a technical appendix that contains more detail.

5.1 Summary of planning objectives and levels of service

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

The challenges associated with growth, urban creep and climate change are expected to result in reduced future resilience of drainage and wastewater infrastructure. This is likely to cause vulnerable properties to flood more regularly and storm overflows to operate more frequently with more discharge to the environment.

There has been a significant increase in political pressure regarding storm overflows in the last year, following all UK sewerage undertakers 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 sewerage undertakers, known as common planning objectives. The common planning objectives are detailed on the WaterUK website[75] and summarised in Figure 20. 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. We presented a Slido poll question asking stakeholders 'are there any other planning objectives you would like us to consider?'. The responses are shown in Figure 19.

Figure 19: Bespoke planning objectives Slido poll results

In our annual DWMP meetings in 2020 and 2021 we discussed and agreed the six planning objectives bespoke to Wessex Water (detailed in Figure 21) are as follows:

- groundwater infiltration reduction
- sustainable drainage
- partnership working opportunities
- waterbodies (river water quality) improved
- risk of water recycling centre flow compliance failure
- blockage risk

The first 3 listed bespoke planning objectives came directly out of the consultation meeting response. The last 2 objectives in Figure 21, sustainable drainage and partnership working are included to identify efficiencies and how can multiple-benefits solutions can be included in our plans by working with our partners as well as internally. The sustainable drainage objective has synergies with the storm overflow reduction targets. Where they have identified to be best value, we have included separation schemes in our storm overflow programme, even though they are not the lower cost option. We incorporated the partnership working objective to continue to work with partners to identify other wider multiple benefits, such as the council having highway flooding that we could help with our solutions to flooding or storm overflows.

Figure 20: Common planning objectives for Wessex Water's DWMP

Internal sewer flooding risk

The number of internal flooding incidents per year from all causes, including hydraulic and blockages. This is reported per 10,000 sewer connections and follows the OFWAT performance commitment.

Pollution risk

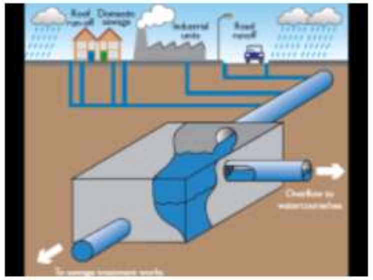
The number of category 1 - 3 pollution incidents per year. This is reported per 1,000 km of sewer network as reported to the Environment Agency.

Sewer collapse risk

The number of sewer collapses per year, including bursts to rising mains. This is reported per 1,000 km of sewer network and follows the OFWAT performance commitment.

Risk of sewer flooding in a 1 in 50 year storm

Percentage of population at risk of sewer flooding in a 1 in 50 year return period storm. This is focused on the hydraulic capacity of the network and primarily based on computer model predictions.



Storm overflow performance

Using hydraulic computer models predictions to assess the spill frequency of storm overflows.

Risk of water recycling centre quality compliance failure

Capacity of water recycling centres to treat and dispose of sewage in line with the discharge permit sanitary conditions.

Figure 21: Bespoke planning objectives for Wessex Water's DWMP

Risk of water recycling centre flow compliance failure

Capacity of water recycling centres to treat and dispose of sewage in line with the discharge permitted dry weather flow conditions.

Blockage risk

The number of blockages per year, in accordance with the OFWAT performance commitment. This is reported per 1,000 km of sewer network.

River water quality improved

Number of waterbodies improved through improvements at continuous (water recycling centres) and intermittent (storm overflows) discharges.

Groundwater infiltration reduction

Length of sewer inspected for infiltration and the length of sewer sealed for infiltration in km.

Partnership working opportunities

Number of partnership projects delivered.

Sustainable drainage

Outcome focused aimed at disconnecting impermeable area through sustainable drainage schemes.

The planning objectives for our DWMP are listed in Figure 22, 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 22: PR24 outcomes and DWMP planning objectives

Unconstrained mapping of DWMP planning objectives to outcomes	Outcomes: An effective sewerage system	Greater customer experience	Good envirnomental water quality	Incresed biodiversity	Water resource benefits	Net zero carbon	Affordable bills	Theme
WRC quality compliance	✓✓	✓	✓✓	✓	✓			
WRC flow compliance	✓✓	✓	✓✓	✓	✓			Environmental
Environment improved	✓✓	✓✓	✓✓	✓				
Storm Overflows	✓✓	✓✓	✓✓	✓	✓			
Internal flooding	✓✓	✓✓	✓	✓	✓			
Flooding in a storm	✓✓	✓✓	✓	✓				
Blockages	✓✓	✓✓	✓			✓		Effective sewerage
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, as defined in Table 2. 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.

Table 2: Level 1 and 2 Planning objectives scores being met or breached

Planning objectives	Description	Type	Scores for achieving the planning objective	Scores for breaching the planning objective
Risk of WRC quality compliance failure (% of all WRCs)	Percentage of WRCs that are non-compliant against their quality discharge parameters	Risk	0, 1 and 2	N/A
Risk of WRC flow quality compliance failure (% of all WRCs)	Percentage of WRCs that are non-compliant against their DWF discharge parameter	Risk	0, 1 and 2	N/A
Waterbodies improved	Number of waterbodies improved	Activity	1 or 2	0
Storm overflow performance	Average discharge frequency	Risk	0 or 1 with a future tightening	2
Risk of sewer flooding in a 1 in 50-year storm	Percent of properties at risk of internal flooding	Risk	0 or 1	2
Internal sewer flooding risk	Number of properties that have flooded internally	Risk	0 or 1	2
Blockage risk	Number of blockages	Risk	0 or 1	2
Pollution risk	Number of pollutions (cat 1 to cat 3)	Risk	0 or 1 with a future tightening of threshold	2
Sustainable drainage	Net area of new roof and roads drained sustainably minus new area allowed to connect to the foul/combined system	Activity	1 or 2 with a future tightening of threshold	0
Partnership working	Number of partnership schemes	Activity	1 or 2	0
Sewer collapses	Number of collapses	Risk	0 or 1	2
Groundwater inundation score	Weighted length of sewers inspected or sealed	Activity	1 or 2	0

For this first cycle of DWMPs the thresholds to determine what is a 0, 1 or 2 are company specific, as the DWMP framework deliberately didn’t specify the thresholds. The approach to thresholds is being reviewed in the cycle 1 to cycle 2 DWMP review to identify where there may be opportunities for greater standardisation of approaches (informed from Cycle 1).

Thresholds are set so that each catchment is scored in one of 3 categories (score 0, score 1 or score 2). Depending on the type of planning objective, a score of 2 could be ‘poor’ (e.g., performance related objectives), but for other planning objectives (activity based) then a score of 0 is 'poor'.

The AMP7 thresholds we have set for the planning objective scores are detailed in Annex E. For future cycles these may be tightened. For example, there may be a greater focus in making sewers watertight, if climate change results in inundation occurring too frequently, so the thresholds will need to increase.

The planning objective scores are calculated at Level 3 and aggregated to Level 2 and Level 1 scores.

Table 2 shows the planning objectives types (risk or activity) and which scores mean that the planning objective is met or breached at Level 1 or Level 2. It is not appropriate to use the scores at a level 3 to indicate planning objectives not being met; but it does indicate which catchments have higher risks to indicate where we should focus attention. The thresholds are used to highlight where planning objectives are at risk of not being met and will be used to inform future investment – they do not reflect failure. The thresholds will be subject to review at each cycle and will be modified in line with the DWMP being developed as an adaptive plan.

5.1.1 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] explains our statutory obligations and the regulators expectations and provides a strategic steer regarding:

- improving the environment
- resilience for the environment and customers
- flood risk
- relevant legal requirements

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 which considers the balance of costs and benefits, and affordability. 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 was published in mid-May 2022 and we may need to update this draft 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

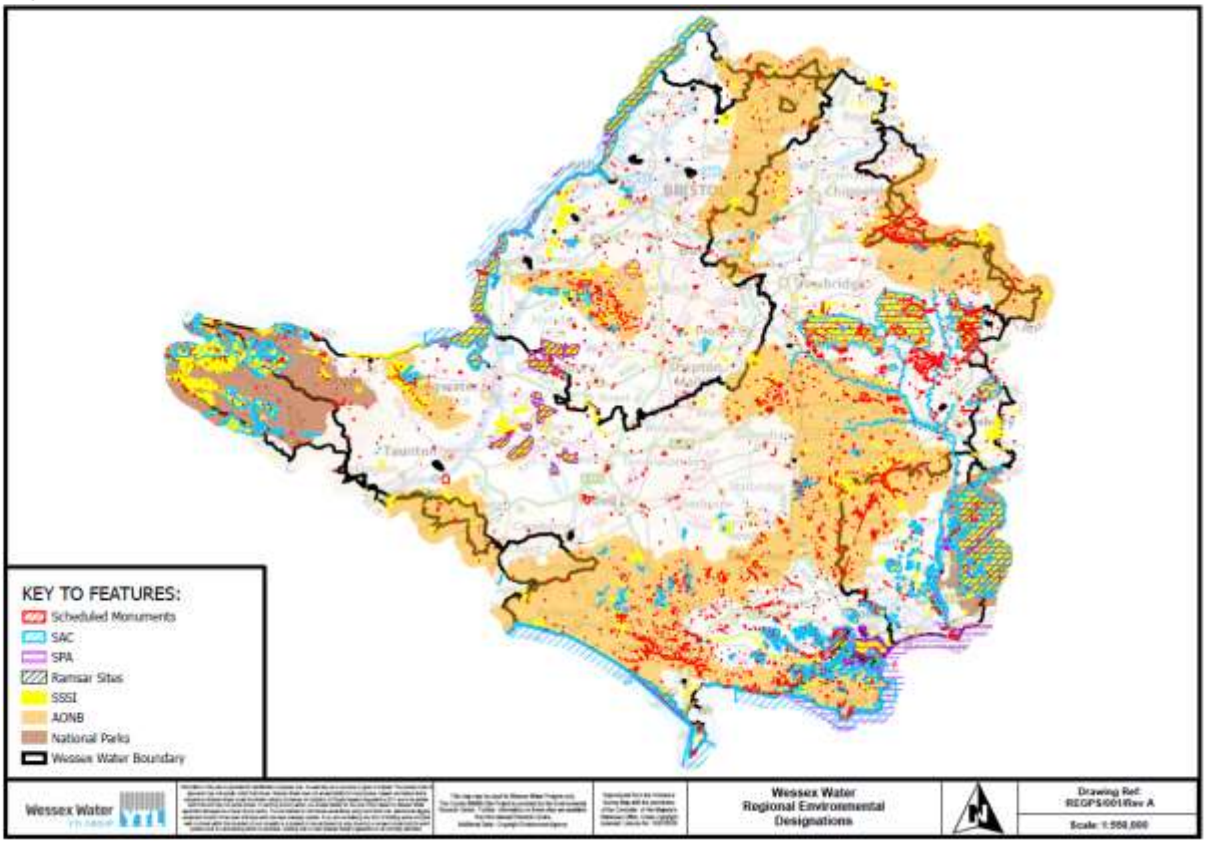
The WINEP has significant overlaps with both the water resources management plan (WRMP) and drainage and wastewater management plan (DWMP), along with capacity enhancement and capital maintenance needs.

The WINEP process is key to ensure outputs are delivered to achieve our outcomes. We 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 scale of the storm overflow programme has been influenced by the government's policy on storm overflow reduction. 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 23.

Figure 23: 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 Coast watch 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 Safer Seas (and Rivers) app.

5.1.2 Effective sewerage theme

Sewer flooding is one of the worst service failures our customers can experience, so we have invested millions to ensure we have a low number of flooding incidents inside people's homes. We also understand how distressing sewer flooding can be when flooding occurs in gardens or in public areas and have set ourselves some challenging targets.

Ofwat and CCWater's recent research on Customer experiences of sewer flooding[1] how distressing sewer flooding is. The report suggests that sewerage undertakers should make improvements to how we respond to customers that are impacted by flooding. 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 24.

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 24 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.

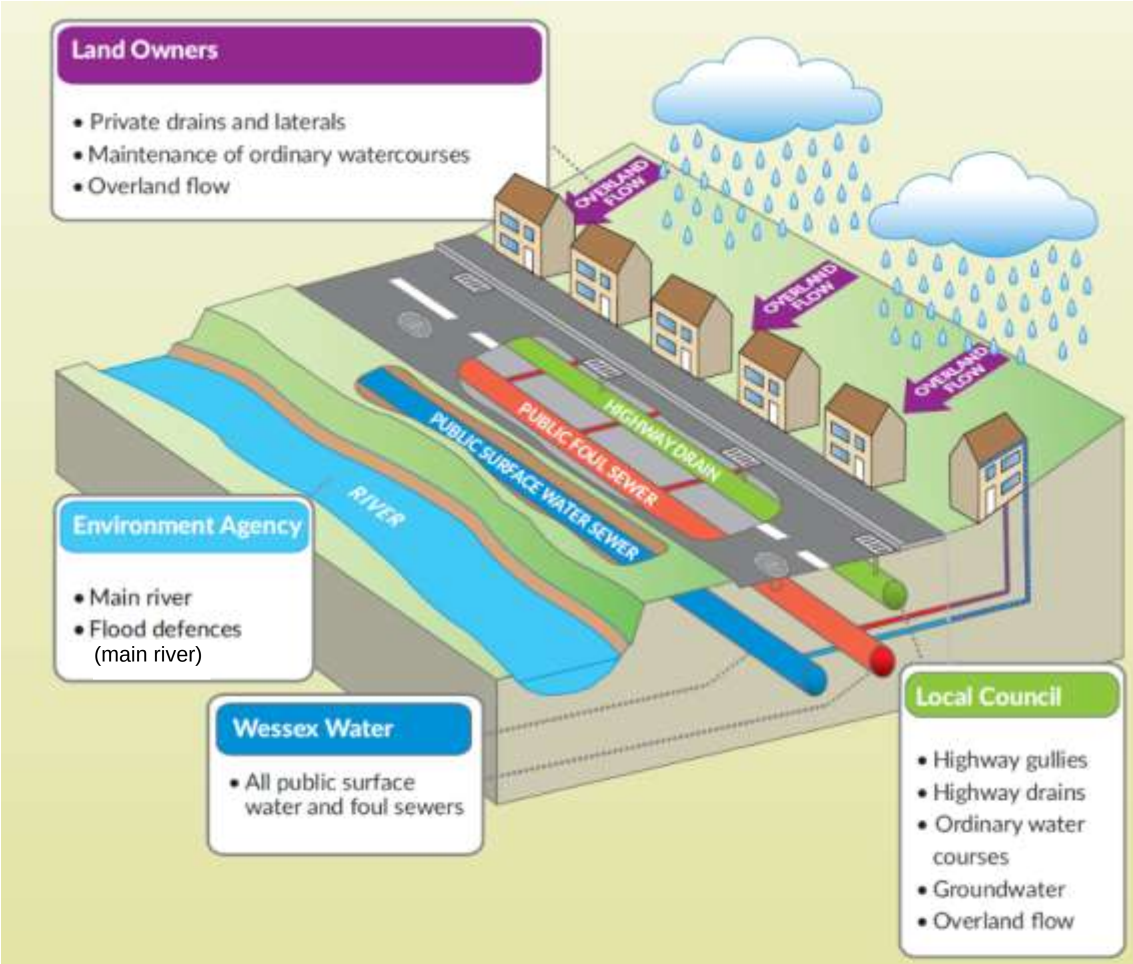
Hydraulic flooding only accounts for about 10% of flooding incidents.

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 24: Flooding responsibilities



5.1.3 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.

5.2 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.

5.3 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.

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

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

5.5 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.

5.6 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 increased rainfall intensity associated with climate change. The current target of 8.37% will increase to 12% by 2050.

5.7 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 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.

5.8 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 25. 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 25: Root causes of blockages (2018-2021)

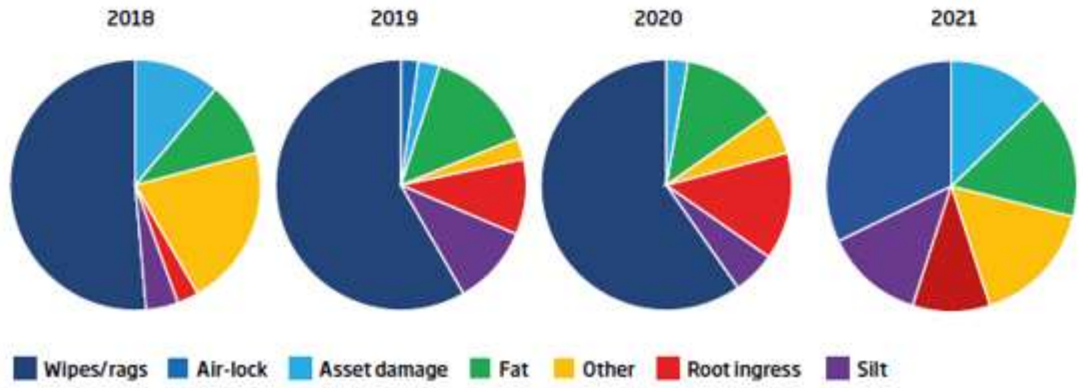


Figure 26: Publicity campaign

Figure 26 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.

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.

5.9 Pollutions

When an escape of sewage occurs[3] 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 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.

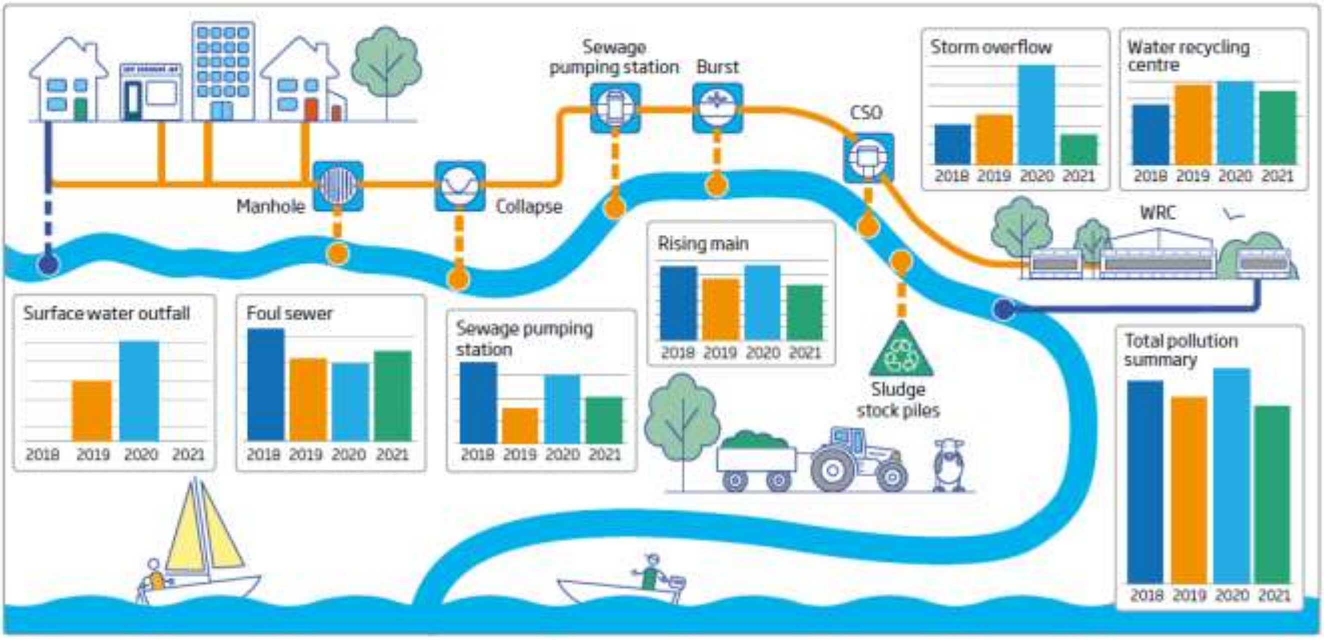
This common planning objective reports the pollution risk. It reports pollution incidents as set out in Environmental Performance Assessment (EPA) relating to wastewater assets only and thus this measure will exclude non-sewer related pollutions such as water treatment/supply assets, third party private 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 27 (an extract from our PIRP[91]) shows what caused pollutions between 2018 and 2021.

[3] 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.

Figure 27: Cause of pollutions in the Wessex area (2018-2021)



5.10 Sustainable urban Drainage Systems

Sustainable urban Drainage (SuDS) are installed to store 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 it 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 sewerage undertakers 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 28).

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 some developers are still connecting more impermeable areas 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 28: 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 the 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

5.11 Partnership working

This partnership working bespoke planning objective is to encourage all risk management 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 of partnership projects where joint funding or contributions are provided. 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.

5.12 Collapses

Collapses occur when sewers reach the end of their long life. This is an 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 suggests we should be having a step change in proactive sewer rehabilitation to match the deterioration rate and challenges posed by climate change, 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).

5.13 Groundwater inundation

Cracks or holes in sewers can allow groundwater to enter the sewers when the groundwater table is high, 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, mudstone geology in the north west and fluvial inundation of the Somerset levels and Moors during wet winters. Our video[85] explains how flooding in areas with chalk geology can impact our customers sewage services, meaning that they are unable 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.

6. Stakeholder and customer engagement

This section sets out 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 15)
- Level 2: Catchment partnership areas (see Figure 16)
- Level 2b: Lead Local Flood Authority areas (see Figure 17)
- Level 3: Water Recycling Centre catchments (see Figure 18)
- 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:

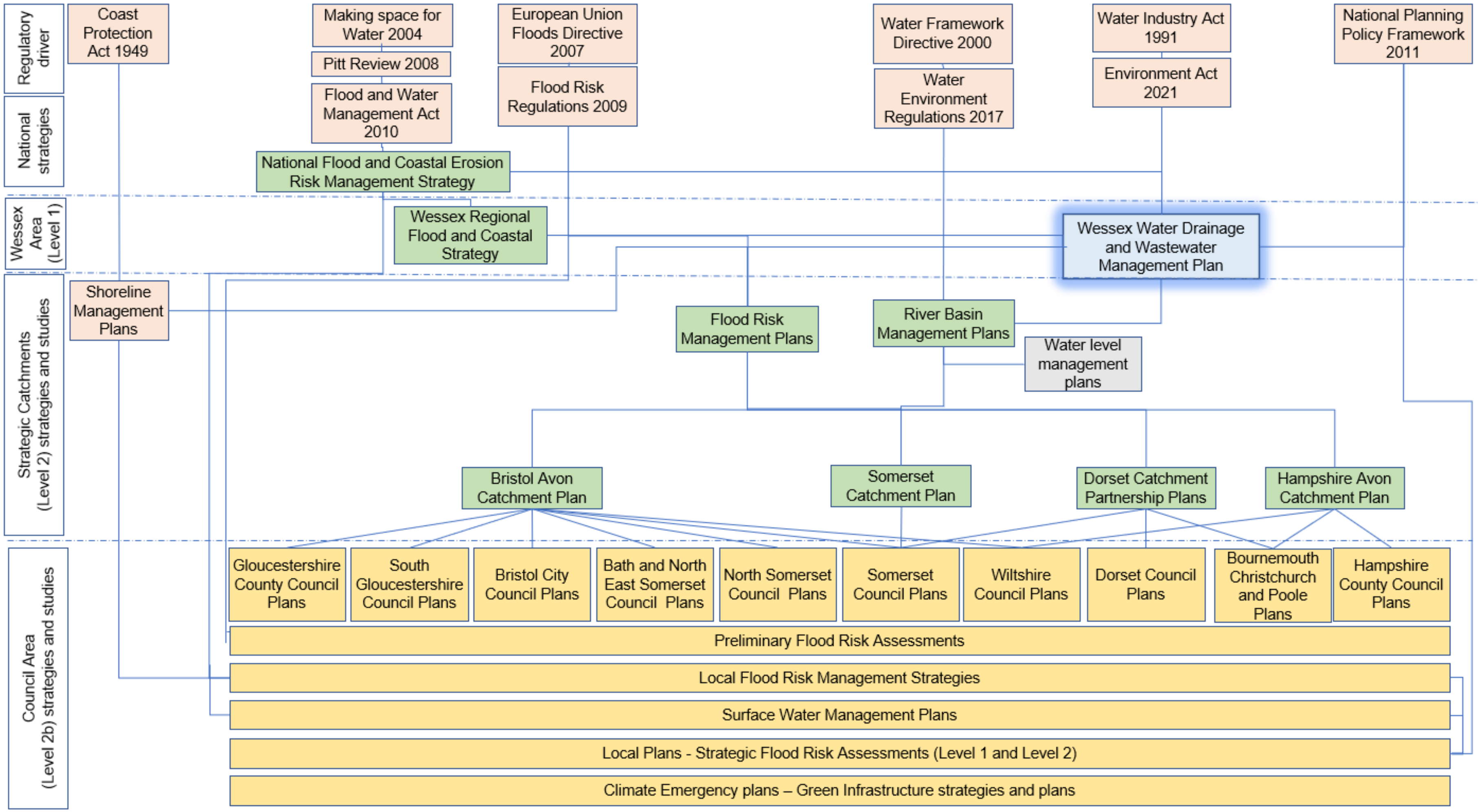
- level of interest in the DWMP
- time and staff resources to co-create
- financial resources to contribute to partnership projects
- level of interest in the planning objectives
- generic options that have the greatest potential for future partnership working and collaboration.

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 Figure 29.

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.

Figure 29: Links between the DWMP and stakeholders plans and strategies



The stakeholder identification element of this section:
- identifies key internal stakeholders within Wessex Water (section 6.1)
- identifies external stakeholders involved at different planning levels of the DWMP (outlined in section 4, with further details provided in section 6.2)
- demonstrates the stakeholder mapping process that was undertaken.

The stakeholder engagement element of this section:
- shares key messages and engagement activities that have been used for the different groups.
- describes established engagement, refers to relevant plans and strategies, and identifies their priority areas for future collaboration.

Our approach to community engagement is detailed in section 6.5.1.
The customer engagement is detailed in section 6.5.2 and covers the customer research that has been completed as part of the DWMP and how customer views have been incorporated within the DWMP.

6.1 Internal Stakeholders

There are stakeholders from different departments across Wessex Water that have had a critical role in facilitating the development and delivery of the DWMP. We have a formal governance structure set up as detailed in Figure 30. Regular interactions with various teams across Wessex Water are detailed in Table 3. We held regular internal implementation and steering group meetings with invitees from all the internal stakeholders listed in Table 3.

Figure 30: Internal stakeholders within Wessex Water who have influenced the development of the DWMP and provided assurance

Table 3: Internal stakeholders within Wessex Water who have an involvement in the DWMP

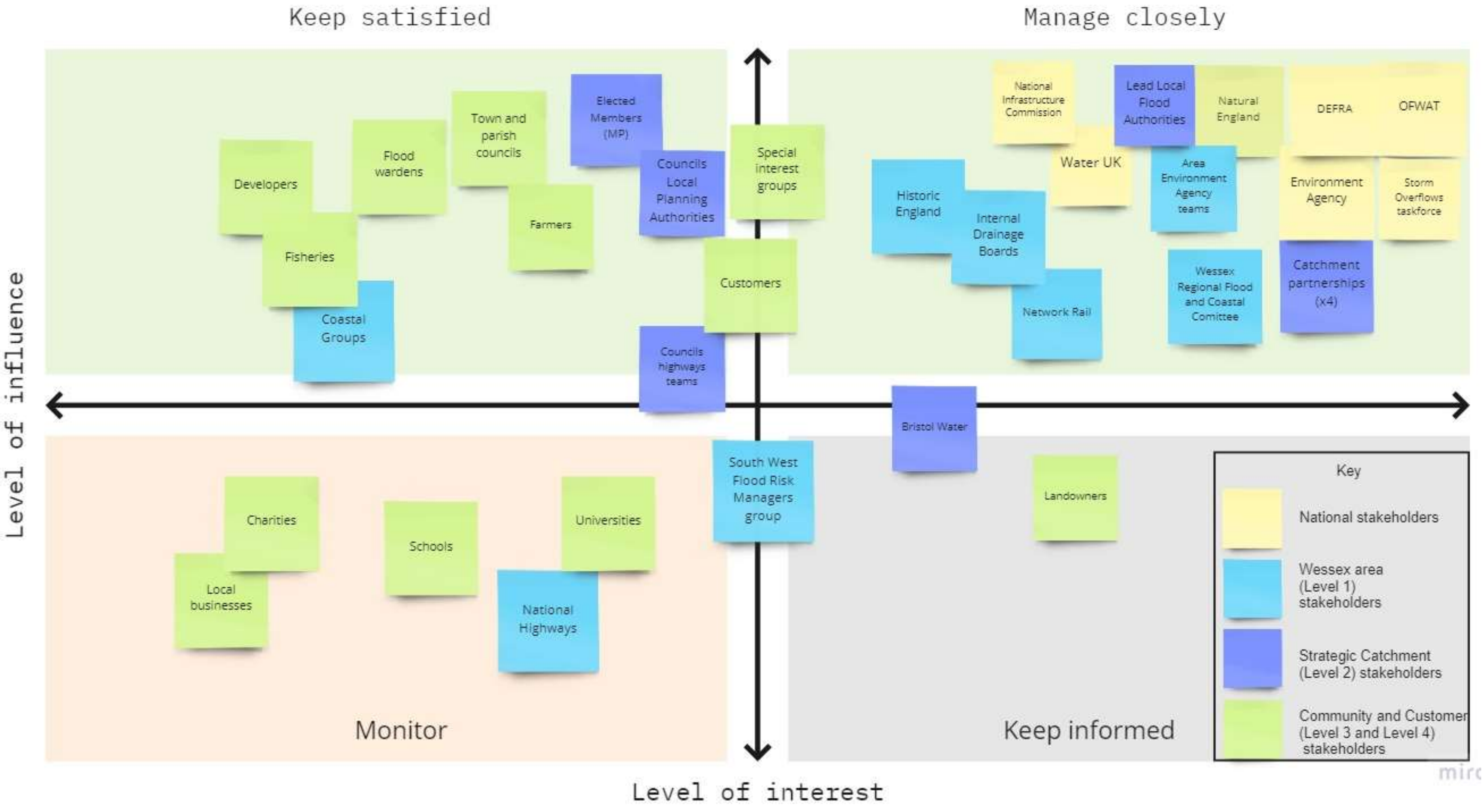
Team	Role and interest in the DWMP
Asset Strategy	Leading the development of the DWMP and giving direction for other parts of the business. Asset strategy has the strategic overview of asset management, strategic investment and lead the EA WINEP wastewater planning and contribute to the wastewater elements of the business planning to Ofwat.
Water Resource	Leading the development of the WRMP – opportunities for synergies between the WRMP and DWMP regarding management of surface water.
Regulation Strategy	Involvement in engagement with OFWAT and steering the development of the DWMP.
Customer Policy	Lead for customer engagement, customer campaigns, insight, and participation.
Legal	Data licences and partnership agreements.
Engineering and sustainable delivery	Leading the hydraulic computer modelling elements of the DWMP to understand some planning objectives through use of 1D models, commissioning consultants to undertake the work. Involvement in stakeholder problem characterisation and ODA scoring stages of the framework and to have an awareness of the work to inform future development of schemes.
Operations	Understanding challenges, provide input relating to the DWMP resilience and stage and problem characterisation stage and reviewing the report. Provide input regarding development sites through the Planning Liaison team.
Internal and external comms and PR	Communications, Educational material, Report design, Publishing, Public Relations.
Information technology	DWMP portal, internal, and external mapping, website.

6.2 External stakeholders / partners

There are a range of external stakeholders and partners that have an interest in the DWMP. Some of the key groups include national stakeholders, regulators, flood risk management authorities, councils, catchment partnership stakeholders, infrastructure providers, communities, businesses, and customers. A stakeholder mapping assessment was undertaken to understand their level of interest and level of influence in the DWMP to inform our approach to engagement, as shown in Figure 31.

Three main stakeholder groups were identified through this mapping as follows:
- Flood risk management authorities, catchment coordinators and strategic stakeholders
- National stakeholders
- Local communities and customers.

Figure 31: Stakeholder mapping for the DWMP



6.2.1 Priority stakeholder groups for DWMP external stakeholders

The main objectives identified for the stakeholder engagement in the DWMP included a need to:

- increase understanding about the challenges facing drainage and wastewater infrastructure regarding growth, urban creep, and climate change
- inform stakeholders about complex roles and responsibilities of flood and water management
- inform stakeholders of the range of options available to increase resilience of drainage and wastewater infrastructure
- enable stakeholders to understand how they can work with us to deliver measures to increase the resilience of drainage and wastewater infrastructure while also delivering multiple benefits
- assist in the selection of partnership priority areas to increase the likelihood of successful partnerships
- manage expectations of partners and other stakeholders:
  - a range of solutions are often required to increase the resilience of drainage and wastewater infrastructure
  - there are opportunities by working together to achieve improved climate resilience and multiple benefits
  - work needs to be aligned to priority areas to enable the greatest outcomes to be achieved

The main objectives identified for the customer engagement for the DWMP included a need to understand customer views on:

- issues relating to wastewater drainage
- acceptability of impact and frequency of sewer flooding
- the acceptability and willingness to support a range of ‘generic options’ (GOs)
- willingness to pay for alternative GOs
- 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

Further details about the customer engagement can be found in section 6.5.9.

6.2.2 Key messages relating to the DWMP

We identified the key overall messages that need to be the focus of engagement to meet the objectives. Different messages may be relevant for each stakeholder group. For each of the prioritised stakeholder groups a ‘message house’ table was created to give more detail on the engagement, including objectives relevant to these groups, possible objections, and engagement methods, as outlined in Table 4 to Table 6.

Table 4: Stakeholder group 1 - Flood Risk Management Authorities, catchment coordinators and strategic stakeholders

<table>
<tr><td colspan="3">

GROUP ENGAGEMENT OBJECTIVES

- To increase understanding, commitment and buy-in to the DWMP from within the partner organisations, and increased interest in trying to establish collaboration and partnership working as standard where complex or priority locations have been identified.
- To raise awareness of the level of investment required and the need to collaborate
- To manage expectations of partners and other stakeholders:
  - a range of solutions are often required to increase of drainage and wastewater infrastructure
  - working together to achieve improved climate resilience provides multiple benefits
  - work needs to be aligned to priority areas to enable greatest outcomes to be achieved

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<tr><td colspan="3">

WHY THE DWMP MATTERS?

- It is going to help increase the resilience of drainage and wastewater infrastructure to climate change, growth, and urban creep. The resulting investment will reduce the risk of sewer flooding and the frequency of storm overflow operation and harm to the environment.
- We are all part of the solution - a community of support; by working together we can help deliver integrated flood alleviation solutions to achieve best value to communities, customers, and the environment over the long-term.

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BENEFITS TO EXTERNAL STAKEHOLDERS

- Transparency and consistency
- Shared view of current and future challenges to address
- Integration of local placemaking and growth strategies
- A holistic and catchment-wide approach to achieve individual and common flood risk and environmental outcomes
- Line of sight from risk to investment
- Create an evidence base for effective engagement with communities, customers, and stakeholders
- Smarter, better investment choices
- Adaptive planning
- Delivering more multiple benefits through collaboration
- Reducing impact of local flooding
- Deliver benefits through regeneration
- Improve health and wellbeing
- Economic benefits for businesses

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PRE-EMPT OBJECTIONS

- Current way of working using traditional solutions achieves results
- Partnership working is too difficult and takes too much time
- Partners may not have resources
- Surface water flood risk is insignificant
- Maintenance - councils will all be concerned about who is going to maintain the assets
- Partners and stakeholders may claim they don't have the funds to contribute

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CALL TO ACTION

- We want to be able to have a conversation with you
- We want you to be part of our DWMP journey
- We want to be able to explain to you what we are doing, and we want to learn from you
- Opportunity to engage but need to think about HOW we make partnership working work well for us all
- Time for action is now

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Engagement methods (Flood Risk Management Authorities, catchment coordinators and strategic stakeholders)

- Workshops, established meetings, DWMP public website, 1:1 meeting, E-mail
- Webinars for knowledge exchange, Site visits, Online Surveys, PR - Press releases, social media (joint where relevant), Informal consultations and feedback opportunities, including the potential for community hubs for community consultation,
- Senior management updates and opportunity for them to ask questions, briefings
- Finding key people (in relevant organisations) to help create links to the communities (including campaigns i.e., stop the block, round the bend etc)

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Table 5: Stakeholder group 2 - National stakeholders

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GROUP ENGAGEMENT OBJECTIVES

- To raise awareness about the significant level of investment required to make drainage and wastewater infrastructure resilient to climate change, growth, and urban creep
- To ensure stakeholders understand this is the first time a DWMP has been completed, this provides opportunities to explore innovative and different ways of applying the framework.
- To manage expectations of partners and other stakeholders:
  - range of solutions are often required to increase of drainage and wastewater infrastructure
  - there are opportunities by working together to achieve improved climate resilience and multiple benefits
  - work needs to be aligned to priority areas to enable greatest outcomes to be achieved

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WHY THIS PROJECT/PROGRAMME MATTERS

- It is going to help national stakeholders understand scale and timing of investment needs
- They are part of the solution – to help steer the development of the DWMP and inform future policy.

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BENEFITS TO EXTERNAL STAKEHOLDERS

- Transparency and consistency
- A shared view of current and future challenges that need to be addressed
- Integration of local placemaking and growth strategies
- A holistic and catchment-wide approach to achieve individual and common flood risk and environmental outcomes
- Create a ‘line of sight’ from risk to investment
- Create an evidence base for effective engagement with communities, customers, and stakeholders
- Smarter, better investment choices
- Adaptive planning
- Delivering more multiple benefits through collaboration
- Reducing the impact of local flooding
- Opportunity to deliver additional benefits through regeneration
- Improve health and wellbeing
- Economic benefits for businesses

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PRE-EMPT OBJECTIONS

- DWMP outputs are different between water companies
- Level of investment is too large and unaffordable
- Nature based solutions do not guarantee regulatory outputs will be met

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CALL TO ACTION

- We want to be able to have a conversation with you
- We want you to help steer and influence the development of the DWMP to ensure outputs can benefit all
- We want to be able to explain to you what we are doing, and we want to learn from you and have a 2-way dialogue

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Engagement methods (National stakeholders)

- Engagement through the DWMP steering, implementation and task and finish group meetings and other Water UK industry meetings
- Engagement through the Wessex Area Strategic Stakeholder meeting
- Engagement through 1:1 meetings or informal discussions

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Table 6: Stakeholder group 3 - Local communities and customers

GROUP ENGAGEMENT OBJECTIVES

- To provide a basic understanding about the drainage and wastewater infrastructure
- understand impact and frequency of flooding, proposed generic options and willingness to pay, approach to intergenerational investment.
- To empower communities to understand how they can help us address their needs through reduced sewer misuse and improved surface water management
- To raise awareness of the level of investment required and ways in which the communities and customers can get help
  - To manage expectations of partners and other stakeholders:
    - there is not one solution to increasing the resilience of drainage and wastewater infrastructure
    - there are opportunities by working together to achieve improved climate resilience and multiple benefits

WHY THIS PROJECT/PROGRAMME MATTERS

- It is going to help protect them and others to gain climate resilience
- They are part of the solution - a community of support, we can't do it without them.

BENEFITS TO EXTERNAL STAKEHOLDERS	PRE-EMPT OBJECTIONS	CALL TO ACTION
• Property uplift - we are transforming local places • Reducing the impact of local flooding • Improve health and wellbeing • Economic benefits for businesses • Sustainable farming - more efficient and less cost • Regeneration - people enjoying their local areas, good for community and local businesses.	• Residents: parking may be reduced. • Maintenance - councils will all be concerned about who is going to maintain the assets • Businesses may claim they don't have the funds to contribute • Landowners - upkeep and responsibility - potential conflict with grants for farmers • Landowners – reduced development viability because of more robust/innovative approach to achieving flood resilience on their site (especially if this means going above and beyond what is required by planning policy).	• We want to be able to have a conversation with you • We want you to say yes • We want to be able to explain to you what we are doing, and we want to learn from you • Opportunity to engage but need to think about HOW

Engagement methods (Local communities and customers)	
• Workshops • Established meetings • DWMP public website • 1:1 meeting • E-mail • Webinars for knowledge exchange • Site visits • Wessex Water magazine • Letter drops • Online Surveys • Press releases	• Social media • formal customer research • Informal consultations and feedback opportunities, including the potential for community hubs for community consultation • Political member briefings • Development of different tools for different groups • Link with some of the existing networks to reach different communities • Language simple and straightforward

6.2.3 Engagement activities and approaches for each stakeholder segment

It is likely that the engagement of stakeholders will involve a combination of approaches for different objectives and different stakeholder groups, at different stages of the programme. These were discussed in line with "Working with Others" (Environment Agency guide), identifying three main types of engagement:

- **Provide** something (information, money, skills, knowledge, experience, or people's time) to others ('tell'), and/or
- **Receive** something (information, money, skills, knowledge, experience, or people's time) from others ('ask'), and/or
- **Collaborate** with others to achieve something that neither we nor they could achieve by working alone ('collaborate').

  Examples of 'provide' are press releases, hard letter drops and information sent out on Twitter, for example to businesses and landowners.

  Examples of 'Receive' are – obtaining information from developers, landowners, and farm owners for example.

  Examples of 'Collaborate' are – workshops, internal partnership meetings.

The ongoing dialogue relating to the DWMP has provided the opportunity to check-in on stakeholders understanding of the outputs that have been discussed and shared. This provides opportunity for a 2-way dialogue and chance to give further explanation and answer any questions.

A key part of the process of stakeholders understanding and consolidating the information shared within the DWMP is through collaboration. Focused conversations on partnership priority areas provides a great opportunity to discuss challenges and desired outcomes and how a range of measures can be all progressed to achieve a common outcome (i.e. of improved water quality or reduced flood risk) that can only be achieved by working together.

6.2.4 Equality, diversity, and inclusion

We seek to identify and define hard to reach communities through existing networks and champions. These community members are those that have not engaged in flooding initiatives or conversations about the topic in the past. These may include community members with low levels of literacy, low levels of English, disabled people, young people, and those with caring responsibilities.

We will identify specific organisations to help us consider the best approaches and understand best practise to ensure our engagement is meaningful.

We will build on our existing knowledge and understanding from previous engagement work in some areas. Approaches may include getting literature translated in community languages, holding workshops at a time and location that will make it accessible for these community members. By attending community events and creating relevant materials that will engage different audiences (i.e. increased use of social media for young people) we are able to connect with a wide range of customers and provide appropriate advice and support. For those customers who are worried about what the future holds for their finances either short-term or long-term we can direct them to our relevant support schemes (see our website[84]).

6.2.5 Engagement Activities

These include:

- Workshops
- Established meetings
- DWMP public website
- 1:1 meetings
- E-mails
- Webinars for knowledge exchange
- Site visits
- Wessex Water magazine
- Letter drops
- Online Surveys
- Press releases
- Social media
- Informal consultations and feedback opportunities, including the potential for community hubs for community consultation
- Senior management updates and opportunity for them to ask questions
- Briefings
- Finding key people to help create links to the communities (including campaigns i.e., stop the block, round the bend etc)
- Different tools for different groups, for example using different social media for different ages groups, leaflets in different languages
- Link with some of the existing networks to reach different communities
- Language simple and straightforward

6.2.6 How we have engaged our stakeholders

We have worked closely with our flood risk (FRM) and environmental stakeholders for decades which means we have excellent relationships to enable us to fully embrace the collaborative ethos of the DWMP framework.

In addition to 1-2-1 meetings with stakeholders, we held annual DWMP workshops with all our LLFAs and catchment partnership coordinators to get everyone in the same room (pre-Covid) and virtually (during Covid), so that we could share the best practices and promote the DWMP collaborative working approach. Figure 32 shows some feedback from those workshops.

Figure 32: Stakeholder feedback

Throughout the development of the DWMP, we have recognised the resource limitations and capacity of our stakeholders to get involved in the co-creation and development of the plan.

We have had a clear steer from our stakeholders (confirmed through polls at our annual workshops), 78% confirmed that they would like to engage with us on partnership priority locations using existing meetings with an annual update.

Given limited capacity of stakeholders, which we were aware of through established relationships and feedback at established meetings, including catchment partnerships, there was limited benefit in requesting stakeholders do pre-work ahead of workshops or homework after workshops. We recognised that many of the elements of the DWMP are relatively new concepts that can be quite complicated to understand. We chose to use our DWMP workshops to guide the stakeholders through the elements of the DWMP to secure their views. We provided material after the workshops and used feedback from workshops and ongoing dialogue through established meetings or 1:1 sessions to influence our approach to define appropriate actions which were tailored according to the feedback we received.

The covid pandemic of 2020-2022 presented challenges to traditional ways of working, but also provided different opportunities for engagement through the new ways of working based around online meetings. We utilised our good relationships with our catchment coordinators to ensure the outputs of stakeholder workshops, led through the catchment partnerships, were designed to secure useful information for the DWMP as shown in Figure 30. This approach not only maximised the use of stakeholders limited time, but also reduced any duplicated effort.

We undertook a stakeholder survey at the beginning of the pandemic to understand how stakeholders were impacted by covid and how they wanted to work with us during lockdown. The re-introduction of face-to-face meetings in 2022 has re-iterated the benefits of being able to meet in person to strengthen relationships and understanding of each other's interests and needs. Going forward, we expect a blended approach of MS Teams and face to face meetings to facilitate further development of collaborative projects.

These meetings are influencing our approach and have led to named partnership working schemes on our DWMP data table and commentary (Appendix F and G). This includes working in partnership with the catchment partners and other risk management authorities to jointly provide nature-based solutions to complement or even replace engineered traditional solutions.

6.2.7 Engagement between the draft and final DWMP

A series of briefing sessions were held following the draft DWMP to walk stakeholders through key elements of the draft DWMP and explain the consultation and next steps for project development. Catchment Partnership stakeholders were offered the opportunity to put forward partnership schemes to develop proposals for water quality focused partnership projects to be included on the WINEP for delivery over a multi-amp period. The successful proposals needed to identify match funding opportunities. The successful projects resulting from this process are detailed in Table 32. Further development of flood alleviation partnership schemes has progressed with LLFAs through high level assessments to inform options to reduce risk of flooding from surface water and sewers.

Where complex integrated flood mechanisms required further investigation, 2D integrated catchment models have been developed to inform collaborative schemes looking to deliver surface water flood alleviation schemes which provide benefits to the sewer network.

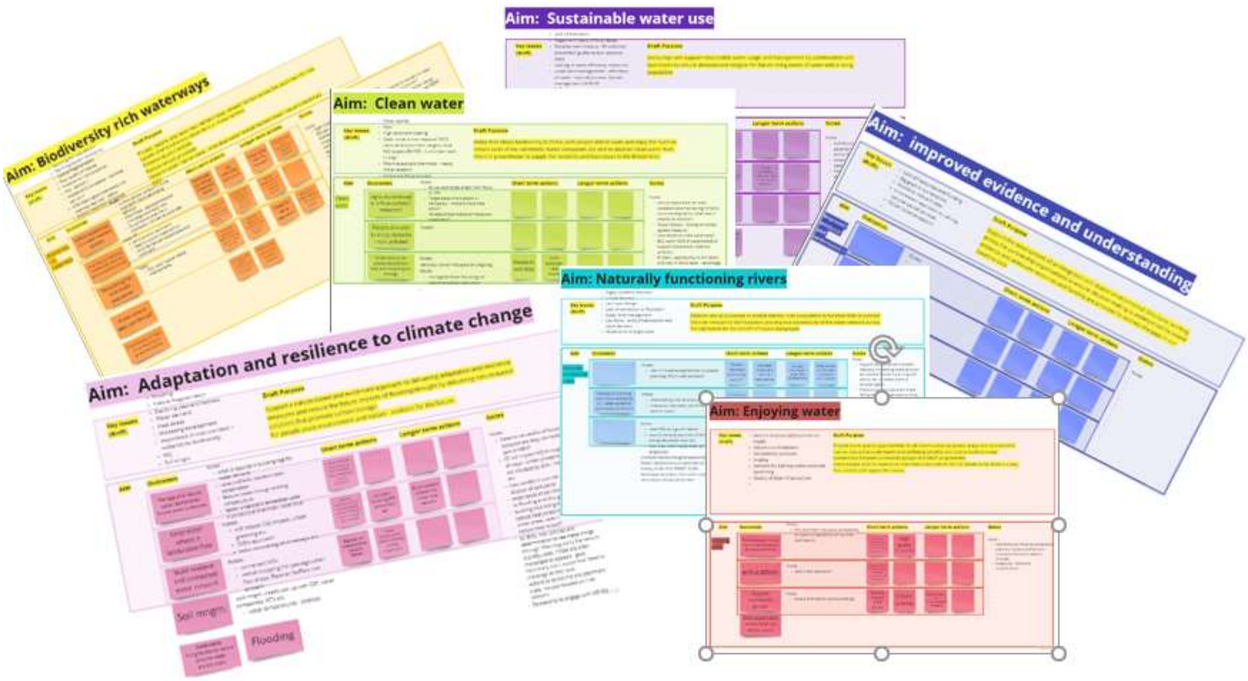
6.2.8 Future engagement for cycle 2 of the DWMP

Through delivery of cycle 1 of the DWMP, there has been a significant increase in stakeholders' understanding and awareness of various challenges for the water industry and opportunities for collaboration. The learning and experience gained through development of projects for DWMP Cycle 1 combined with the greater understanding about what partnership working for the DWMP could look like will influence our approach to cycle 2 of the DWMP.

We will use the strategic context stage to enable stakeholders to influence the direction of the DWMP and help shape our approach to collaboration and engagement for DWMP cycle 2. We will look to try to further integrated projects and opportunities to deliver multiple outcomes of both flood risk and water quality benefits, working with flood risk management authorities and catchment partnership representatives. We would look to utilise support from the catchment partnerships in facilitating and coordinating workshops and meetings to understand the range of aims, challenges and aspirations for priority catchments. Figure 33 shows some of the outputs where the workshops hosted by BACP which will influence project development for the DWMP.

To address the resource challenges and skills shortage within the industry, we have put in a proposal to secure joint funded resources to focus on collaborative development of surface water solutions to develop a pipeline of partnership projects for AMP 8 and beyond.

Figure 33: Example of online collaboration boards generated to gather views about catchment priorities as part of a Bristol Avon Catchment Partnership led workshop



6.2.9 External National Stakeholders

National stakeholders with a role in the development or delivery of partnership projects identified within the DWMP are described within this section.

National stakeholders that we regularly engage with include Ofwat, Environment Agency, DEFRA, National Infrastructure Commission, Water UK, and the Consumer Council for Water. The main form of engagement with national stakeholders has been through the Water UK led DWMP steering and implementation groups. Representatives have also been invited to our Wessex Water strategic stakeholder meetings. Table 7 details the organisations who we have engaged throughout the development of the DWMP and relevant strategies and plans. The subsequent text provides further details.

Table 7: National stakeholders involved in the development of the DWMP

Organisation	Department or group	Relevant strategies or plans
Water UK	DWMP Steering Group DWMP Implementation Group DWMP Task and Finish Groups	• DWMP Framework[74]
Water UK	Surface water management network and Sewerage Infrastructure Network group	
Ofwat	Engagement on the DWMP Steering Group and at Level 1 Engagement sessions	• DWMP Guiding Principles[6] • Ofwat Customer Engagement Policy[40] • Ofwat PR24 and beyond: Long-term delivery strategies and common reference scenarios[37]
Environment Agency	National Flood and coastal erosion risk management strategy	• DWMP Guiding Principles[6] • National Flood Risk Management Strategy[11] • River Basin Management Plans[14] • Flood Risk Management Plans • WINEP roadmap[19] • A Green Future: our 25 Year Plan to Improve the Environment[20] • Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026[15]
DEFRA	Engagement on the DWMP Steering Group and at Level 1 Engagement sessions	• DWMP Guiding Principles[6] • A Green Future: our 25 Year Plan to Improve the Environment[20]
National Infrastructure Commission	Engagement on the DWMP Steering Group and at Level 1 Engagement sessions	• National Infrastructure Assessment[28]
National Storm Overflows Taskforce	Group set up to outlines the evidence, costs, and benefits of reducing the occurrence of storm overflow spills which is due to inform the Final DWMP	• Storm overflows evidence project[25]

6.2.10 Water UK

The Water UK team engages with companies and regulators to ensure customers receive high quality water services at a reasonable price and that our environment is protected and improved. Water UK has hosted the DWMP Steering and Implementation Groups which we have taken an active part in, alongside all other sewerage undertakers throughout the development of the DWMP. We have also taken an active role in all task and finish groups that have been set up to discuss the interpretation of the DWMP framework.

6.2.11 Ofwat

The Water Services Regulation Authority, or Ofwat, is the economic regulator of the water sector in England and Wales. We have worked with Ofwat through the Water UK led DWMP Steering and Implementation Groups, invited Ofwat to our strategic stakeholder meetings and had pre-consultation meetings to discuss and get feedback on our plan throughout its development.

Ofwat documents that have been considered in the development of the DWMP include:

- the DWMP Guiding Principles[74] which sets out Ofwat's expectations for the DWMP.
- the Ofwat PR24 and beyond: Long-term delivery strategies and common reference scenarios[37] document has influenced the outputs of the DWMP to ensure alignment with proposals that will be developed for PR24
- the OFWAT Customer Engagement Policy[40] which has been used to help inform our approach to customer engagement (detailed in section 6.5.2).

6.2.12 Environment Agency (EA)

The Environment Agency works to create better places for people and wildlife, and support sustainable development. They are a regulator for the water sector and are responsible for environment and flood risk management, regulating major industry and waste, water quality and resources, fisheries, inland river, estuary and harbour navigations, conservation and ecology. They also have responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

A selection of key strategies and plans published by the EA are as follows:

- National Flood and Coastal Erosion Risk Management Strategy for England[11]
- River Basin Management Plans[14]
- Flood Risk Management Plans
- WINEP roadmap[19]
- A Green Future: our 25 Year Plan to Improve the Environment[20]
- Shoreline management plans[16]

The National Flood and Coastal Erosion Risk Management Strategy sets out a vision of a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100. The strategy has been supported by the Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026[15].

We regularly engage with EA representatives from both the National and Wessex Area teams at director, manager and officer level. National EA staff from Flood Risk and Water Quality teams are involved at various water industry meetings, which discuss DWMP related matters including: the Water UK DWMP Steering Group, Water UK led task and finish groups and the Surface Water Management Network.

6.2.13 Department for Environment, Food and Rural Affairs (DEFRA)

The Department for Environment, Food and Rural Affairs is the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom.

We regularly engage with representatives from DEFRA regarding drainage and wastewater infrastructure.

DEFRA documents that have been considered in the development of our DWMP include:

- the Governments 25 Year plan to improve the Environment[20]

Wessex Water's Director of Assets and Compliance has represented WaSCs on the DEFRA / EA Storm Overflows Taskforce and has chaired the Legislation Options Review T&F group. This has enabled us to influence National policy on the Storm Overflow Task Force to promote reduction in use of wet-wipes and to reduce surface water getting into the sewers, together with promoting separation and SuDS.

Additionally, a Wessex Water Technical Manager was seconded to work for DEFRA (2021-2022) to help with policy thinking on Legislation review regarding the implementation of Schedule 3 of the Flood and Water Management Act (2010).

6.2.14 National Infrastructure Commission (NIC)

The UK National Infrastructure Commission (NIC) is the executive agency responsible for providing expert advice to the UK Government on infrastructure challenges facing the UK. The scale of investment identified through the DWMP will inform the next National Infrastructure Assessment.

We have engaged with the NIC throughout the development of the DWMP via the Water UK steering and implementation group meetings. Further to the feedback that the NIC received from the Wessex Area to their Surface Water Flooding Study 'Call for Evidence' (in December 2021), Wessex Water has supported the NIC with their surface water management review. Documents that have been considered in the development of the DWMP include:

- National Infrastructure Assessment 1[28]

6.2.15 Wessex area stakeholders (Level 1)

Stakeholders and groups that cover the area that has drainage and wastewater services provided by Wessex Water include the Wessex Regional Flood and Coastal Erosion Committee, Environment Agency, Network Rail and National Highways.

6.2.16 Environment Agency (EA) Area teams

At a Level 1 Wessex area, regular meetings are held at Director and manager level with the Wessex area EA who are responsible for the majority of the area covered by Wessex Water.

A small part of the area serviced by Wessex Water is managed by two other area teams within the EA that cover the Solent and South Downs and the Thames regions. Engagement with these groups is predominantly through stakeholder meetings led by the Lead Local Flood Authorities.

The local Wessex area EA team have a designated single point of contact with Wessex Water to discuss strategic elements related to partnership working. Partnership funding is discussed with the Parntership Funding Manager and Programming team.

Within the flood risk management side of the EA business, well established relationships have been developed with officers from the Partnership and Strategic Overview teams, who act as lead contacts assigned to each LLFA (Level 2b DWMP Area). They assist with technical detail relating to EA assets in collaborative project development.

Well established relationships are also maintained with the Environment Agency Environmental Regulation teams and Natural England, who have regular meetings with us to discuss progress and agree new Water Industry National Environment Programme (WINEP) schemes as part of our businiess planning.

Priority areas for the Environment Agency at a Level 1 DWMP area are represented by measures included within the Flood Risk Management Plans (FRMP), projects identified on the DEFRA medium term plan or within the WRFCC strategy.

Specific details about relevant FRMP measures to the DWMP are summarised at a Level 2b DWMP level in section 6.3.

A review of the priority areas identified by stakeholders for the DWMP and the measures that were included in the FRMP, demonstrate alignment of priority locations between the two plans. This is an essential first step in collaboration by having a clear awareness of priority locations, to then progress the development of an understanding of multiple flood risks and drivers to inform where collaborative solutions can be progressed. Within this section, reference is made to the FRMP measures where appropriate.

Several measures identified within the FRMP offer potential collaboration with Wessex Water that could be applied at a Level 1 DWMP scale, regarding:

- undertaking a catchment scale assessment of natural flood management opportunities affecting the Wessex area.
- opportunities to work together to meet carbon, biodiversity net gain and wider environmental benefits by promoting collaborative nature-based solutions.
- in the short to medium term, work with relevant stakeholders to support the shoreline management plan refresh.
- considering the impact of existing beaver populations on flood risk management activities (including drainage and wastewater infrastructure).

6.2.17 Wessex Regional Flood and Coastal Committee (WRFCC)

Wessex Water has an appointed member to attend and participate in the Wessex Regional Flood and Coastal Committee (WRFCC[104]). This committee reviews all types of flooding and coastal erosion issues in the Wessex area at a councillor level. It brings together members appointed by Lead Local Flood Authorities (LLFAs) and independent members with relevant experience for 3 purposes:

- to ensure there are coherent plans for identifying, communicating, and managing flood and coastal erosion risks across catchments and shorelines
- to encourage efficient, targeted and risk-based investment in flood and coastal erosion risk management that represents value for money and benefits local communities
- to provide a link between the Environment Agency, LLFAs, other risk management authorities and other relevant bodies to build understanding of flood and coastal erosion risks in its area.

We have been regularly presenting our DWMP progress to the WRFCC, ensuring our plans are informed by the WRFCC priority places and strategy[104]. We invite the chair and Environment Agency representatives to our key stakeholder DWMP meetings.

6.2.18 South West Flood Risk Manager Group

Wessex Water attend and contribute to the South West Flood Risk Manager Group, which is a LLFA-led flood group covering the south west of England.

Meetings discuss technical details relating to responsibilities of the LLFA, receive updates from speakers and share examples of projects. There are opportunities to discuss surface water management and integrated flood risk management, which align closely with many elements of the DWMP. Wessex Water has updated the group at various meetings during the creation of the DWMP to assist stakeholder understanding of the framework and to receive feedback and questions. The DWMP is a standing item on the agenda.

6.2.19 Strategic catchment stakeholders (Level 2)

Stakeholders and groups that cover the Level 2 DWMP area are defined by four strategic catchments of the Bristol Avon, Somerset, Dorset and Hampshire Avon. Details of the stakeholders within these geographical areas are described in the following sections.

6.2.20 Bristol Avon

The Level 2 DWMP area of the Bristol Avon catchment is covered by the Bristol Avon Catchment Partnership and the Severn Estuary Coastal Partnership.

The fluvial catchment of the Bristol Avon covers the Level 2b council areas of Wiltshire, Somerset, Bath and North East Somerset (BaNES), South Gloucestershire, Gloucestershire, Bristol City Council and North Somerset. Additional partners and stakeholders represented by the Bristol Avon Catchment Partnership (BACP) are shown in Figure 34.

Figure 34: Partners and stakeholders represented by the BACP

The priority locations for the BACP are clearly set out in the Bristol Avon Catchment Plan (2022). The BACP aims are as follows:

- Enhance people's enjoyment and connection with the water environment
- Improve water quality
- Restore biodiversity and ecological connectivity
- Adapt and build resilience to a changing climate.

The BACP aims to align well with the outcome themes associated with the DWMP Figure 22 of improved environment, effective sewerage, and asset health.

The BACP Catchment Plan provides a clear indication of programmes of work and projects that are currently being progressed or developed within the catchment (Figure 35). The BACP priorities, combined with established dialogue with BACP partners and stakeholders has facilitated a clear understanding of priority WRC catchments for the DWMP for potential collaborative projects. Table 8 identifies a number of key strategies and plans within the Bristol Avon Level 2 catchment that have been identified to have potential synergies with DWMP priority areas.

Figure 35: Partnership programmes and projects within the Bristol Avon Catchment Partnership

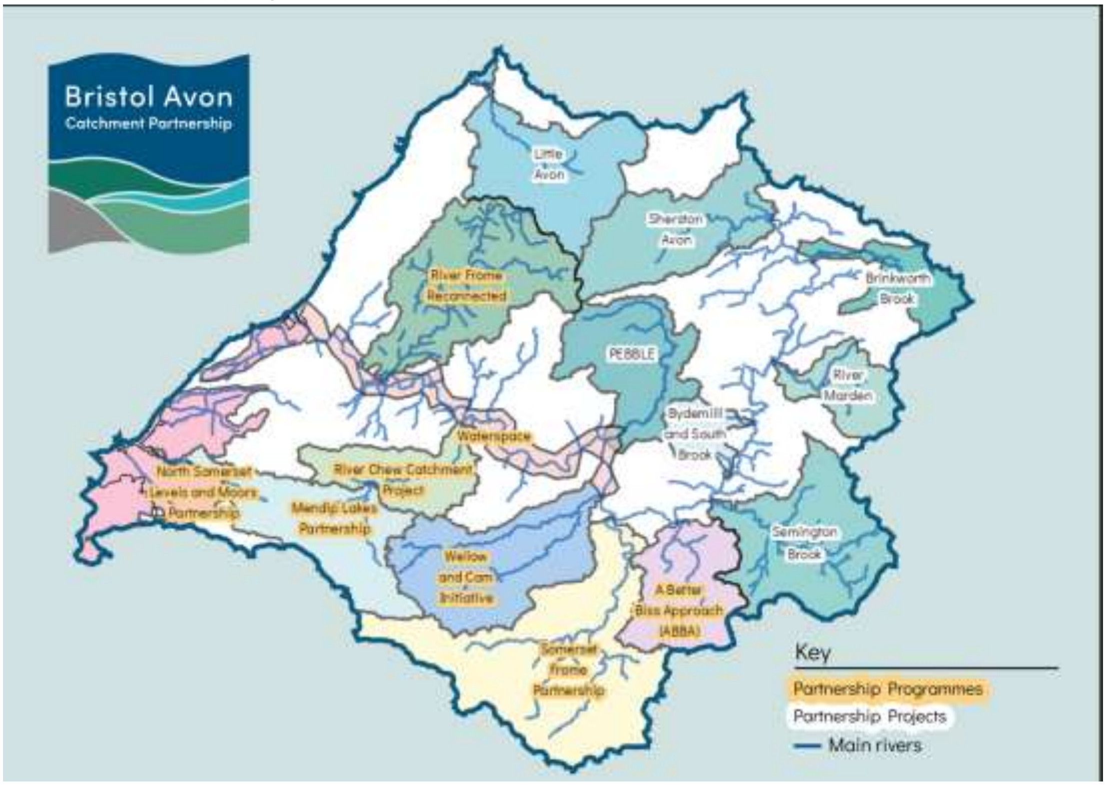


Table 8: Strategies and plans within the Bristol Avon Level 2 catchment that have been identified for potential DWMP partnership opportunities

Organisations	Strategies and plans within the Bristol Avon Level 2 catchment that have been identified for potential DWMP partnership opportunities
Bristol City Council	Bristol City Council Local Flood Risk Management Strategy[112]
Bristol City Council and the Environment Agency	• Bristol Avon Flood Strategy[50] The project aims to reduce the tidal flood risk and fluvial flood risk
River Frome Reconnected Catchment Partnership	• River Frome Reconnected[62] The project aims to make improvements across five main themes: • responding to and managing flood risk • reconnecting people and communities • reconnecting the Frome to nature • redevelopment and planning the Frome • resilient landscapes/ sustainable land management Adaption to climate change through spatial planning is an aspiration across all five themes.
Bath and North East Council	The Bath River Line[49] will create a linear park following the River Avon. Covering 10km, it will connect beautiful green spaces and city landmarks, tempting pubs and peaceful water meadows
Bristol City Council, South Gloucestershire Council, Wessex Water and Environment Agency	• DEFRA Flood Innovation Resilience Fund for the Bristol Frome[5] • Natural Flood Management • Retrofit SuDS • Nature Based Solutions • Engaging businesses in climate resilience • Innovative Policy • Monitoring

Environment Agency	• Catchment Investment Strategy: Upper Bristol Avon (including Malmesbury, Chippenham, Trowbridge, Melksham)
Environment Agency	• Catchment Investment Strategy: Bristol Frome
Environment Agency	• Catchment Investment Strategy: Bath and North East Somerset
Environment Agency	• Flood alleviation scheme at Bradford-on-Avon
Bristol Avon Rivers Trust (BART)	• River Chew Reconnected[61] – has been awarded Green Recovery Challenge funds. • The River Chew Reconnected project will deliver a suite of work that will act as a stimulus for further support, to create a healthier river for wildlife and people to enjoy. The project will deliver two river habitat enhancement schemes that have been developed through BART's feasibility work.
Wiltshire Wildlife Trust	• Wiltshire Wildlife Trust - A Better Biss Approach[45] (ABBA) (2021 - 5-year funded project)
Somerset Frome catchment partnership	• Somerset Frome River Strategy[58]
Bristol Avon Rivers Trust	• BART are in the early stages of assessing the headwaters of the Little Avon catchment[48]
North Somerset Levels and Moors Partnership	• Areas of interest: Gordano Valley/Land Yeo, Tickenham Nailsea Kenn Moor Wetland, Congresbury Yeo, Banwell
Climate Emergency Strategies	• BaNES: Read our Climate Strategy | Bath and North East Somerset Council (bathnes.gov.uk) • Bristol: one-city-climate-strategy.pdf (bristolonecity.com) • Gloucestershire: Climate Strategy • North Somerset Climate Emergency Strategy • South Gloucestershire: Climate Emergency Strategy • Wiltshire: Climate strategy
Biodiversity	• Gloucestershire highways: Biodiversity Guidance • South Gloucestershire: Biodiversity Action Plan
Ecological Emergency	• BaNES: Ecological Emergency Action Plan • Bristol: Bristol's ecological emergency • Gloucestershire: Ecological planning advice
Carbon neutral target	• BaNES (2030) • Bristol (2030 – with a partial target of 2025 for direct emissions) • Gloucestershire (2045) • North Somerset (2030) • South Gloucestershire (2030) • Wiltshire (2030)
Green Infrastructure	• North Somerset: Green Infrastructure Strategy • South Gloucestershire: Green Infrastructure Strategy • Wiltshire: A Green & Blue Infrastructure Strategy for Wiltshire
Liveable Neighbourhood	• BaNES: Liveable Neighbourhood • Bristol: East Bristol Liveable neighbourhoods • North Somerset: Liveable Neighbourhoods Action Plan • South Gloucestershire: Urban Lifestyles

In locations where the BACP have identified partnership projects and partnership programmes and the DWMP has identified a current requirement for investment in our drainage and wastewater assets, we will look to align our investment in the catchment.

This will provide an opportunity for BACP stakeholders to use our investment to support funding bids to other funding streams focusing on mutual aims or outcomes. Further development of

partnership projects will progress after submission of the draft DWMP to inform projects to be put forward as part of the PR24 business plan.
There are several already well-developed partnership projects and programmes of work within the Bristol Avon, which provide opportunities for collaboration with the DWMP including: the Bristol Avon Flood Strategy, River Frome Reconnected (funded by the DEFRA flood and coastal resilience innovation programme), Bristol Avon catchment market; River Chew Reconnected and the water space initiatives.

6.2.21 Dorset

The Level 2 DWMP area of the Dorset catchments is covered by the Stour Catchment Initiative (SCI), Poole Harbour Catchment Initiative (PHCI) and West Dorset Rivers and Coastal Streams (WDRCS). The coastal areas are covered by the Southern Coastal Group (SCG). The area covered by the Dorset catchments falls within the council boundaries of Bournemouth, Christchurch and Poole (BCP) and Dorset Council.

The agreed vision of the Dorset catchment partnerships is that:
Dorset's river catchments are sustainably healthy, resilient, and safe for people and wildlife.
This means we aim to make our rivers

- **Sustainable** - economically, environmentally self-maintaining or with self-maintaining processes in place which support them improving to or above the required level of a given metric
- **Healthy** - at Good Ecological Status or higher and well-connected hydrologically, with natural processes functioning well across the catchment.
- **Resilient** - to climate change-induced fluctuations in flow and temperature, to human population growth, to encroachment of invasive non-native species and to habitat degradation
- **Safe** - so that known pathogens and contaminants are monitored and are at or below the relevant Environmental Quality Standards. Access and recreation are managed in balance with environmental need at a catchment scale. Ensuring that migratory pathways are open to support the full life cycle of relevant species
- **For people** - recognising that our river catchments have significant amenity, health and wellbeing value to Dorset's resident and visiting populations, including providing high quality opportunities to engage with nature
- **For wildlife** - ensuring that wildlife populations and habitats are protected, supported and able to thrive and expand in number and distribution

Figure 36 presents the strategic programme areas that have been identified within the Stour Catchment Initiative and Poole Harbour Catchment Initiative.

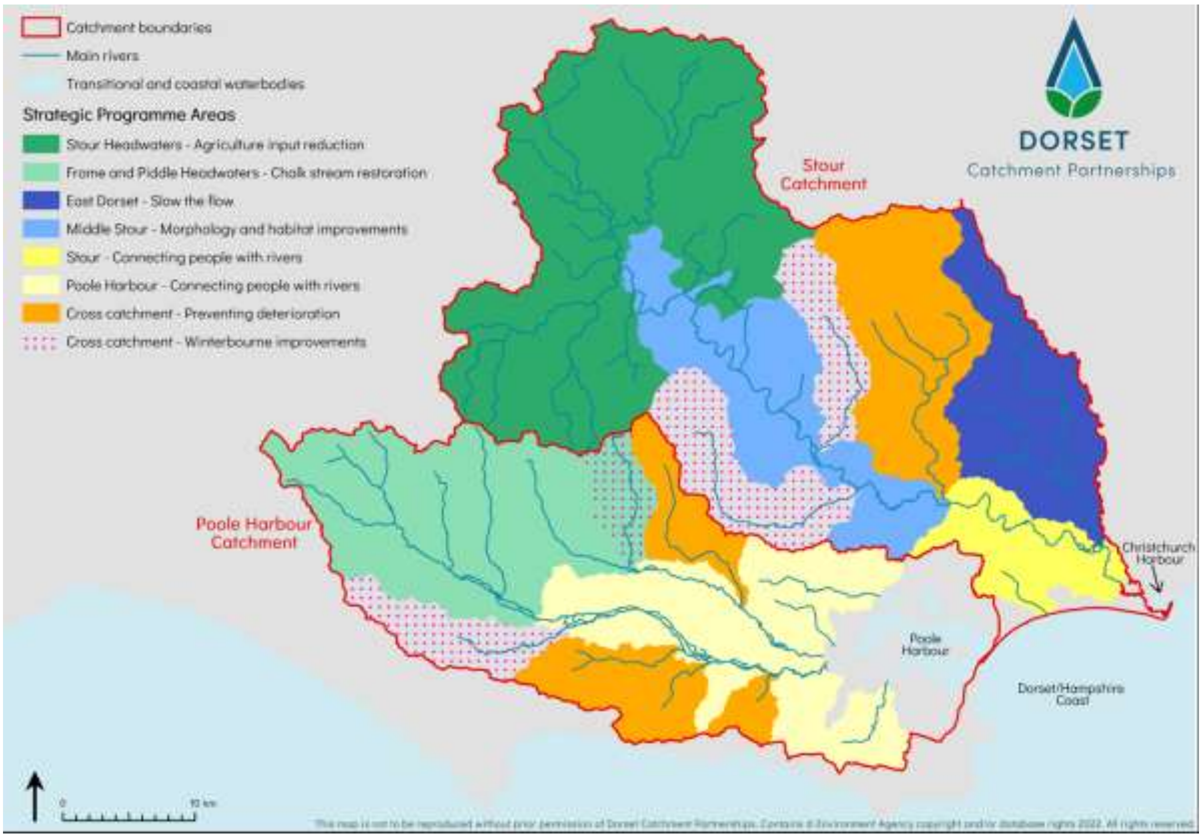
<u>Stour Catchment Initiative (SCI)</u>

The Stour catchment initiative covers the area of the fluvial catchment and tributaries of the Dorset Stour. Strategic programmes within the Stour catchment have been defined which have the following areas of focus shown in Figure 36:

- Stour Headwaters – agriculture and input reduction
- Middle Stour – morphology and habitat improvements
- Cross catchment – winterbourne improvements and preventing deterioration
- East Dorset, slowing the flow

- Lower Stour – connecting people with rivers

Figure 36: Strategic programme areas for the Stour Catchment Initiative (SCI) and Poole Harbour Catchment Initiative (PHCI).



There are potential opportunities to align SCI strategic priorities with the DWMP. Wessex Water funded the River Stour phosphorous offsetting scheme in 2022, which was available to farmers and land managers in the Blackmore Vale and Middle Stour for adopting practices that reduce phosphorus inputs to farmland, prevent soil erosion and buffer watercourses from run-off. There could also be the opportunity to promote natural flood management in areas where overland flow and runoff and sediment deposition impact on the operation and performance of the sewer network.

The SCI priorities within the Middle Stour and Cross catchment have opportunities to align with the outcome themes to deliver improved environment, effective sewerage and asset health themes. While the focus on connecting people with rivers in the lower catchment presents opportunities to align with engagement and customer behaviour campaigns.

<u>Poole Harbour Catchment Initiative (PHCI)</u>

The Poole Harbour Catchment Initiative includes the area covered by the fluvial catchment of the Frome and Piddle Rivers, which discharge into Poole Harbour.
Strategic Programmes within the Frome and Piddle fluvial catchment have been defined which have the following areas of focus:

- Frome and Piddle Headwaters – chalk stream restoration
- Cross catchment - winterbourne improvements and preventing deterioration
- Poole Harbour – connecting people with rivers

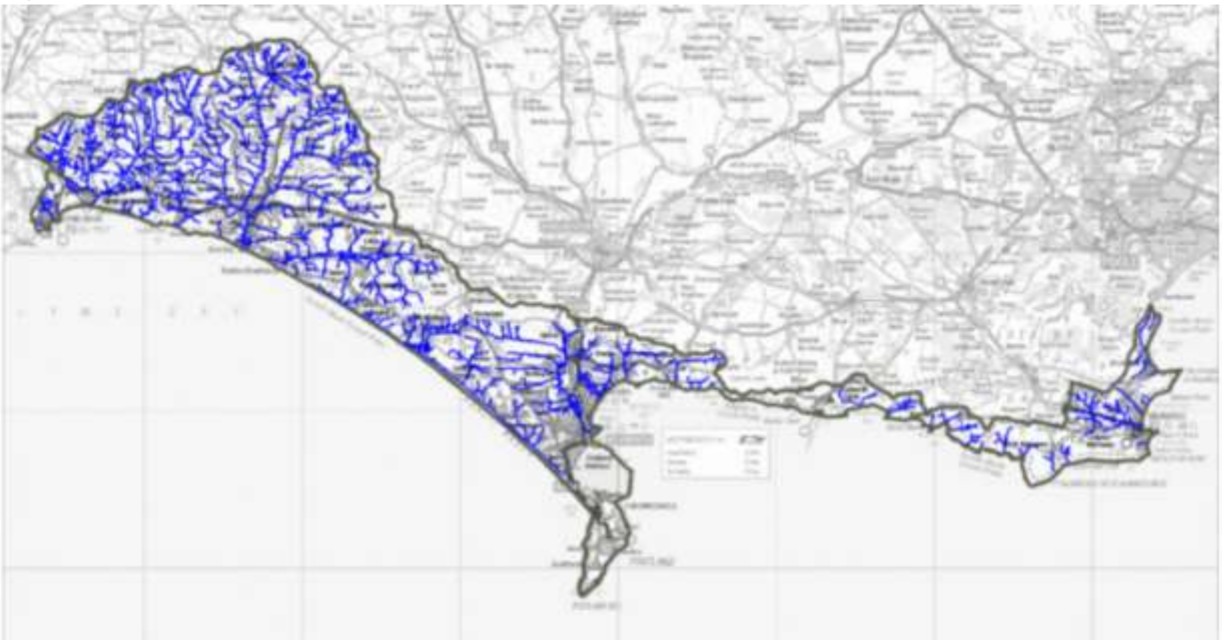
The PHCI cross catchment priorities have opportunities to align with the DWMP outcome themes to deliver improved environment, effective sewerage and asset health themes. Wessex Water has an established nutrient offsetting project in the catchments that drain to Poole Harbour. The focus on chalk stream and winterbourne improvements aligns with the DWMP groundwater bespoke planning objective.

The focus on connecting people with rivers in the lower catchment presents opportunities to align with engagement and customer behaviour campaigns. The awareness raising of the challenges associated with drainage and wastewater infrastructure will help facilitate informed discussions about storm overflows and water quality. This presents an opportunity to highlight investment that Wessex Water intends to make through funding obtained through the PR24 process.

The West Dorset Rivers and Coastal Streams (WDRCS)

The catchment areas covered by the West Dorset Rivers and Coastal Streams (WDRCS) Initiative relates to those shown in Figure 37.

Figure 37: catchment areas covered by the West Dorset Rivers and Streams initiative



The WDRCS partnership has undertaken an assessment of the issues within the area[68]. The priority locations for the issues and actions identified by stakeholders involved in the WDRCS include:

- Management
- Parish & Community
- Farmers & Landowners
- Invasive species
- Drainage
- Advice

The Dorset AONB completed strategic landscape plans as part of the Defra Tests and Trials project in the Brit Valley and Marshwood Vale[52], Cerne and Sydling Valleys[54] and South Purbeck[66].

The opportunity mapping generated as part of the landscape plans will be used to guide prioritisation for investment through the new Environmental Land Management Scheme (ELMS). This can also be used to assist with identifying partnership opportunities within the DWMP aligning with the themes of clean and plentiful water and flood risk protection.

There are opportunities to align with priorities, issues and actions identified by the WDRCS through the DWMP relating to the outcome themes to deliver improved environment, effective sewerage and asset health themes within the DWMP. There are several priorities within this area that have been identified by the Lead Local Flood Authority (section 4.3) where working with them could help achieve mutual outcomes.

Table 9 identifies various key strategies and plans within the Dorset Level 2 DWMP catchment area that have potential synergies with DWMP priority areas.

Table 9: Key plans and strategies within the Dorset Catchment Partnership area

Organisations	Strategies and plans within the Dorset Level 2 catchment that have been identified for potential DWMP partnership opportunities
Dorset Council	Dorset Council Local Plan
Dorset Council	Climate and Ecology plan
Dorset Council	Dorset Council Climate and Ecological Emergency Strategy
Dorset Council	Dorset Local Flood Risk Management Strategy
Dorset AONB	Dorset AONB Management Plan
BCP Council	Climate and Ecological Emergency - Action Plan (bcpcouncil.gov.uk)
BCP Council	BCP Council Local Plan
BCP Council	BCP Council Climate Emergency Strategy
BCP Council	Poole and Christchurch Bays Shoreline Management Plan
BCP Council	Poole Bay, Poole Harbour and Wareham FCERM Strategy
BCP Council	Christchurch Bay and Harbour FCERM Strategy (in development)
BCP Council	Bournemouth, Poole and Christchurch Flood Risk Management Strategy (in development)
Dorset Stour and Poole Harbour Catchment Strategy	Poole Harbour and Stour catchments.
Environment Agency and Natural England	Poole Harbour Consent Order and Technical Recommendations

6.2.22 Hampshire Avon

The Level 2 DWMP area of the Hampshire Avon is covered by the Hampshire Avon Catchment Partnership (HACP). Christchurch Harbour is covered by the Southern Coastal Group (SCG). The area covered by the Hampshire Avon catchment falls within the council boundaries of Wiltshire and Bournemouth Christchurch and Poole Council (BCP).

The HACP has the following vision:
"Our vision is of healthy water bodies within the Hampshire Avon catchment which are valued and nurtured by residents, businesses and the wider community"

Quote and Figure 38 source: http://www.hampshireavoncatchmentpartnership.org.uk/.

Figure 38 shows opportunities that have been identified by stakeholders involved in the HACP to address the challenges facing the Hampshire Avon. There is the potential to align opportunities identified by the HACP in locations with investment needs recognised by the DWMP.

There could also be the opportunity for the HACP to use any investment Wessex Water are planning to make on drainage and wastewater infrastructure in the catchment as match funding to unlock other funding streams.

Projects currently being developed within the Hampshire Avon are shown in Figure 38 summarised in Table 10.

Figure 38: Projects identified within the Hampshire Avon catchment (opportunities, completed work and active projects)

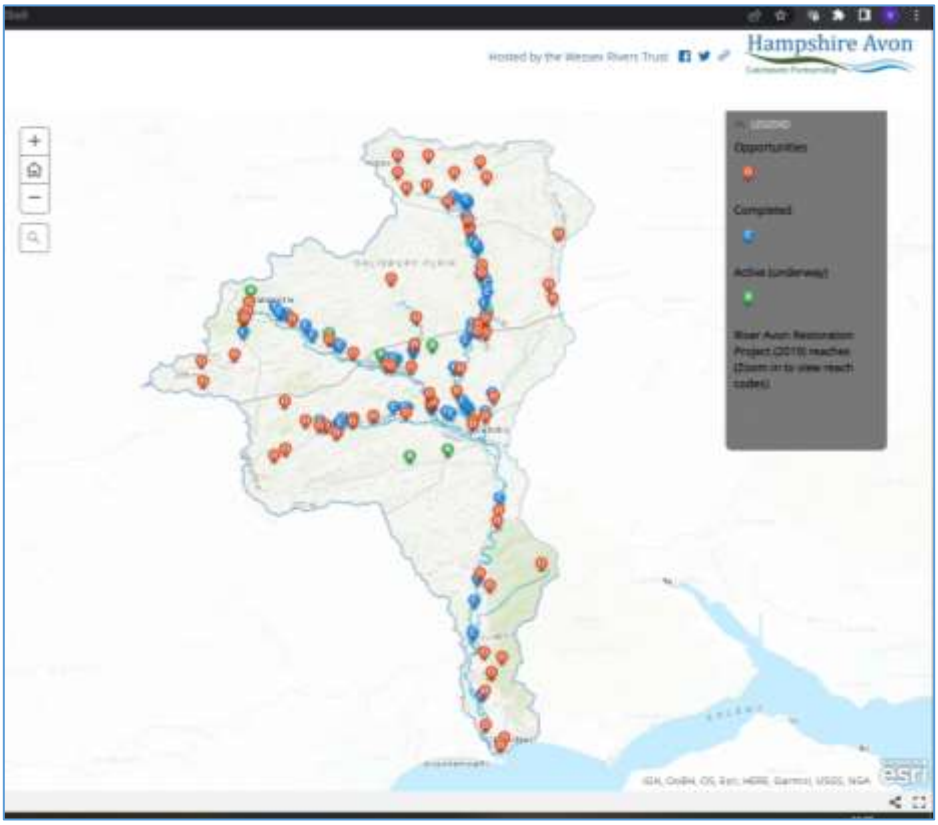


Table 10: Projects currently being developed within the Hampshire Avon

Location	
Pewsey	Volunteer groups interested in citizen science and monitoring. Agricultural - environment groups developing opportunities for ELMS
Western Avon	Wildlife trust project focusing on natural capital outputs through working with farmers and landowners
A303	River restoration work delivered as part of the National Highways scheme
Wylye	Landscape recovery project between Langford to upstream of Warminster
Nadder	Focus on Water quality, identification of hotspots to target catchment management to improve water quality

Salisbury	Focus on opportunities as part of the Salisbury Flood Alleviation scheme
Ebble catchment	Delivery of various catchment measures through a Heritage Lottery Fund project developing citizen science network within the catchment.
Downton	Environmental enhancements
New Forest streams	Green recovery challenge project to restore the water environment on the Ripley Brook
River Mude	Interest in drains from the industrial estate that discharge into the river
Clockhouse stream	Focus on reconnecting and re-wilding the river

Within the Hampshire Avon catchment, several locations have been identified by the Lead Local Flood Authorities of Wiltshire Council, Hampshire Council and BCP Council as a focus for potential partnership and collaborative projects to deliver integrated flood risk management. These projects will also look at catchment measures where appropriate to reduce the flood risk, which have been identified as partnership priority areas for the DWMP detailed further in section 6.3.

6.2.23 Somerset

The Level 2 DWMP area of the Somerset catchments (which include several water bodies) is covered by the Somerset Catchment Partnership, Somerset Local Nature Partnership, Somerset Rivers Authority. The coastal areas are covered by the Severn Estuary Partnership and Southwest Coastal Partnership.

The area covered by the Somerset catchments falls within the council boundaries of Somerset, North Somerset and a small part of Dorset.

The priority locations for current projects taking place as part of the Somerset Catchment Partnership are shown in Figure 39.

The Somerset catchment partnership have led work on two catchment strategies for their priority catchments of the Tone Catchment[67] and the Brue Catchment[53].

The aims of the Somerset Catchment Partnership are to:

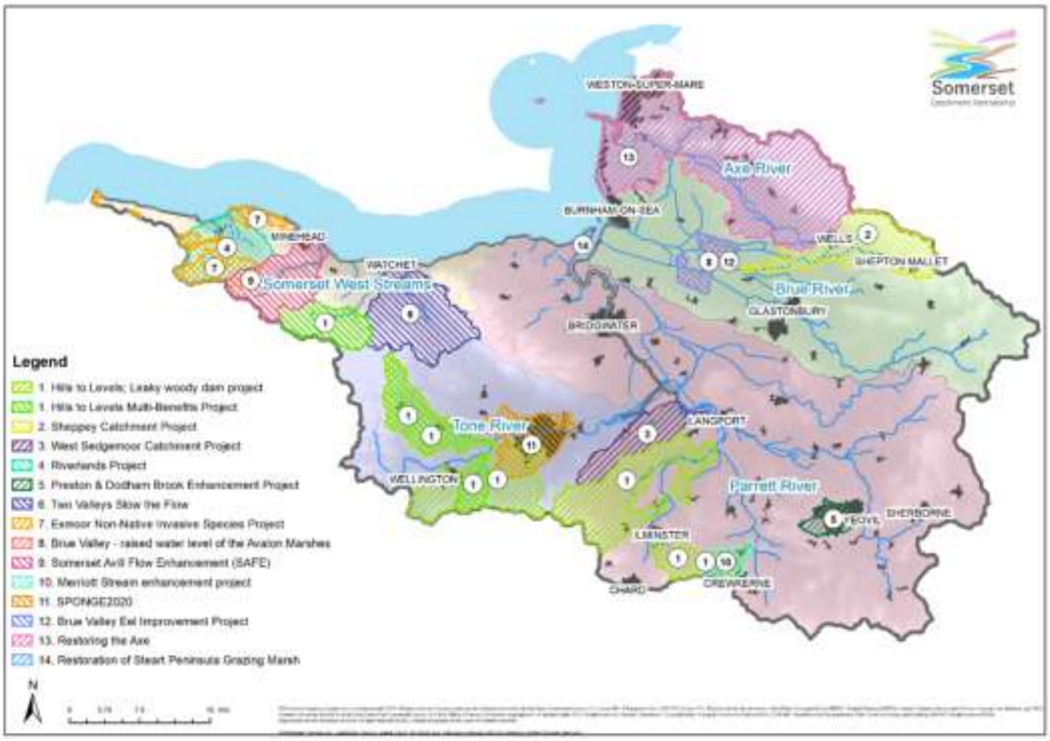
- collectively identify and continually review the key water-based issues to ensure that improvement plans are well-informed by local evidence/data.
- develop a collaborative Whole Catchment Action Plan and sub catchment plans, to help co-ordinate and facilitate project delivery to improve the water-based issues in the catchment.
- encourage collaboration and sharing of knowledge, expertise, and experience to tackle the issues and enable cost effective partnership working and unlock funding streams.
- build local partnerships through stakeholder engagement and deliver a positive outcome for the water environment by promoting a better understanding at a local level.

There are potential opportunities to align SCP projects identified within the River Tone and River Brue catchment strategies and action plans. Given alignment with the outcome themes to deliver improved environment, effective sewerage and asset health themes, the priority areas identified in these documents could be used to align with focus for investment within the catchments in the DWMP.

There are a number of catchment markets being developed and forming within the Somerset area, Wessex Water is funding the Somerset Catchment Market for the Parrett and Tone catchments[63] which has the opportunity to support delivery of water quality improvements in line with DWMP drivers focusing on nature based solutions.

Within Somerset, several locations have been identified by the Lead Local Flood Authority as the focus for potential partnership and collaborative projects which will aim to deliver integrated flood risk management, looking at catchment measures where appropriate, to reduce the flood risk.

Figure 39: Current projects in Somerset supported by the Somerset Catchment Partnership[64]



Projects that are currently being developed through the Somerset Catchment Partnership are summarised in Table 11.

Table 11: Projects that are currently in developed by the Somerset Catchment Partnership

Location	
Hills to Levels approach	Various projects focused on flood risk, water quality, community engagement, climate adaption and habitat creation
Sheppy catchment project	Fisheries, habitat, water quality, flood risk resilience to climate change and community engagement
West Sedgemoor catchment project	Water quality, habitats, community engagement, water level
Riverlands project	Land management, community engagement, habitats, flood risk, water quality access and recreation
Preston and Dodham Brook Enhancement	Community engagement, habitats, water quality, blue and green infrastructure
Two Valleys slow the flow	Flood risk, habitat creation, land management, community engagement

Brue Valley Catchment Strategy	Hydrological connectivity, habitats, water level management
Somerset Avil Flow Enhancements	Fisheries, habitats
Merriott Stream enhancement project	Habitats, fisheries, river restoration, channel enhancements
SPONGE2020	Sustainable drainage, flood risk, water quality, community engagement, climate adaption green and blue infrastructure
Brue Valley Eel improvement	Eels, fisheries, habitat, ecology
Restoring the Axe	Fisheries, habitat, land management, runoff
Restoring the Steart Peninsular	Water quality, biodiversity, habitats

Table 12 identifies a number of key strategies and plans within the Somerset Level 2 DWMP catchment area that have been identified to have potential synergies with DWMP priority areas.

Table 12: Key plans and strategies within the Somerset Catchment Partnership area

Organisations	Strategies and plans within the Somerset Level 2 catchment that have been identified for potential DWMP partnership opportunities
Somerset Council	Somerset's Climate Emergency Strategy
Somerset Council	Phosphates – Templates, Guidance and Useful Information (somerset.gov.uk)
Somerset Council	Somerset Council Local Plan (under development)
Somerset Rivers Authority	Somerset's 20 Year Flood Action Plan - Somerset Rivers Authority
Somerset Drainage Boards Consortium	Water Level Management Plans | Somerset Drainage Boards Consortium
Somerset Drainage Boards Consortium	Somerset Biodiversity Action Plan
Somerset Catchment Partnership	Brue Catchment Action Plan: 2020-2025
Somerset Catchment Partnership	Tone Catchment Action Plan: 2021:2026
Minehead and Coast Development Trust	Minehead Plan: Inspiring People and Place

6.3 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 5. The council boundaries in some cases cover multiple Level 2 catchments (Table 13). We attend over 100 meetings a year 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.

Table 13: Level 2b council areas and relevant Level 2 areas

Organisation	Relevant DWMP Level 2 area(s)
Bath and North East Somerset (BaNES) Council	Bristol Avon
Bournemouth Christchurch and Poole (BCP) Council	Dorset and Hampshire Avon
Bristol City Council	Bristol Avon
Dorset Council	Dorset and Somerset
Hampshire County Council	Hampshire Avon
Gloucestershire County Council	Bristol Avon
North Somerset Council	Bristol Avon and Somerset
Somerset Council	Somerset
South Gloucestershire Council	Bristol Avon
Wiltshire Council	Bristol Avon

6.3.1 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.

Potential partnership opportunities identified through FRMP measures relating to the BaNES Level 2b DWMP area included in the short- to medium- term to:

- work with Bath and North East Somerset Council to achieve the objectives of the Local Flood Risk Management Strategy (FRMP reference: 0204809051).
- work with partners to support the wider flood risk management strategy in Bath being led by the Environment Agency (FRMP reference: 0203409002).
- consider impact of works to the EA assets of Twerton (FRMP reference: 0203409003) and Pulteney Radial gate (FRMP reference: 0203409004) with a view to exploring opportunities for aligning or integrating delivery of improvements to drainage and wastewater infrastructure.
- consider opportunities for collaboration in the Midford Catchment where the EA are looking to review potential improvements to the flood defences. (FRMP reference: 90203409007).

6.3.2 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.

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.

Potential partnership opportunities identified through FRMP measures relating to the BCP Level 2b DWMP area included in the short- to medium- term to:

- support BCP in their production of a new Local Flood Risk Management Strategy (FRMP reference: 0203308055), new BCP Surface Water Management Plans (0203308058), a Strategic Flood Risk Assessment (FRMP reference: 0203308056), and the development of Local Sustainable Drainage Systems (SuDS) policy in the BCP Council area to reduce the risk of flooding (FRMP reference 0203308060)

- support the development of the Flood and Coastal Erosion Risk Management Strategies in Christchurch Bay and Harbour (FRMP reference: 0203308042), Poole Harbour and Wareham (FRMP reference: 0203308043) where relevant
- support BCP with finalising the Poole Bridge to Hunger Hill Flood Defence Scheme in Poole Old Town, Poole Harbour (FRMP reference: 0203308046) to reduce the risk of tidal flooding and explore opportunities for increasing resilience to drainage and wastewater infrastructure
- work with BCP to investigate opportunities to increase the resilience of the drainage and wastewater infrastructure in relation to the:
    - Hamworthy to Upton Flood Defence Scheme in Turlin Moor in Poole, to reduce the risk of flooding (FRMP reference: 0203308051)
    - Fleetsbridge and Hatch Pond attenuation and natural flood management project (FRMP reference: 0203308052)
    - proposed Bournemouth Central Valley Surface Water Flood Relief Scheme in Bournemouth to reduce the risk of flooding (FRMP reference: 0203308064)

6.3.3 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 were also held with partners 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 currently 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.

Potential partnership opportunities identified through FRMP measures relating to the Bristol City Council Level 2b DWMP area included in the short- to medium- term to:

- support the implement the Surface Water Management Plan in Bristol to manage the risk of surface water flooding (FRMP reference 0206009027) and achieving the objectives of the Local Flood Risk Management Strategy in Bristol (FRMP reference: 0206009028) where possible
- work with partners to develop and progress flood alleviation strategies for the
    - River Avon (FRMP reference 0203409008)

    - Old Colliters Brook in Bristol (FRMP reference: 0203409011).
    - River Malago (FRMP reference 0203409012)
    - Ashton Vale catchment (FRMP reference: 0206009025 and 0203409010)
- support BCC with their Bedminster Green River Restoration project, delivering increased flood resilience through green infrastructure and resilience measures
- work with the EA, BCC and other partners on new development areas in Bristol to reduce the future risk of flooding in the city (FRMP reference 0203409009). This could include supporting the River Frome Gateway Masterplan in the lower Frome catchment (FRMP reference 0206009026) if appropriate, to identify options for river restoration and flood mitigation in Bristol.
- support the EA and BCC and South Gloucestershire Council to deliver the Ecology Mitigation and Flood Defence project in the Avonmouth and Severnside Enterprise Area (ASEA) to understand impact to Wessex Water assets (FRMP reference: 0203409013)

6.3.4 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.

Potential partnership opportunities identified through FRMP measures relating to the Dorset Council Level 2b DWMP area included in the short- to medium- term to:

- work with partners to develop a strategic approach in Bridport to sustainably manage future flood risk to people, property, and other assets over the next 100 years (FRMP reference: 0203308017)
- work with the Environment Agency, Dorset Council, community, and partners to inform the development of flood defences in Swanage town centre (FRMP reference 0203308018)
- support chalk river restoration in Dorset including the River Frome and Moors rivers (FRMP reference 0203308024)
- work with the Environment Agency in their appraisal of options following modelling in the River Piddle to identify partnership opportunities in alignment with our Piddle inflow reduction plan (FRMP reference: 0203308014)
- work with partners to develop and implement an agreed strategic flood risk management approach in Weymouth to increase future resilience from the predicted increase in surface water flood risk and risk from the sea because of climate change (FRMP reference: 0203308012)

- consider the future management of drainage and wastewater infrastructure and the implementation of improved flood defences in Chiswell, Portland to reduce the risk of flooding (FRMP reference: 0288808019)

6.3.5 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.

6.3.6 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.

6.3.7 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 40 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 40: 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.

Potential partnership opportunities identified through FRMP measures relating to the North Somerset Council Level 2b DWMP area included in the short- to medium- term to:

- work with North Somerset Council and partners to achieve the objectives of the Local Flood Risk Management Strategy in North Somerset (0213109029), achieve the objectives of the Local Flood Risk Management Strategy and Surface Water Management Plan in Weston-Super-Mare (FRMP reference 0203408022)
- work with partners to develop and progress flood alleviation strategies for the Ashton Vale catchment (FRMP reference: 0203409010)
- work with partners to develop a strategy and deliver works in Pill to manage the risk of flooding to the community in line with climate change where interactions occur with the drainage and wastewater infrastructure (FRMP reference 0203409016)
- work with North Somerset Council to undertake the engagement, studies and investigations required in areas along the Weston-Super-Mare to Clevedon Pill frontage to plan and develop current and future coastal flood and erosion risk adaptation options (if funding allows) in the Weston-Super-Mare, South West Flood Risk Area where interactions occur with the drainage and wastewater infrastructure (FRMP reference: 0203508020).

6.3.8 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 41.

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).

Potential partnership opportunities identified through FRMP measures relating to the Somerset Council Level 2b DWMP area included in the short- to medium- term to:

- work with the Environment Agency and Somerset West and Taunton Council to understand any opportunities to deliver improvements to the resilience of drainage and wastewater infrastructure in alignment with projects identified in the Strategic Flood Alleviation Improvements Study in Taunton (FRMP reference: 203508002 and 0203508004.
- consider opportunities to increase the resilience of Wessex Water drainage and wastewater infrastructure in alignment with the Bridgwater tidal barrier flood defence scheme (0203508006)
- work with partners to support the development of a flood risk management strategy for the Somerset Levels and Moors to increase the resilience to future flood risk from drainage and wastewater infrastructure (FRMP reference: 0203508008 and 0203508029)
- work with partners to investigate options and develop a strategy in the River Axe catchment (partially in Chard) to manage the future risk of flooding and provide environmental enhancements where possible (FRMP reference: 0203508016)
- work with Somerset Council, the Environment Agency, Internal Drainage Board, and all relevant partners to investigate a strategic, integrated approach to managing all sources of flood risk and identify partnership funding opportunities in Minehead to align surface water management needs with strategic coastal objectives and account for future development (0203508018).

Figure 41: 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 sewage flooding and restricted toilet use experienced by the local community.

6.3.9 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 Board's 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 several 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.

6.3.10 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, bi-weekly meetings with the Resilient Frome partnership that secured Flood and Coast Innovation Resilience funding from 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.

Potential partnership opportunities identified through FRMP measures relating to the South Gloucestershire Council Level 2b DWMP area included in the short- to medium- term to:

- work with partners to achieve the objectives of the Local Flood Risk Management Strategy in South Gloucestershire to manage the risk of flooding in the Avon Bristol and North Somerset Streams Management Catchment (FRMP reference: 0203409014).
- support the Environment Agency and Bristol City Council and South Gloucestershire Council to deliver the Ecology Mitigation and Flood Defence project in the Avonmouth and Severnside Enterprise Area (ASEA), to understand impact on Wessex Water assets (FRMP reference: 0203409013)

6.3.11 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.

Potential partnership opportunities identified through FRMP measures relating to the Wiltshire Council Level 2b DWMP area included in the short- to medium- term to:

- investigate options to reduce flood risk to residents and areas of Corsham to reduce flood risk (FRMP reference 0203309031)
- work with partners to develop a strategic approach for the next 100 years in the Upper Bristol Avon to sustainably manage flood risk to people, property and other assets in the Avon Bristol and North Somerset Streams Management Catchment and deliver water quality improvements (FRMP reference 0203309033)
- work with partners to investigate options and identify future funding opportunities in Warminster to manage river, sewer, and surface water flood risk in the Hampshire Avon catchment (FRMP reference: 0203308003)
- support chalk river restoration in the Hampshire Avon catchment (FRMP reference 0203308025)

6.4 Partnership priority areas

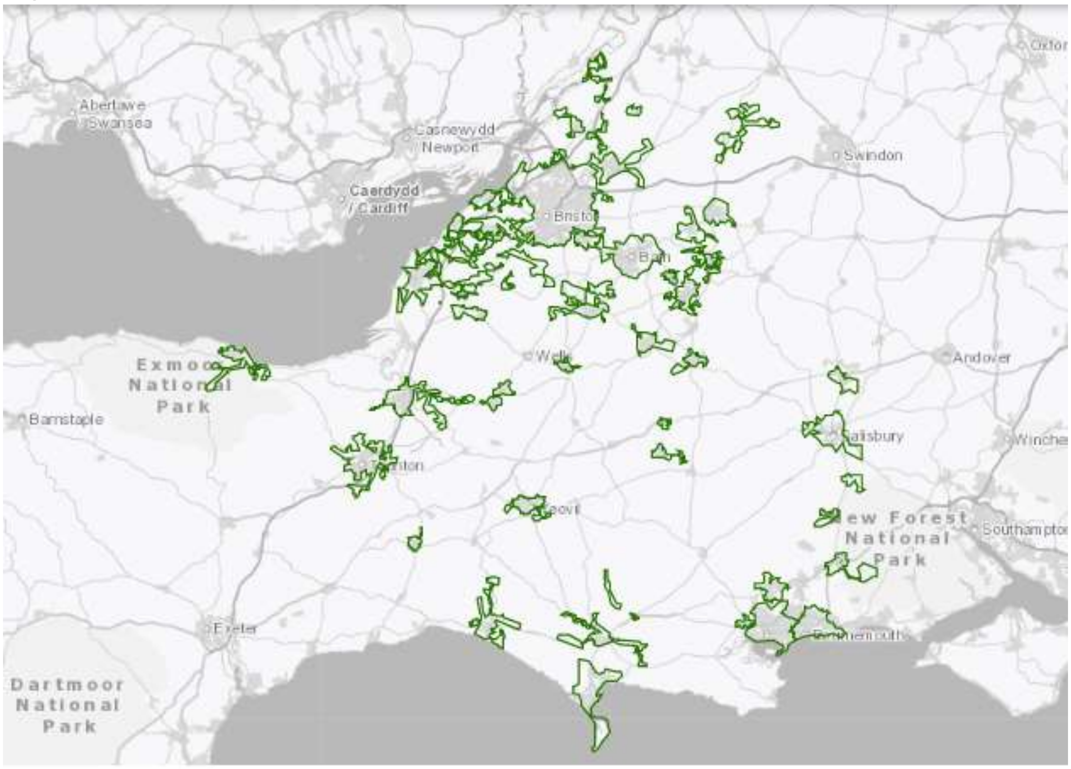
Throughout the development of the DWMP and through our established relationships and regular engagement with stakeholders across the Wessex area, we have a clear understanding of priority catchments where stakeholders are interested in potential development of collaborative projects.

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

Figure 42 highlights areas that have been identified as partnership priority catchments. Table 14 to Table 17 lists the catchments that have been identify DWMP priority areas.

Figure 42: Partnership priority locations for the Level 1 Wessex area



6.4.1 Partnership priority areas - Bristol Avon (Level 2)

Catchments that have been identified as priority areas by stakeholders within the Level 2 Bristol Avon Catchment partnership area are shown in Figure 43 and detailed in Table 14.

Figure 43: Partner priority locations for the Bristol Avon catchment and approach to ODA

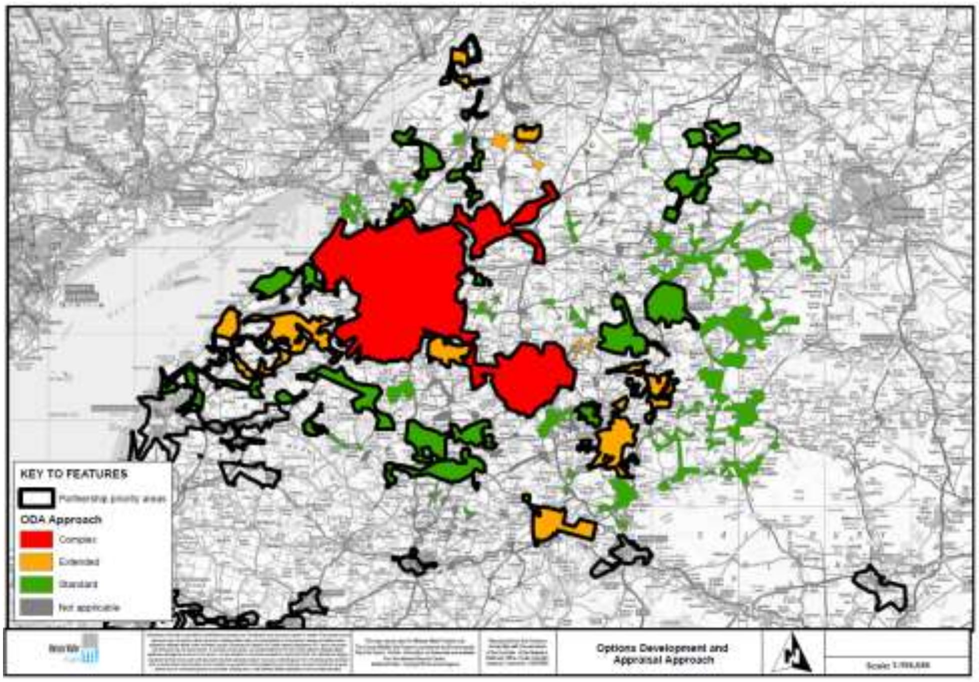


Table 14: Partner priority locations for the Bristol Avon

Level 2b - LLFA	Level 3 Water Recycling Centre catchment	
Bath And North East Somerset	Bath	Paulton
	Cam Valley	Radstock
	Chew Stoke	Stanton Drew
	Keynsham	Ubley
Bristol City	Avonmouth	
Gloucestershire County	Michaelwood	Wotton Under Edge
	Sharpness	Portbury Wharf
North Somerset Somerset County	Blagdon	Wick St Lawrence
	Butcombe	Wrington
	Kingston Seymour	
	Frome	
South Gloucestershire	Almondsbury	Pucklechurch
	Cromhall	Thornbury
	Parkfield	
Wiltshire	Bowerhill	Melksham
	Bradford On Avon	Thingley
	Chippenham	Trowbridge
	Malmesbury	

6.4.2 Partnership priority areas - Dorset

Catchments that have been identified as priority areas by stakeholders within the Level 2 Dorset Catchment partnership area are shown in Figure 44 and detailed in Table 15.

Figure 44: Partner priority locations for the Dorset strategic catchments and approach to ODA

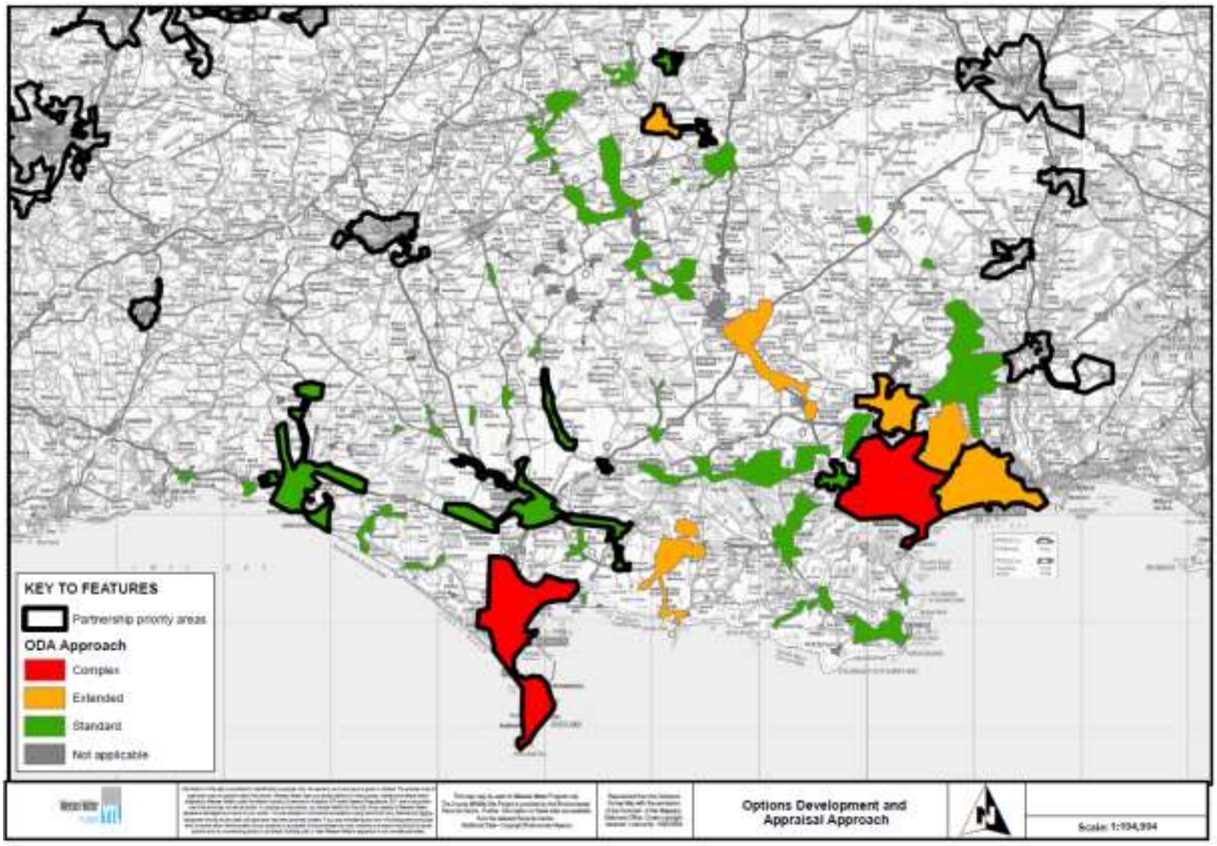


Table 15: Partner priority locations for the Level 2 Dorset Catchment

LLFA	L3 WRC Name
Bournemouth, Christchurch, and Poole	Holdenhurst
	Kinson
	Poole
Dorset	Bridport
	Dorchester
	Gillingham
	Lytchett Minster
	Piddlehinton
	Puddletown
	Swanage
	Weymouth
	Wimborne
Wiltshire	Mere

6.4.3 Partnership priority areas - Hampshire Avon

Catchments that have been identified as priority areas by stakeholders within the Level 2 Hampshire Avon Catchment partnership area are shown in Figure 45 and detailed in Table 16.

Figure 45: Partner priority locations for the Hampshire Avon strategic catchments and the approach to options assessment informed by the ODA

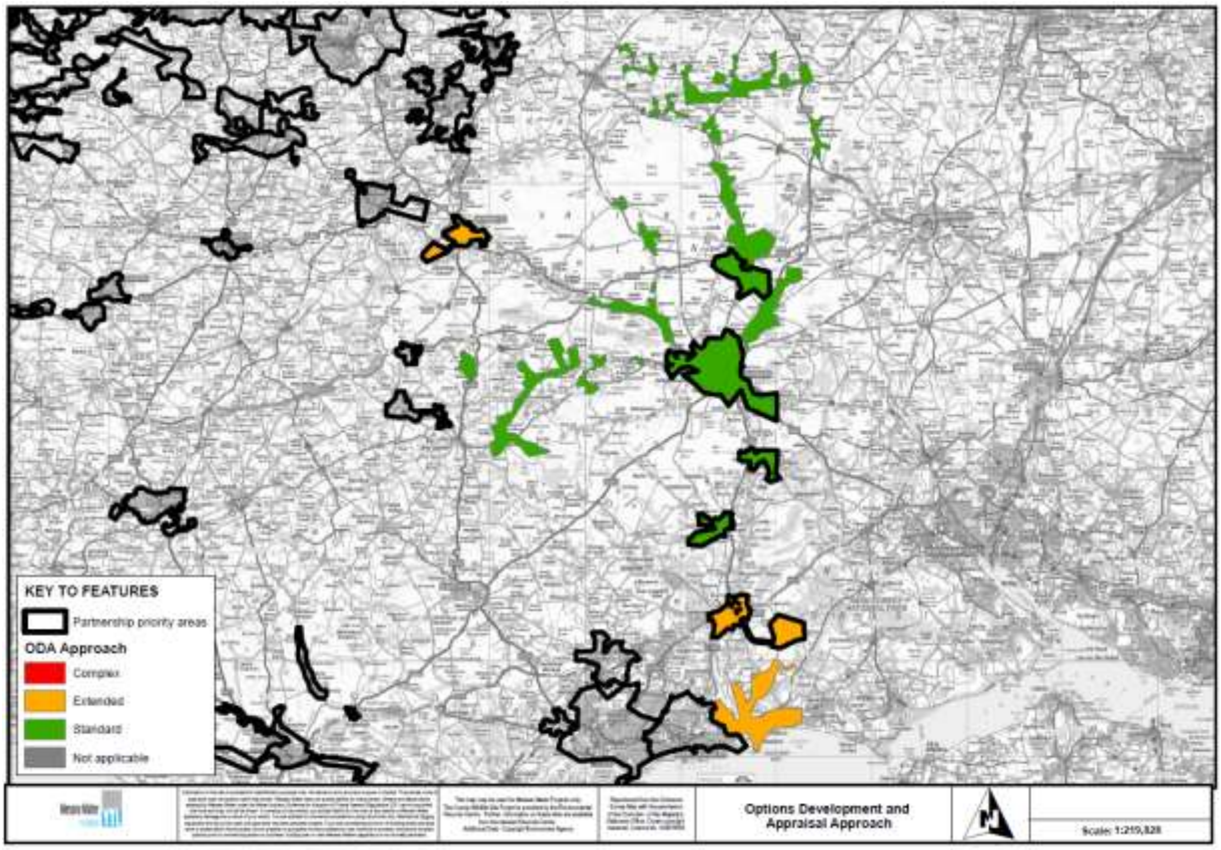


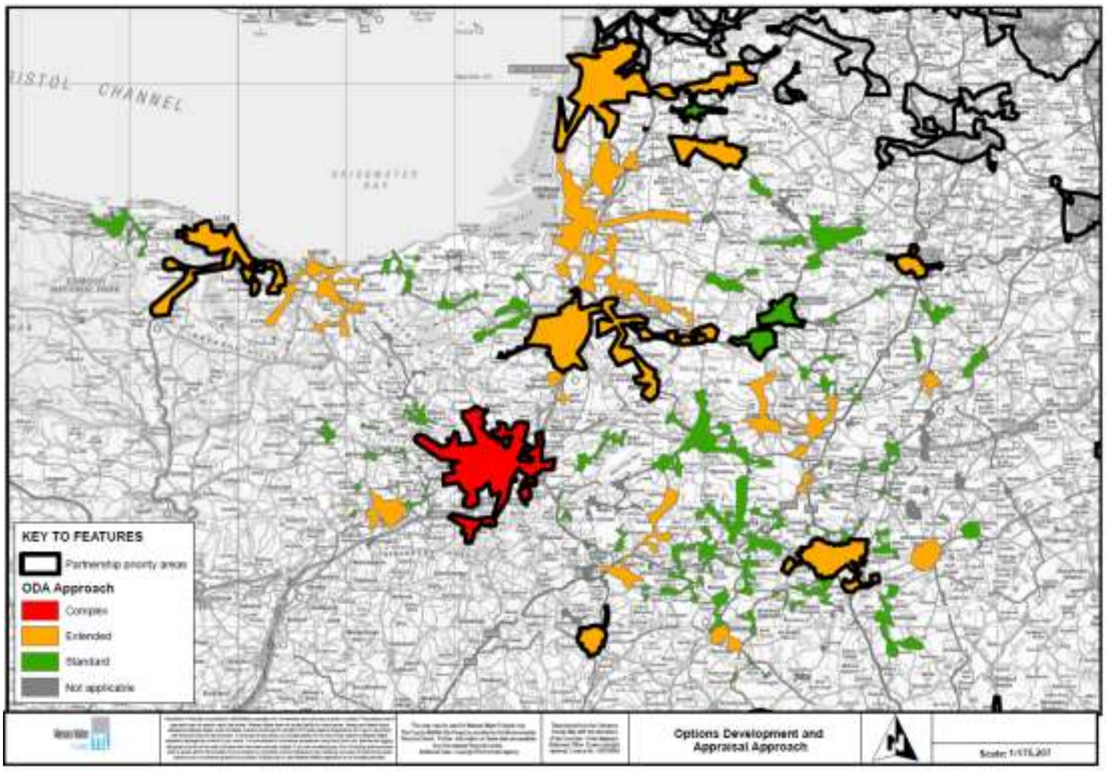
Table 16: Partner priority locations for the Level 2 Dorset Catchment

LLFA	L3 WRC Name
Hampshire County	Fordingbridge
	Ringwood
Wiltshire	Amesbury
	Downton
	Salisbury
	Warminster

6.4.4 Partnership priority areas - Somerset

Catchments that have been identified as priority areas by stakeholders within the Level 2 Somerset Catchment partnership area are shown in Figure 46 and detailed in

Figure 46: Partner priority locations for Somerset strategic catchments and the approach to options assessment informed by the ODA



Further examples of Case study examples of completed partnership projects and those in development are shown on our portal on our public DWMP website.

Table 17: Partner priority locations for the Level 2 Somerset Catchment

LLFA	L3 WRC Name	
Dorset	Sherborne	
North Somerset	Loxton	
	Weston Super Mare	
	Winscombe	
Somerset County	Bridgwater	Minehead
	Chard New	Shepton Mallet
	Cheddar	Taunton
	Glastonbury	Yeovil
	Ilminster	

6.5 Local areas (Level 4)

6.5.1 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 48 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 47.

Figure 47: Photo of flood public meeting with other Risk Management Authorities

Figure 48: 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.

6.5.2 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.

6.5.3 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.

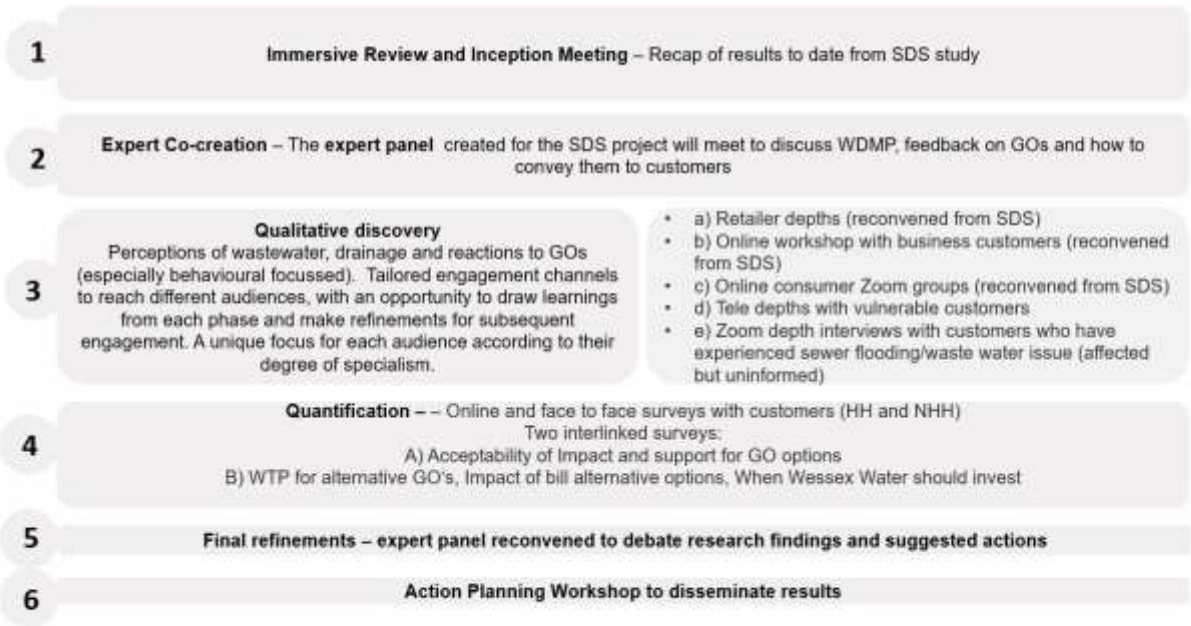
The aims of the customer research that we undertook to inform the DWMP were to:

- 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 49: Methodology used for the DWMP customer research



6.5.4 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 50.

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

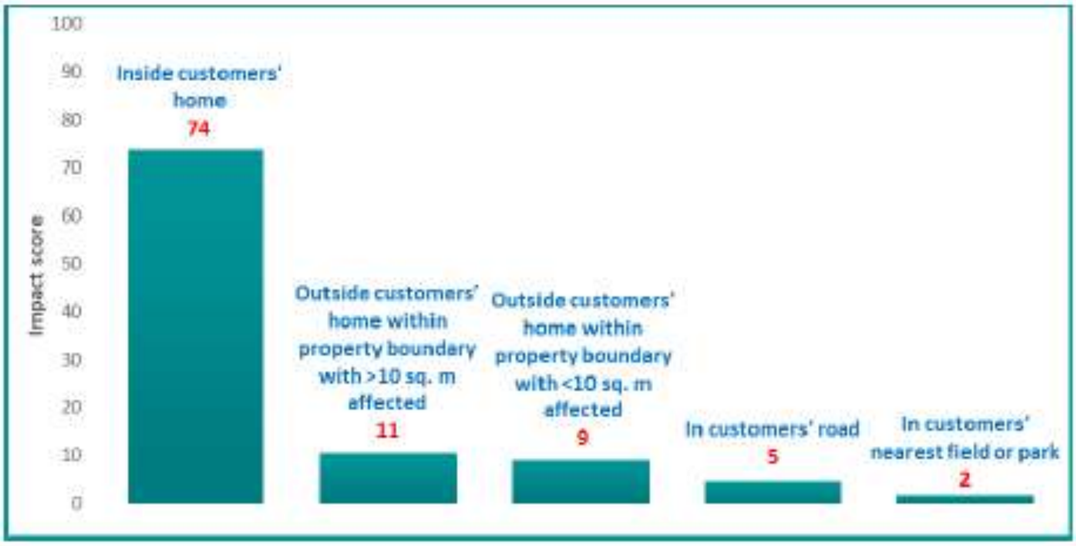
Understanding was greater among those living near treatment works or had experienced local drain or sewer flooding.

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.

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

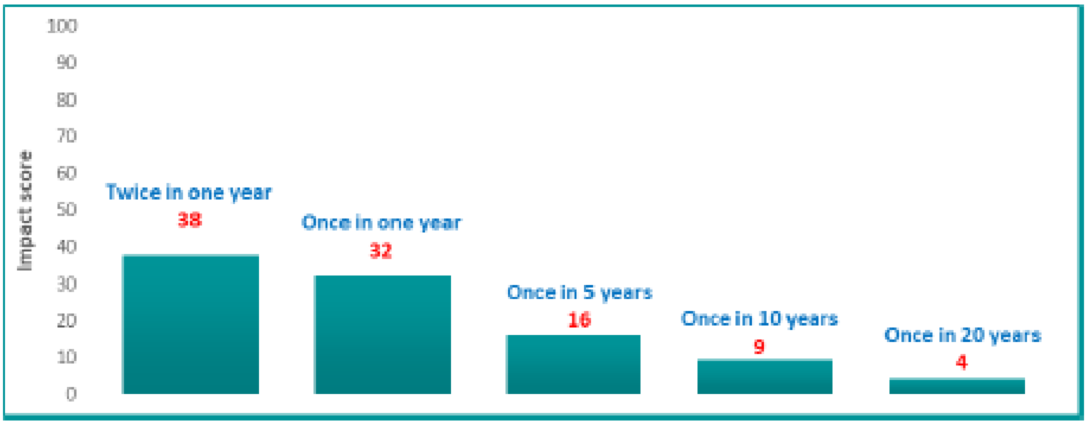
The results from the customer research relating to customers views on the acceptability of impact of flooding are shown in Figure 51. The impact of sewer flooding is clearly worst when inside the home. Next worst, but significantly less of an impact, was when flooding was outside the customers' home 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 51: Relative impacts of flooding by location



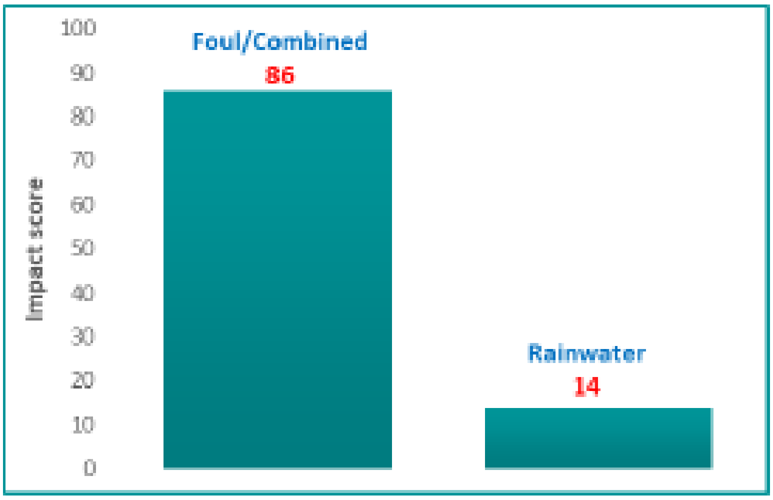
The results from the customer research relating to customers views on the acceptability of impact of flooding are shown in Figure 52. The impact of sewer flooding was worst when occurring more frequently. This order of impact is again as expected.

Figure 52: 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 53. 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.

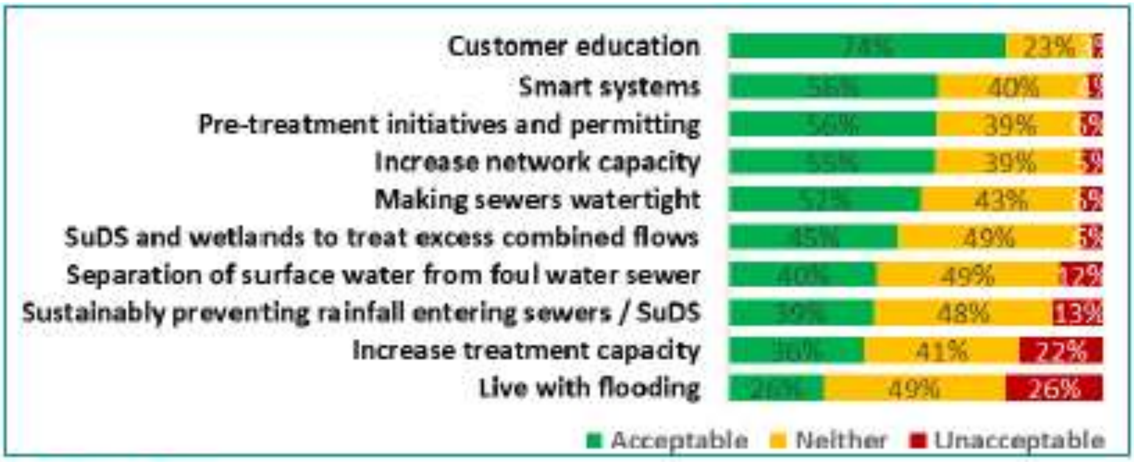
Figure 53: Relative impacts of flooding by type (Rainwater or Foul / Combined)



6.5.6 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 54: Customer views on acceptability of generic options considered in the DWMP



Base: Total=1,084

6.5.7 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.

6.5.8 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.

6.5.9 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.

6.6 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.

6.7 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.

6.8 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 55: Examples of our customer magazine informing our customers about our work

Figure 56: Article about using wetlands to treat storm overflows in Wessex Waters customer magazine spring summer 2022 edition

Reed all about it

Every month we're spending £3 million to reduce storm overflows, part of a £150 million investment programme between 2020 and 2025. We're committed to completely eliminating the discharge of untreated sewage into rivers and seas.

Half of storm overflow discharges in the Wessex Water region occur when groundwater, held within rocks and soil beneath our feet, gets into drains and sewers and has nowhere else to go.

A natural solution

The village of Hanging Langford in Wiltshire has long been prone to flooding, caused by exceptionally high groundwater levels, and climate change means rainfall is becoming more intense - not just during winter months.

Building new storage tanks on the sewerage network would be hugely expensive and disruptive to local people, not to mention the sizeable carbon footprint left behind. So, after re-lining our sewer pipes, we joined forces with Wiltshire Wildlife Trust and the Environment Agency to build a reed bed at Langford Lakes nature reserve.

This acts as a filter for potentially harmful bacteria before waste water from our screened storm overflow is released back into the River Wylye.

Sampling upstream and downstream of the discharges has shown no adverse impact on river ecology - indeed downstream water quality has improved - while the reed bed has become a haven for wildlife species like dragonflies and warblers.

Gary Mantle (pictured inset), Chief Executive of Wiltshire Wildlife Trust, said: "The reed bed has ended up stopping pollution that was taking place in the river, so it has improved water quality as well as creating a fantastic wildlife habitat, with lots of birds nesting, living and feeding here.

"Local people are really pleased because it's solved what was a major problem for them, as previously their domestic sewage system wouldn't function properly whenever groundwater levels rose.

"So everybody wins as a result of this. I'd like to see Wessex Water delivering more of these projects, not just in Wiltshire but across their region."

While reed beds will only work in certain locations and conditions, nature-based initiatives are a key part of our strategy to tackle overflows.

Director of Environmental Solutions Ruth Barden, said: "Sometimes there isn't an engineering solution to a problem of nature, such as at Hanging Langford and other locations that are inundated with groundwater flooding.

"We don't have the powers to re-line customers' domestic sewer pipes, where the majority of the groundwater enters the system. We can only look after our public network.

"So this solves the problem by reducing flooding and enabling us to discharge throughout the year when groundwater levels are higher, with no impact on the river."

4 Wessex Water Magazine

Storm overflows: Your questions answered

Why are you dumping raw sewage?

We're not. While we agree that storm overflows have no place in the 21st century, they are carefully designed to release highly diluted and screened storm sewage only. Dilution by rainwater and groundwater infiltration means what's released is more like the image on the right of a sample from an overflow at Shrewton in Wiltshire. Overflows have always been part of the UK sewerage network because most sewers carry both rainwater and foul sewage, and they protect properties from flooding. We're now experiencing more intense storms due to climate change and this can lead to more discharges.

Do storm overflows cause pollution?

Rarely. Only eight out of 444 waterbodies in our region are identified as not achieving good ecological status due the impact of storm overflows and other factors. That's well below the national average.

Why don't you invest more of your profits on fixing the problem?

Every month we're investing £3 million to reduce storm overflows, with £150 million being spent between 2020 and 2025. We spend more than we receive through customer bills, and this investment is tightly controlled by our regulators.

Is Brexit to blame?

No. The use of storm overflows in the UK is consistent with practice throughout Europe, which has around 650,000 overflows across the continent.

Do you monitor storm overflows?

Yes, around 80% are monitored in our region and we have a programme in place to install monitoring equipment on them all by 2023. We're also using artificial intelligence technology, both to detect sewer blockages and potentially notify when water quality might deteriorate in areas where overflows operate.

Can customers help?

Yes. Only flush the three Ps – paper, poo and pee – down the toilet. Wet wipes and sanitary products don't break down properly in our sewers and cause blockages, leading to overflow discharges. Installing water butts in gardens helps too because it means rainwater is collected, reducing the risk of flooding that can overwhelm the sewer network.

So is it safe to swim in my local river or the sea?

We know more people are enjoying rivers and lakes near them, including for swimming, but it's important to remember there will always be bacteria in the water. This can come from wildlife and agricultural run-off as well as regulated overflows and treated sewage discharges, so the advice from Public Health England is to avoid ingesting the sea or river water while swimming. We provide information for local councils, Surfers Against Sewage and others when storm overflows operate that could potentially affect bathing waters and inland swimming sites. This can be found at **wessexwater.co.uk/coastwatch**

Wessex Water Magazine 5

Figure 57: Article about Wessex Water's route map to net zero carbon emissions in Wessex Water's magazine winter 2021

Wessex Water's routemap to **net zero carbon** emissions

We've published a routemap to achieve net zero operational carbon emissions by 2030 and full de-carbonisation of all aspects of our work by 2040, a decade ahead of the UK government's 2050 target. Dan Green, Head of Sustainability and Innovation, explains what's involved.

"There is no doubt we are in the midst of a climate crisis, said Dan. "Unless substantially reduced or removed, emissions of carbon dioxide and other greenhouse gases will result in a level of global warming that will be catastrophic for humanity and most of the world's remaining ecosystems. The climate is changing rapidly and the effects will become more severe unless we act now.

"We are committed to achieving net zero emissions related to our energy use, transport, and treatment of sewage and sludge by 2030. However, we must decarbonise all aspects of our work, and will work to achieve net zero total emissions, including those from the construction matererials and consumeables that we use, by 2040 at the latest."

Wessex Water's operational net zero plan will reduce annual emissions by 110,000 tonnes of CO_2. The plan has three strands.

- **Emissions avoidance** by further reducing leakage and encouraging water efficiency; use of lower carbon transport and promoting low energy, nature-based solutions.
- **Optimisation measures** to improve efficiency and control nitrous oxide from sewage treatment.
- **More renewable energy** by increasing generation from biogas and pursuing opportunities for wind and solar power, both as generator and end user.

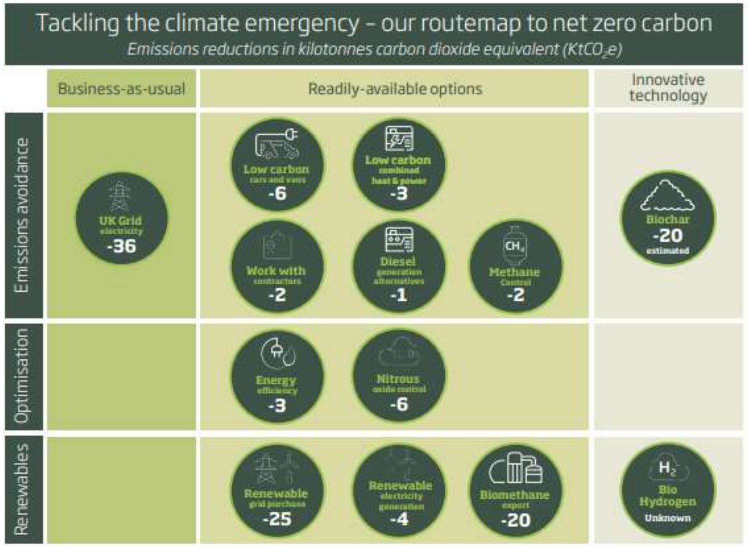
Dan said: "Delivering our plan will require investment, collaboration and innovation. A good example of innovation is the role out of our trucks (see opposite) which run on biomethane and make considerable carbon savings.

"We are committed to working with communities, customers and other stakeholders and finding new ways of working and use of emerging technologies.

"By working together we will play our part in halting the damage to the environment and people caused by climate change."

Find out more at **wessexwater.co.uk/environment**

26 Wessex Water Magazine



Poo-powered trucks hit the road

We're using trucks powered by sewage and food waste as part of a transport revolution that could potentially slash greenhouse gas emissions and improve air quality.

Each truck converted from diesel to biomethane achieves a carbon saving that's equivalent to removing more than 100 cars from the roads.

Following in the footsteps of the famous Bristol 'poo bus', which was the first in the UK to be powered by biomethane, the new HGVs run on Bio-CNG (compressed natural gas) and are helping to reduce our carbon emissions and fuel costs.

Bio-CNG fuel can either be derived from liquified natural gas or from the bi-product of the decomposition of organic matter. All fuel used in the trucks comes from the anaerobic digestion of sewage and food waste at Bristol Bioresources and Renewable Energy Park.

Sean Hill, Wessex Water's Director of Bioresources, said: "The tankers collecting sewage sludge for treatment and the trucks delivering the output fertiliser are both powered by the gas generated from this treatment, so we're closing the loop when it comes to our recycling.

"This will make a huge difference to our carbon footprint and help improve the air quality of communities in our region, as well as improving operational efficiency and bringing cost benefits."

Bio-CNG has several advantages over petrol or diesel, reducing CO_2 emissions by up to 84% as well as nitrous oxide emissions by up to 75%. The trucks are also much quieter than their diesel equivalents.

Wessex Water is the first water and sewerage company to transport both sludge and biosolid fertilisers using vehicles powered by gas from the waste it is treating.

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Figure 58: Article about flood responsibilities in Wessex Water's magazine winter 2021

The facts about flooding

Most of us will have seen reports of flooding in recent times, and it can be a hugely worrying for those affected.

Extreme weather patterns in the UK can lead to heavy rainfall resulting in localised flooding which may affect your home, open spaces or roads.

With climate change contributing to an increase in frequency and intensity of extreme weather events, it's no surprise that drainage systems can become overwhelmed at times.

Drainage systems carrying floodwater are often interconnected, so at Wessex Water we work closely with local councils, the Environment Agency and other partners to investigate reported flood incidents to inform how future flood risk can be managed.

We are continuously investing in our sewerage network to reduce risk through operational activities or schemes to increase storage capacity. Nearly £250 million is being spent in our region between 2020 and 2025.

Sewers, roads and rivers

Different organisations are responsible for managing flood risk, depending on where the water has come from. If you experience flooding, it's very important to report it to the relevant authority so it can be investigated and responded to where appropriate.

Vicky Farwig, our Flood Risk Coordinator, said: "We understand that it can be very difficult to distinguish the different types of flooding when it occurs, as often the water can come from a variety of sources.

"That's why it is so important to report flood incidents to the relevant authority so they can be investigated to understand the causes and what measures can be taken to reduce the impact of future flood incidents."

Sewage flooding at home

It is very rare for customers to experience sewage flooding at home, but there are steps you can take to minimise the damage should the worst happen.

"If you are experiencing sewer flooding it's important you don't use any appliances that use water, such as washing machines or dishwashers, and you should also take precautions to protect the health of both you and your family," Vicky said.

"If flooding is caused by a blockage in a public sewer, we'll arrange for the blockage to be cleared at our cost. Where flooding is caused by multiple sources, we work with councils and other authorities to investigate and develop joint solutions where appropriate.

What you can do to help

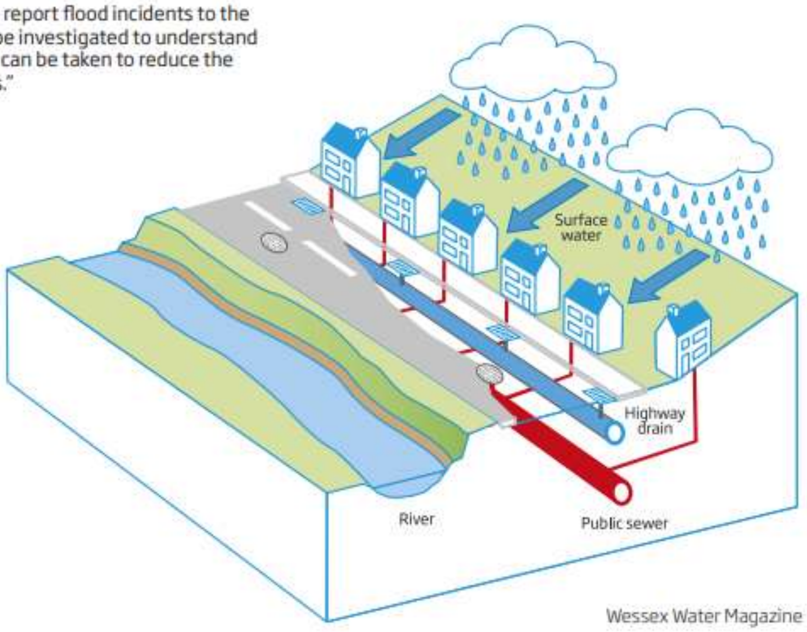
Sewer blockages are often caused by people flushing items they shouldn't down the toilet, such as wet wipes, so always stick to the three Ps - paper, poo and pee.

Installing water butts collects rainwater from roofs and can reduce flooding risk caused by excessive rainfall. There are other measures too, which we will explore in our spring edition.

Find out more at **wessexwater.co.uk/flooding**

Who to contact

Main river levels and flood defences	Environment Agency
Highway flooding	Local council Highways Agency
Sewer flooding from public sewer	Wessex Water
Surface water groundwater and ordinary watercourses	Local council or land drainage board



Wessex Water Magazine **5**

6.9 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.

6.9.1 Summary of findings from customer research

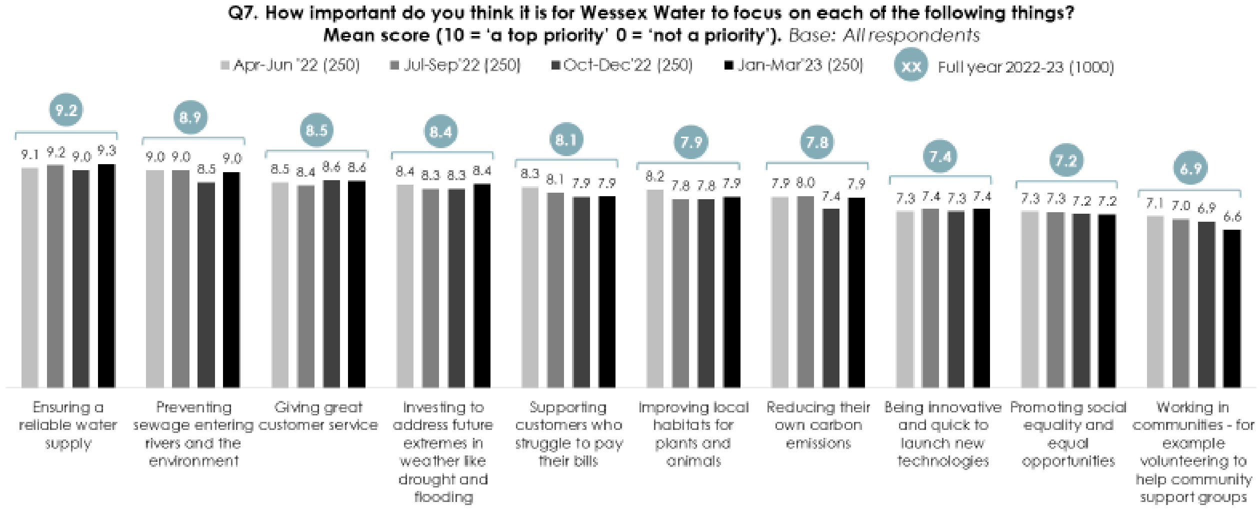
Overall key insights from recent studies can be summarised as below; evidence from research to underpin these statements is presented in the text that follows:

- 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.

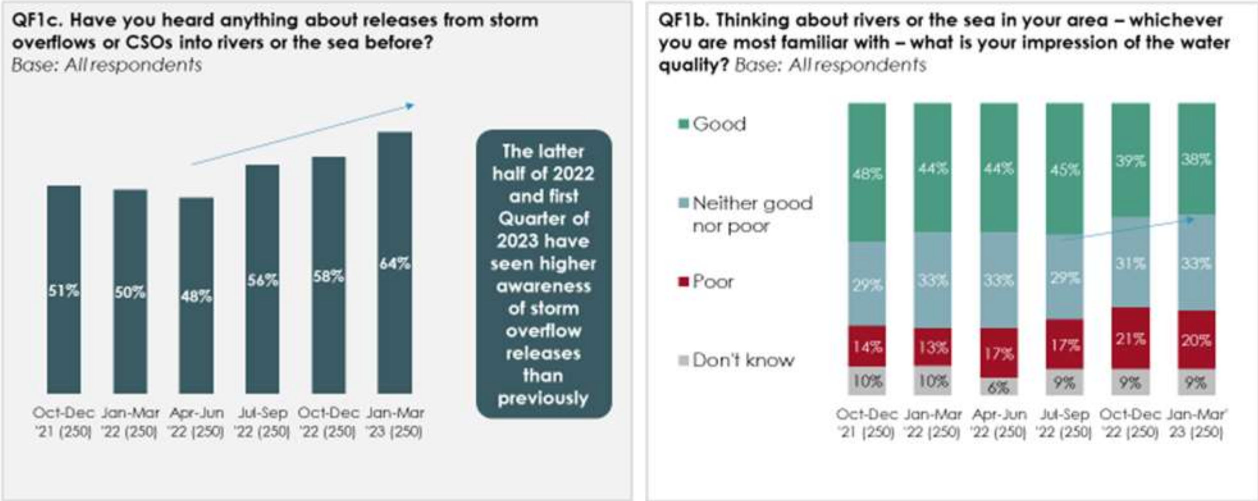
Customer priorities have remained stable through the year with 'preventing sewage entering rivers and the environment' scoring as the second top area of importance (Figure 59).

Figure 59: Results from customer Tracker Survey in 2023 on priority areas



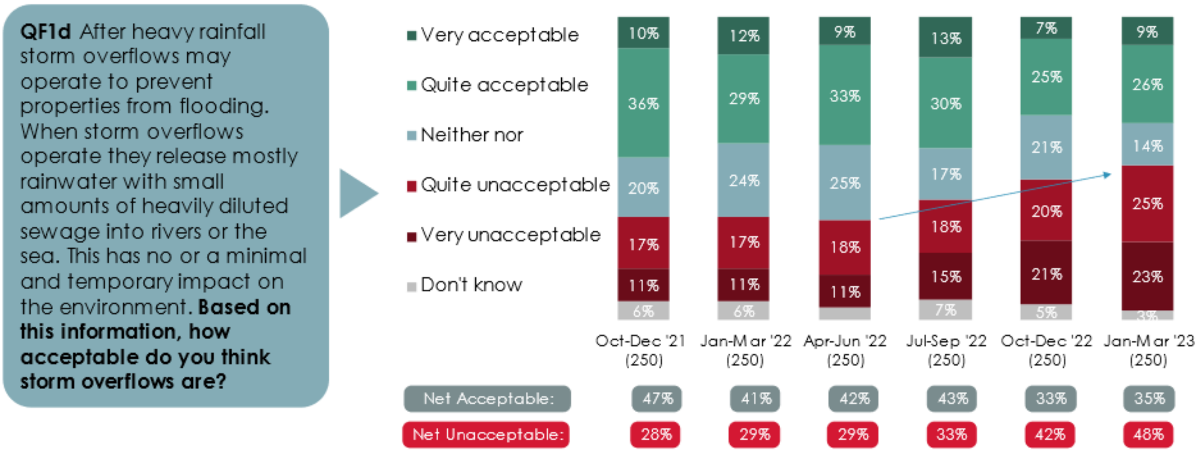
In October 2021 we introduced some new questions in the flexi-section of the Tracker Survey to explore attitudes to storm overflows. We have seen a growing awareness of storm overflows over the last 12 months and for the quarter of January-March 2023 awareness amongst the representative sample of customers 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 60).

Figure 60: 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 61).

Figure 61: 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 62). 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 63) – 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 62: Results from customer Tracker Survey on expectations for household finances

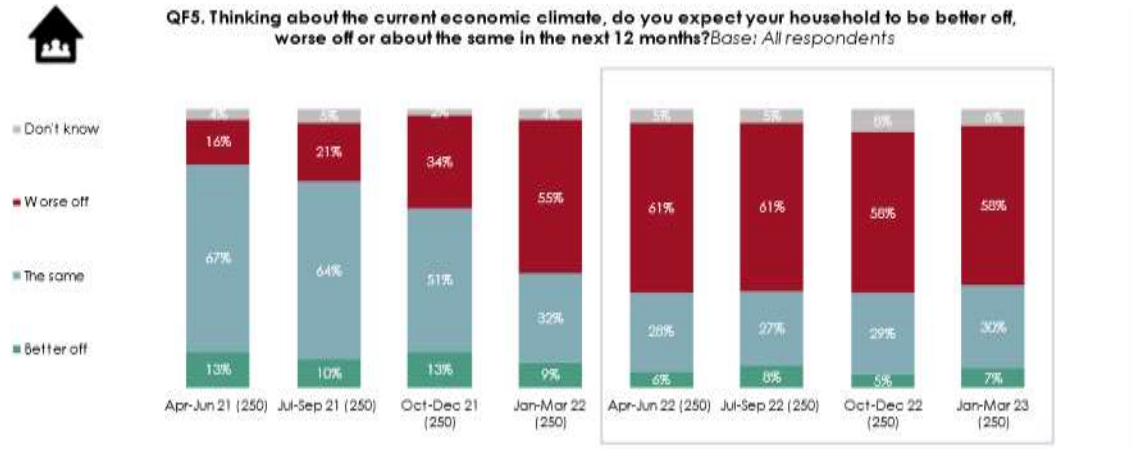
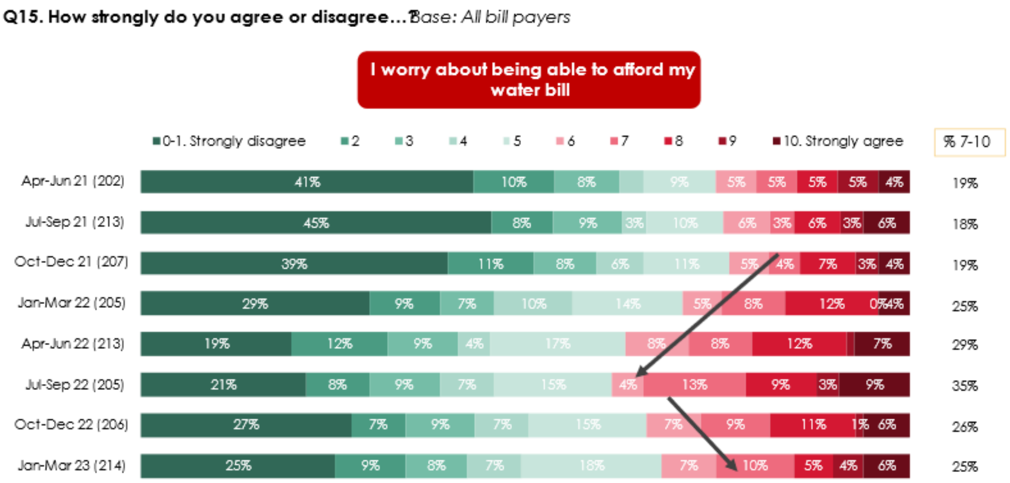


Figure 63: Results from customer Tracker Survey on bill affordability



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 responses 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.

6.10 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.

Please also see Section 2.2 which details the changes made in response to the consultation.

7. Plan development

This section outlines at a high level the overall approach we have taken to apply the DWMP framework[74]. Figure 64 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 64: DWMP framework stages

Strategic context	Setting the context in terms of planning objectives levels of service and how we report and communicate at different levels
Risk-based screening	Initial screening of WRC catchment against 18 indicators
Baseline risk and vulnerability assessment	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.
Problem characterisation	How big is the problem and how difficult will it be to resolve
Option development and appraisal	Options appraisal for the existing and future issues identified including grey, green and partnership working opportunities
Programme appraisal	Prioritising options into a deliverable plan that keeps bills affordable and considers our customers preferences
Final DWMP programme	This will be provided in the Final DWMP in March 2023, after consultation and prioritising our DWMP investment needs against other company requirements.
Business plan development	
PR24 business plan	Our PR24 business plan will not be drafted until September 2023, but will be informed by the DWMP submissions.

7.1 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 7.3 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 7.4.

Section 7.6 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.

7.2 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.

7.3 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.

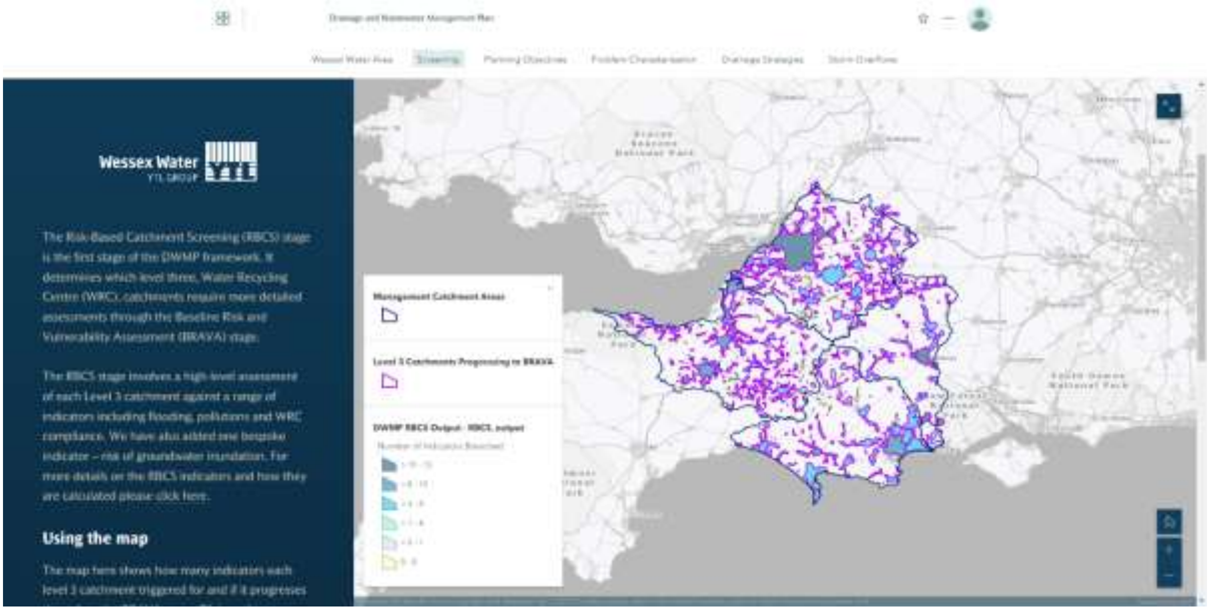
The RBCS results are whether the WRC catchments go thought to the next stage of the framework (BRAVA). 228 WRC catchments need to be reviewed in the BRAVA stage.

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 65.

Figure 65: Example of the RBCS results on our website



7.4 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.

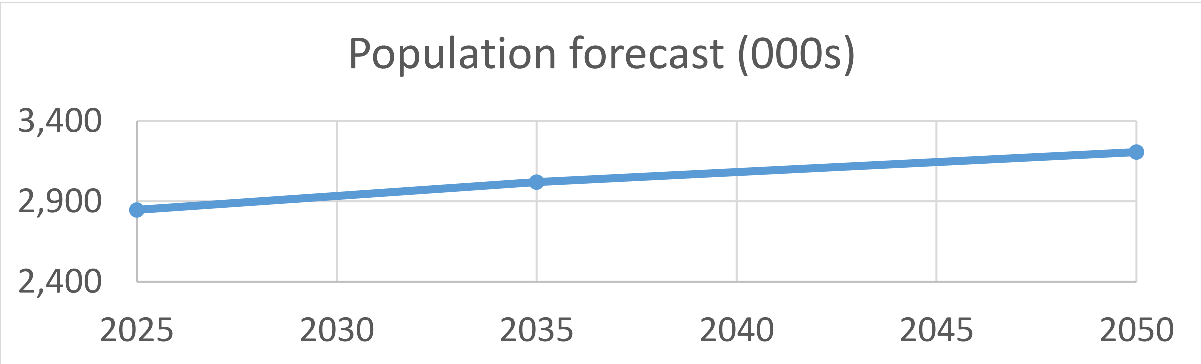
The next stage (section 8) is the options stage to investigate what can be done to mitigate the existing and predicted future failures of levels of service. 214 WRC catchments progressed to the options stage (14 fell out of the process as they were assessed in BRAVA stage as having no significant risks).

7.4.1 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 66.

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 66: 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.

7.4.2 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.

7.4.3 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 18.

Table 18: Peak rainfall allowances for climate change

Management catchment name	River basin district	2050s central for 30 year return peric	2050s upper end for 30 year return peric	2070s central for 30 year return peric	2070s upper end for 30 year return peric
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 18. 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].

7.4.4 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.

7.5 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 67 shows an example of our geospatial portal[82] which contains the details of the BRAVA results.

Figure 67: Geospatial portal showing BRAVA results

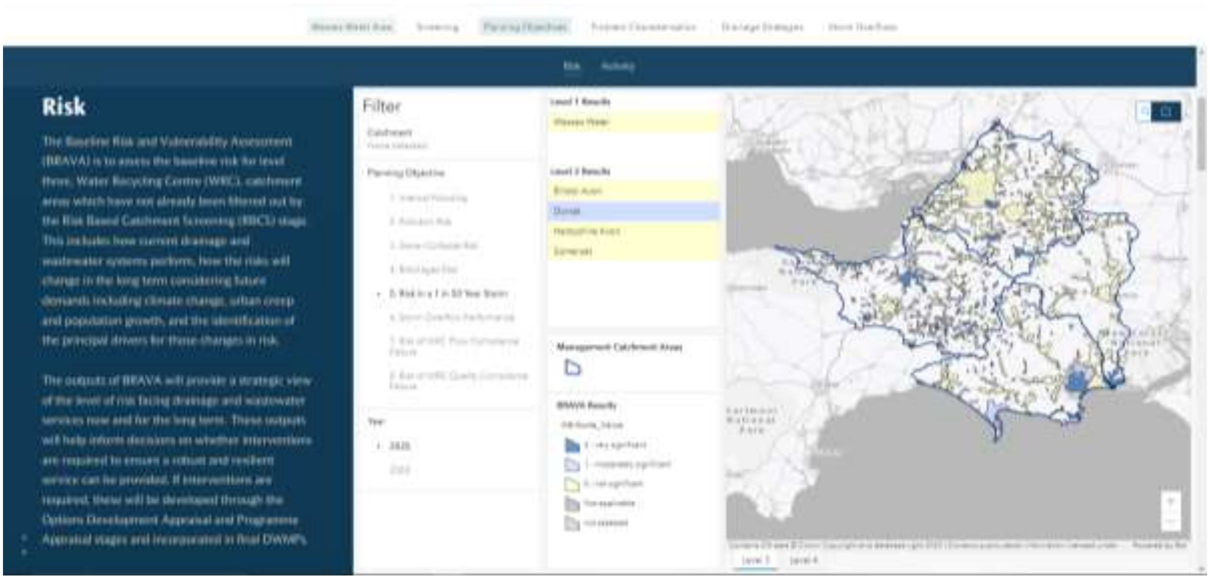
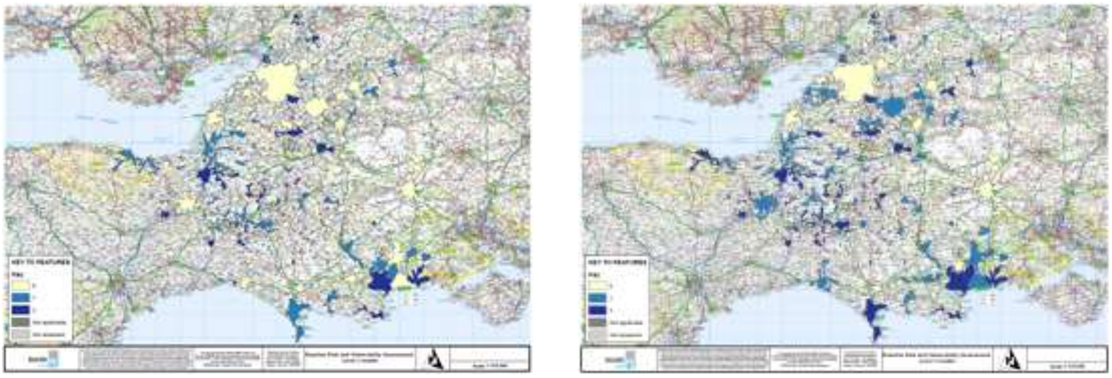


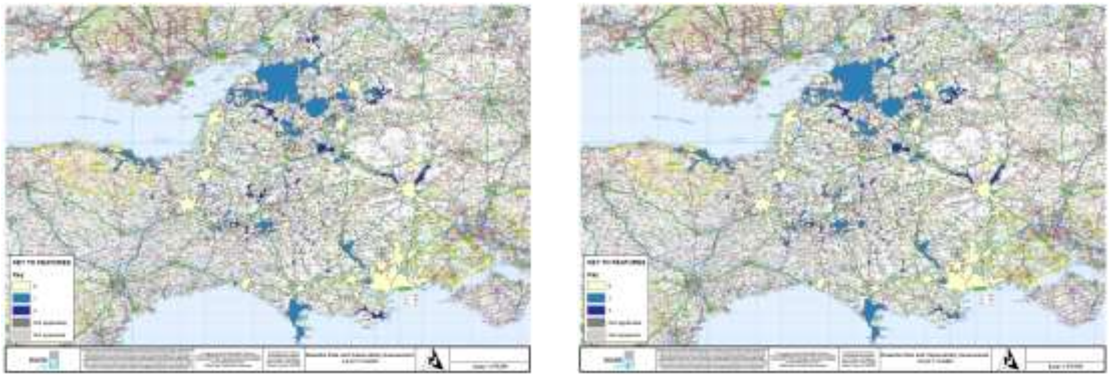
Figure 68, Figure 69 and Figure 70 show the results for different planning objectives, displaying risk in the baseline (2025) and the future (2050) assessments. Light yellow shows that the catchments not at significant risk, light blue have some risks, and dark blue have significant risks.

Figure 68: Population at risk of flooding planning objective (in 2025 and 2050)



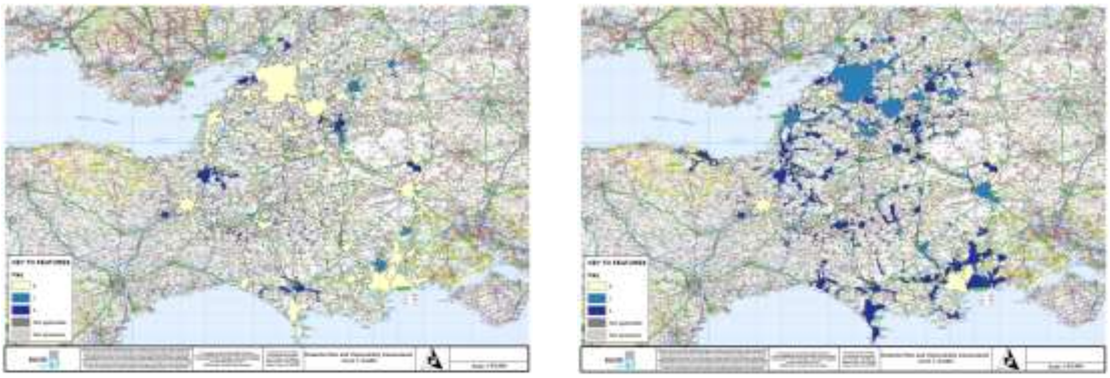
2025 2050

Figure 69: Storm overflow planning objective (in 2025 and 2050)



2025 2050

Figure 70: 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 67. A breach shows there is a risk in that catchment.

7.6 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 19). 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.

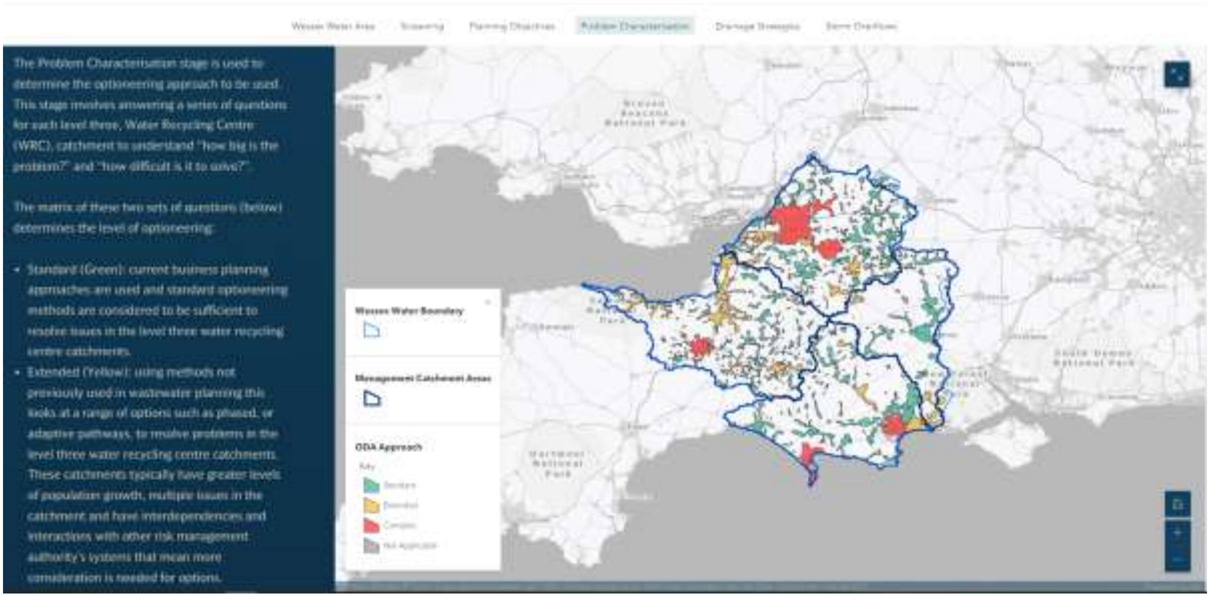
Table 19: Problem characterisation matrix

		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 71.

Figure 71: Example of the problem characterisation on our website



7.7 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 ODA stage is described in the next section (section 8).

7.8 Resilience

To identify and assess current and future risks to drainage and sewerage assets, a resilience assessment of water recycling centre (WRC) sites and sewage pumping station (SPS) sites was undertaken for all Level 3 catchments. The assessment identified 248 sites potentially at risk of flooding from fluvial, tidal, or surface water flooding.

Wessex Water commissioned consultants Mott MacDonald to conduct the DWMP flood resilience assessments at 125 of these sites as a sample, to identify suitable mitigation measures and determine costs, and then extrapolated the results to the Wessex area. 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. Figure 65 summarises the project.

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. sample sites determined to be in scope for assessment. One site was subsequently de-scoped due to lack of quality data.

Phase 2: Flood Risk Assessment and Mitigation Strategy
- High level assessment of flooding at each of the sample 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 72: Case Study: Digital solutions in water (Mott MacDonald)

Wessex Water needed to assess water recycling and pumping station 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, and developed and implemented lean processes and digital innovations, including a suite of digital tools. These included 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 to identify the location of critical elements and threshold values, including incoming power sources, control panels, chemical storage areas, communications equipment, and access roads.

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 high-level cost was estimated for options to make 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.

The tools developed through this project 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.

The project has identified the assets most at risk and where further investment is required to make these more resilient, as required by the Drainage Wastewater Management Programme (DWMP) which will help inform Wessex Water's Business Plan.

Proposed resilience options are outlined in Section 8.5, and Figure 106.

7.9 Programme appraisal

The programme appraisal stage of the DWMP framework is described in section 10.

7.10 Programme outputs

The programme outputs stage of the DWMP framework is described in section 11 Our best values plan and Section 12 Adaptive planning.

7.11 Changes we made in response to the consultation

Please see Section 2.2 and Annex H to see the feedback we received from the consultation of the draft DWMP and how we have updated the final DWMP to make it a better plan.

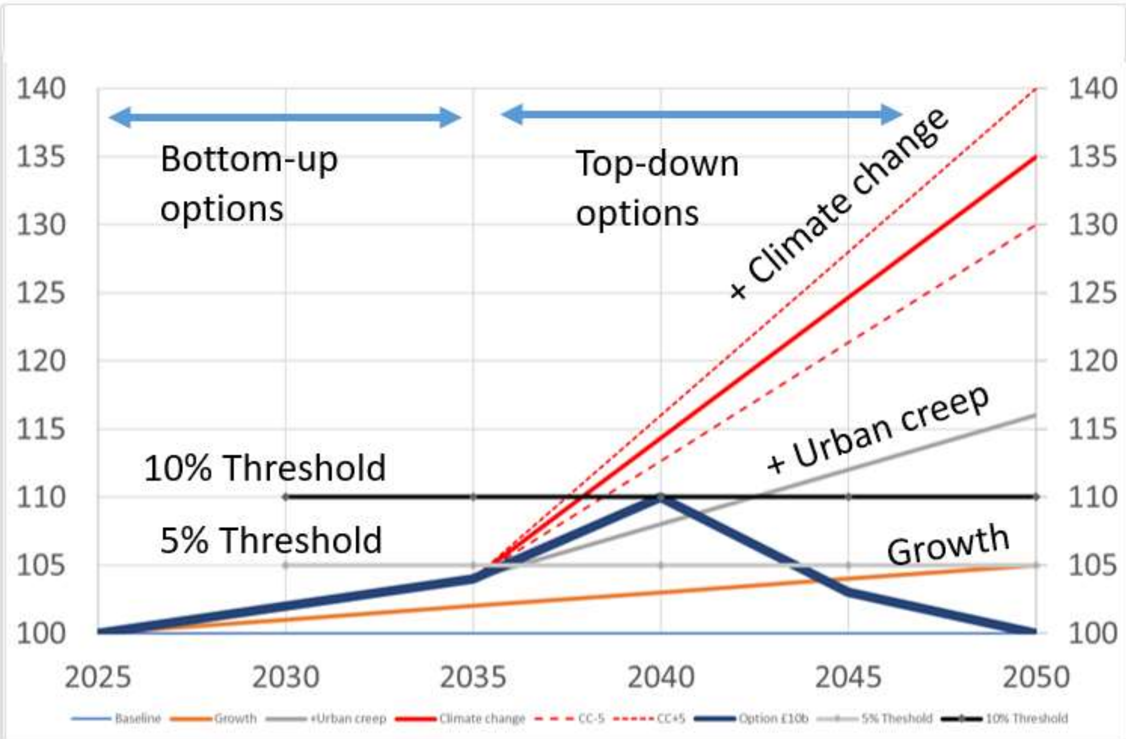
8. Options development and appraisal

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.

Figure 73: Graph showing the different approaches to short term and long-term options considered within the DWMP

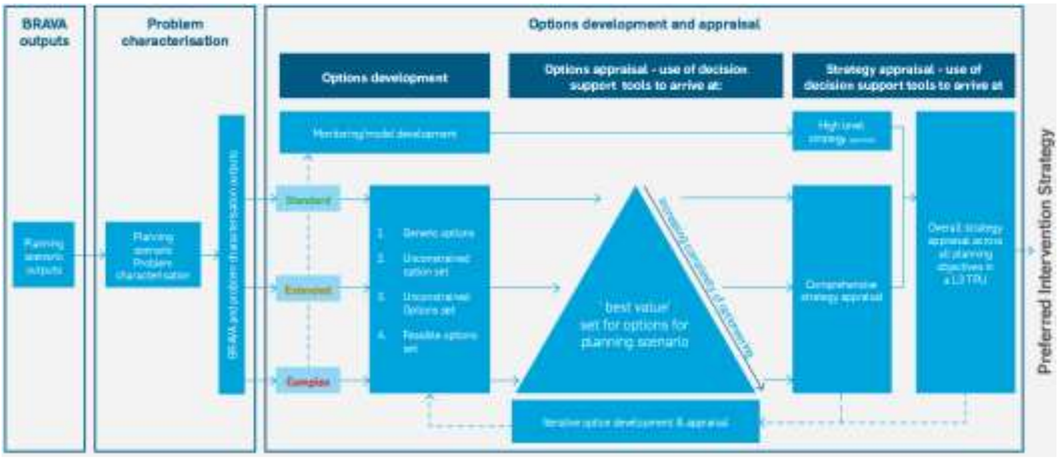


The DWMP framework sets out a 4-stage screening process to filter an initial long list of 30 generic options down to a short-list of two feasible options outlining a range of solutions required to meet the thresholds proposed within the planning objectives. Both ‘bottom up’ and approaches to the ODA 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. This information will be presented within the Level 3 drainage strategies on our website. Figure 74 presents how the ODA relates to other stages of the framework.

Figure 74: DWMP framework schematic of ODA process



This section firstly describes the different approaches to the ODA, before detailing the 4 - stage screening process (section 8.2.1). It then goes on to summarise the typical options that have progressed through the screening stage (section8.2.1, which are then used to inform the programme appraisal to inform our best value plan (section 10).

8.1 Approach to options development and assessment (ODA)

The DWMP Framework defines the level of assessment required for the ODA approach which is applied to all catchments that progress through to the BRAVA stage. A minimum of a 'standard' approach is required. For catchments where greater needs have been identified or local constraints suggest that are likely to be challenging to address, either an 'enhanced' or 'complex' approach has been applied:

- **Standard –** process defaults to companies' existing investment planning practices to maintain or enhance existing levels of service.
- **Extended –** the ODA process will build upon standard processes to provide extended analytical approaches in support of investment planning practice (where DWMP minimum requirements are not met).
- **Complex –** the ODA process considers a wide range of tools and approaches to explore:
  - Uncertainties in the forecasts.
  - The likely complexity of the interventions required to meet all planning objective exceedances is high, involving multiple options and / or stakeholders and the potential lead in times are long.

Within the Wessex area, 5 catchments have been categorised as complex, 20 extended, and 141 catchments standard. Where partners identified 'standard' catchments as partnership priority areas, an enhanced assessment was undertaken which we refer to as 'standard plus' catchments. Further details are provided in Figure 75 and Table 20.

Figure 75: Extended and complex catchments

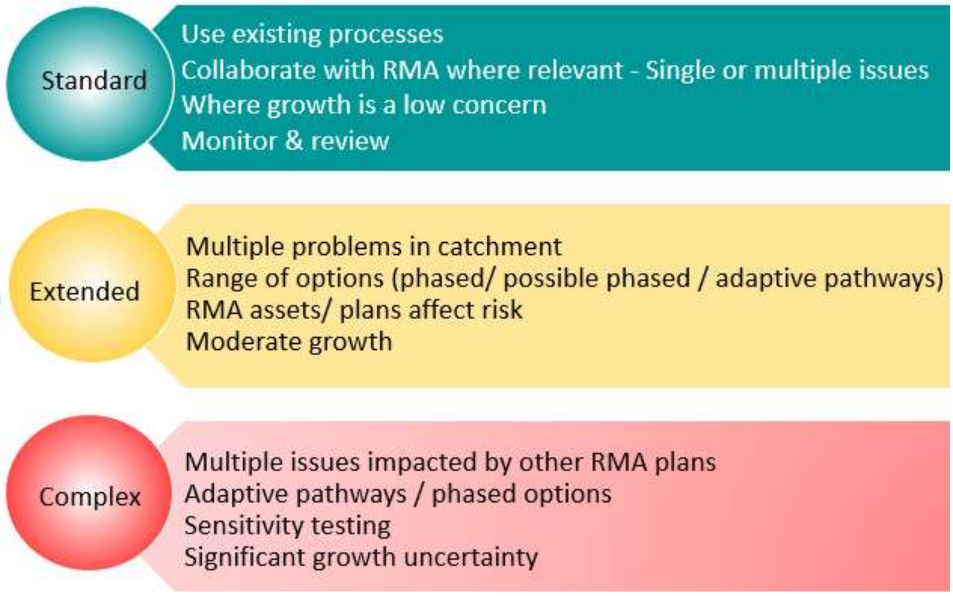
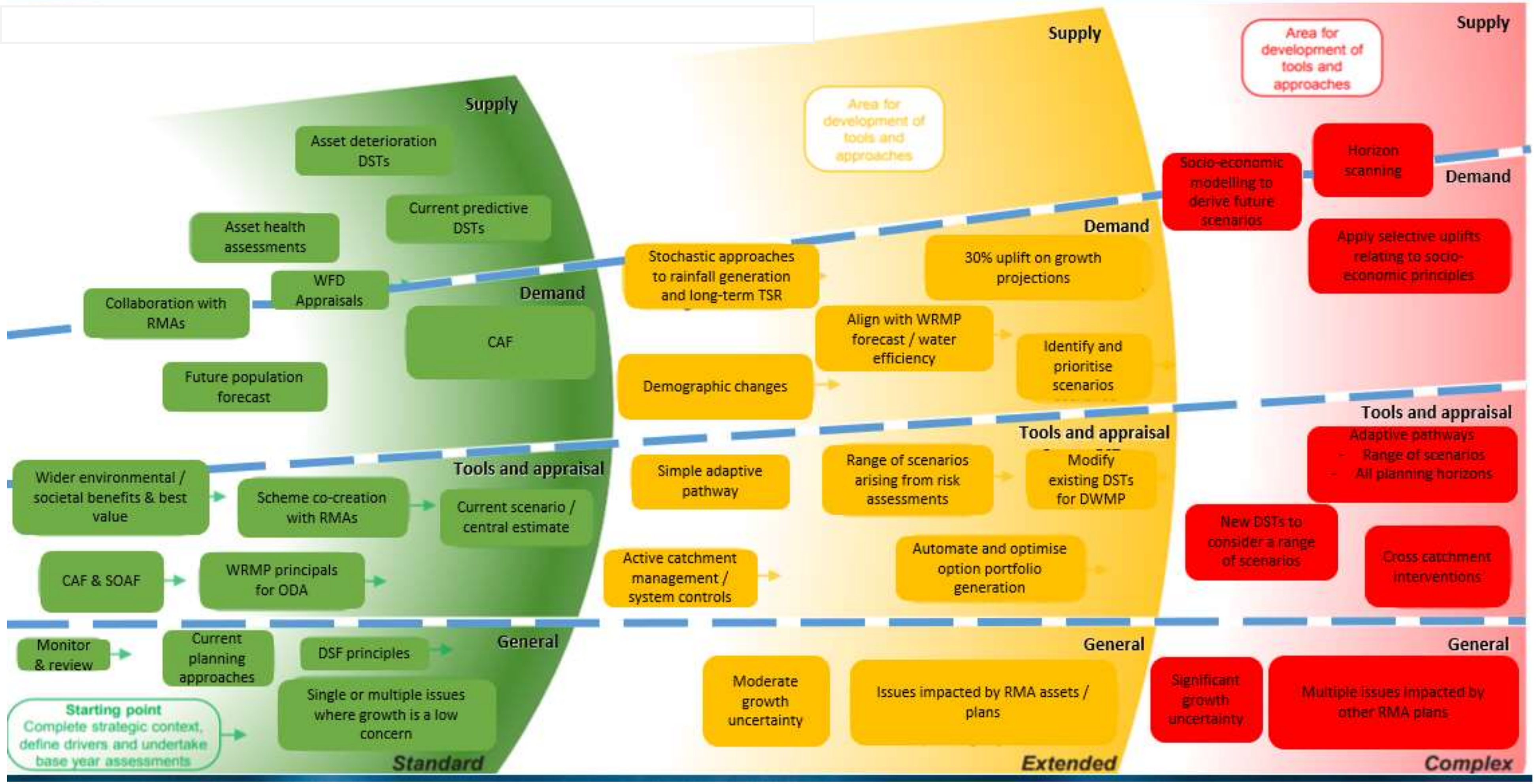


Table 20: Complexity of optioneering, decision-making approaches and reporting detailed within the DWMP framework

Level of concern	Optioneering, and decision-making approach	
Low	Standard	Generally, ‘current’ approaches should be adequate to determine and justify interventions and resultant investment proposals to ensure planning objectives are met (noting earlier guidance on the usage of additional future scenarios as defined within the CAF).
Medium	Extended	‘Extended approaches to optioneering may add considerably to a company’s understanding. ‘Extended refers to methods not previously widely used in drainage and wastewater planning, but which have been utilised previously on specific catchment investigations that are deemed to be at the ‘leading edge’ of current planning approaches or tested to at least the ‘proof of concept’ stage for actual UK drainage and wastewater systems and have outputs that can be readily understood by planners.
High	Complex	Consider whether it would be useful to go beyond the ‘extended’ approaches to decision making (referred to as ‘complex’) as this could add considerably to the company’s understanding. Complex approaches refer to more advanced, conceptually complex methods not yet applied to the UK drainage and wastewater planning context, although these may be under current investigation in academia / currently being developed by companies.

Figure 76 shows an extract of the Framework which summarises the decision-making approach relating to the optioneering.
It provides a simplified version of the figure from the DWMP framework that suggests different ways that the ODA may be achieved, evidence and decision support tools that could be applied.

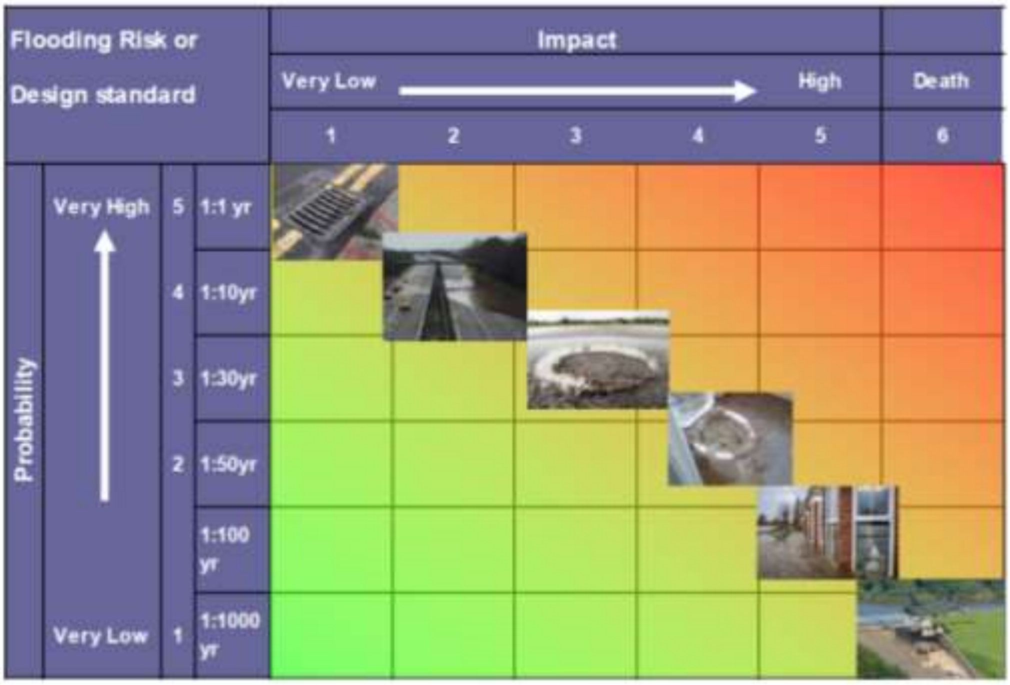
Figure 76: Approaches to standard, extended and complex catchments



8.1.1 Thresholds and triggers for options development and assessment (ODA) for hydraulic modelling

There are different UK design standards that different types of drainage infrastructure are designed to in the UK (Figure 77). The design standard for the capacity of surface water and foul sewers is typically 1 in 20 year to 1 in 30 years event. But highway drainage is much lower, as the impacts are lower. However, fluvial (river) flooding has higher consequences so has a higher design standard of 1 in 100 or 1 in 200-year events.

Figure 77: Resilience standards for drainage infrastructure



The following triggers and targets were used in the DWMP to identify where short-term options should be carried out for sewer flooding. These are summarised in Table 21.

- Trigger levels:
  - 25m^3 from the foul/combined manholes in a 1-year event
  - 100m^3 from the foul/combined manholes in a 1 in 10-year event
  - 200m^3 from surface water manholes in a 1 in 10-year event
  - Inland storm overflow that spill more than 40 times a year on average
  - Estuarine storm overflow that spill more than 30 times a year on average
  - Coastal storm overflows that spill more than 20 times a year on average
  - Shellfish storm overflows that spill more than 14 times a year on average
  - Bathing Water overflows spilling more than 5 spills per bathing season
- The target level of service for the options are:
  - No flooding from the foul/combined manholes in a 1 in 10-year event
  - No flooding from surface water manholes in a 1 in 10-year event
  - Inland storm overflow that spill less than 20 times a year on average
  - Estuarine storm overflow that spill more than 10 times a year on average
  - Coastal storm overflows that spill more than 10 times a year on average
  - Shellfish storm overflows that spill more than 10 times a year on average
  - Bathing Water overflows spilling less than 3 spills per bathing season

Flooding was assessed using a 1 in 10 year return period storm and the 2035 design horizon, no climate change was applied when assessing either trigger locations or solutions. For overflows options were developed by selecting the Stormpac event that generated the 51st, 101st, 151st etc biggest event with the aim being to prevent spills in that event. The unperturbed 2020 Stormpac rainfall was used.

Table 21: trigger thresholds and design thresholds used for the Options Development and Assessment to inform options required for an unconstrained plan

Type of threshold	Trigger thresholds for investigating	Target thresholds for design
Foul/combined flooding from manholes in a 1-year event	$25m^3$	$0m^3$
Foul/combined flooding from manholes in a 10-year event	$100m^3$	$0m^3$
Surface water flooding from manholes in a 1 in 10-year event	$200m^3$	$0m^3$
Inland storm overflow spills	40 times a year on average	15-20 times a year on average
Coastal storm overflows that spill	20 times a year on average	10 times a year on average
Shellfish storm overflows that spill	14 times a year on average	10 times a year on average
Bathing Water overflows spilling	5 spills per bathing season	3 spills per bathing season
Estuarine overflows that spill	30 times a year on average	10 times a year on average

Note: These thresholds may change following Defra's consultation of storm overflow reduction.

8.1.2 Standard ODA methodology

Standard catchments – high level initial modelling tests were undertaken to identify their effectiveness for resolving predicted flooding and overflow spills at the trigger locations. The highest-ranking unconstrained option type was then selected as a general approach for the catchment and a cost determined using high level cost curves and the combined 30-year flood volume at flooding trigger locations and the 1-year spill volume at trigger overflows. The ODA screening process prioritised sustainable solutions where they could resolve the investment needs.

Standard plus methodology

Fourteen higher priority standard catchments were selected for additional analysis, based on feedback from stakeholders of their priority locations. This used the ModeFrontier software to identify up to 3 long term catchment wide solutions (described in Figure 78). The level of detail in the solutions is equivalent to the extended catchments, however option selection was based on financial costs. The ODA screening process prioritised sustainable solutions where they could resolve the investment needs.

Figure 78: 'Standard plus' approach

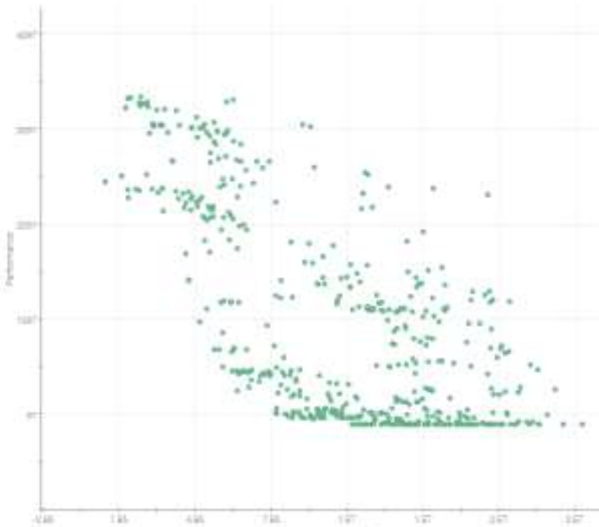
As part of the DWMP, 165 catchments were taken forward for the options design and appraisal (ODA) stage. Initially they were split into three categories: standard, extended, and complex. Stakeholders had shown interest in several catchments that had been assigned a standard approach for optioneering. We therefore selected 13 catchments to pilot as a ‘Standard Plus’ approach, that extended the assessment applied for standard catchments but included an additional optimisation to the selection of feasible options.

The Standard Plus assessment considered all generic options and initial tests stage were used to identify suitable options within a catchment and the software was used to replicate a combined unconstrained and constrained options stages.

All suitable option types were considered for buildability. Wherever there was potential to implement an option, it was added to ModeFRONTIER with a scalable cost model, regardless of benefit. These options typically covered SuDS, separation, pump upgrades, conduit upsizing, and attenuation tanks. For each option upper and lower constraints were provided to ensure modelled benefits were realistic.

The software used machine learning to test the different options presented to it for performance and then refine each option to achieve better performance for lower cost. The algorithm was able to establish which combination of options provided the most effective solutions, regarding both cost and performance. The goal of the algorithm was to provide a solution which addresses all problems in the catchment, for the lowest cost.

The output of the optimisation was thousands of catchment wide solutions with varying degrees of cost and performance
(as shown in the figure to the right).



Three designs from this pareto front were selected according to the following criteria:

1) The cheapest design which resolved all flooding/spills.
2) The cheapest design which resolved 50% of flooding/spills compared to the baseline.
3) The most cost-effective design regardless of performance.

These three designs were considered as feasible options to be taken forward for inclusion in the subsequent DWMP programme appraisal stage.

8.1.3 Extended ODA methodology

Extended catchments – the solutions identified for individual short-term risks were combined into two catchment wide solutions and the long-term risks re-assessed. The solutions were then refined to provide two holistic solutions aimed at dealing with all long-term risk locations as efficiently as possible. The ODA screening process prioritised sustainable solutions where they could resolve the investment needs.

8.1.4 Complex ODA methodology

The complex methodology follows the same approach as applied for the extended ODA methodology, but with additional model scenarios generated to reflect uncertainties and to enable generation of adaptive planning and flexible programmes of interventions. Instead of producing two catchment wide solutions the remit was to develop an adaptive pathway for the catchment.

The model was assessed at the 2035 and 2050 planning horizons with the following uncertainties:

- Population growth
- Urban creep
- Rainfall intensity
- Sea level
- Per capita consumption (PCC) and trade-flow.

8.2 Generic options

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. These are detailed in Table 22.

Table 22: 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

8.2.1 Overview of ODA screening process for hydraulic needs

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 8. Where 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.

8.2.2 Options considered at a level 1 (not included in hydraulic models)

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.

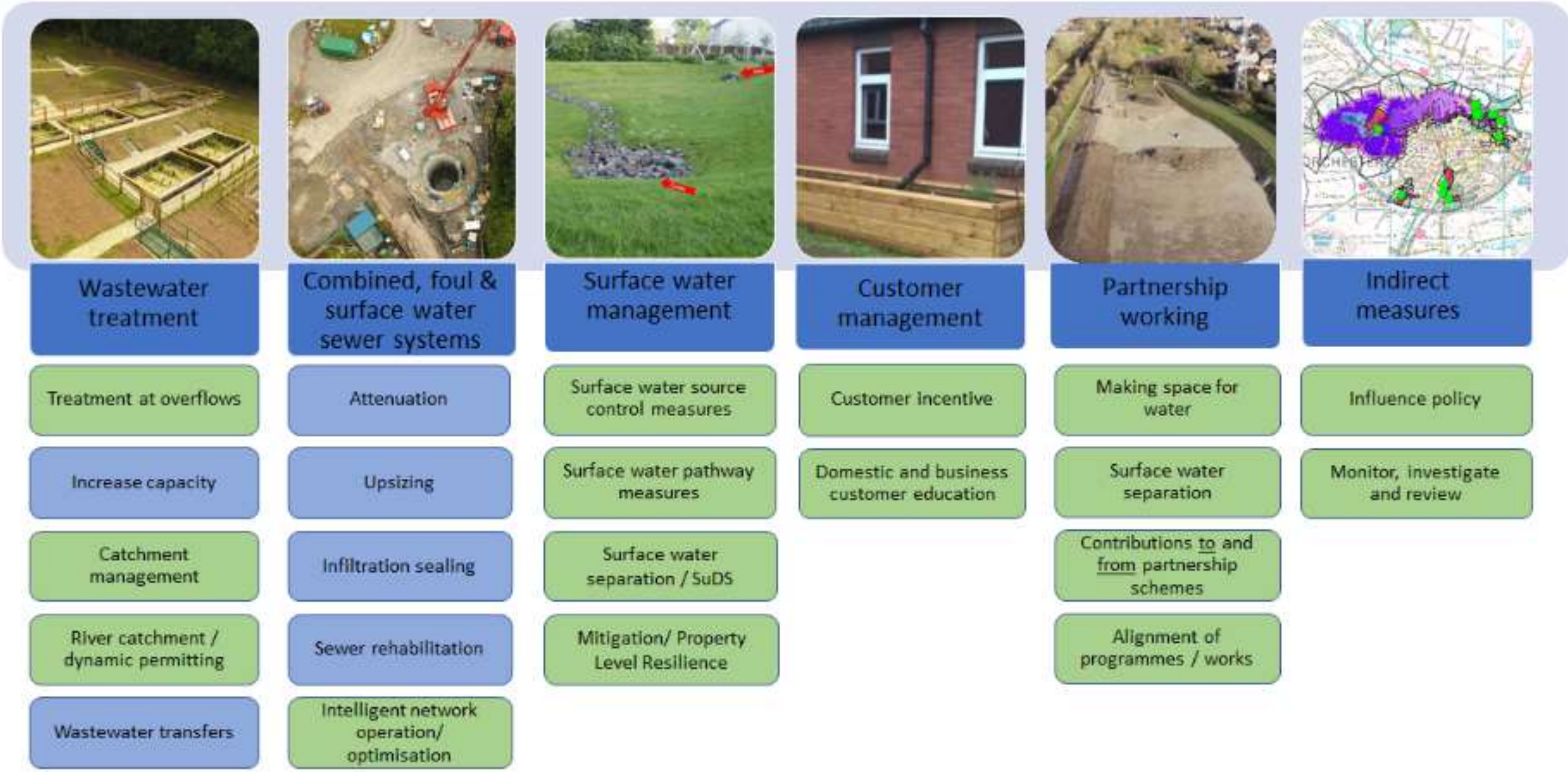
The BRAVA stage has highlighted which catchments have higher blockage rates so we can focus on wider campaigns, especially if the blockage are repeats or cause pollution.

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. The feasible options are presented in Figure 79.

Figure 79: Typical feasible options that were selected during the ODA screening process



8.3 Feasible options considered in the DWMP

The typical feasible options that were identified as preferred options through the screening process are summarised in descriptions of the generic options and examples are detailed in sections 8.3.1 to 8.3.6.

8.3.1 Wastewater treatment

The generic options relating to wastewater treatment included a range of traditional and nature-based solutions. Table 23 details the options that progressed through the ODA screening across the Wessex area. The following sections provide examples of where these options have been applied.

Table 23: Generic options considered for wastewater treatment

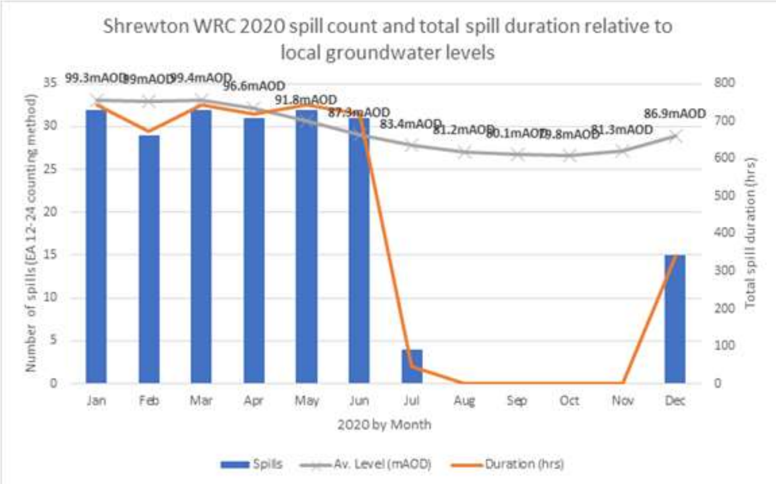
Generic options type	Generic Option description	Progressed through screening? (yes / no)
Treat/pre-treat in network	Chemical dosing prior to flow reaching the treatment works to relieve the load transferred to the WRC or to remove contaminants	No
Treatment at overflows	Use of reedbeds / wetlands to provide treatment for discharges to the environment	Yes
Increase treatment capacity	Increase the efficient use of the existing capacity with the existing assets or invest on new assets to provide additional capacity within site footprint	Yes
Rationalisation/centralisation	Close smaller treatment works and transfer flows to a larger one	Yes
De-centralisation	Remove flows from a treatment works and create localised treatment works	No
Modify consents/permits	Review the permit with the Environment Agency and meet new permit conditions	No
Catchment management initiatives	These options are concerned with treating either diffuse or point-source non-domestic elements of wastewater before they enter the sewer system, or by treating and controlling the other contributors to the environment	Yes
River catchment/dynamic permitting	Work with the EA to spread loading across the catchment	Yes
Effluent re-use	Recycle wastewater treatment works flow within the catchment	No

<u>Treatment overflows</u>

Many groundwater-induced overflows at WRCs discharge at a comparable or better quality than typical treated sewage. These continuous or near-continuous discharges occur due to high groundwater levels, potentially lasting for many months until the groundwater level drops. Given the low level of treatment required, a cost-effective option is to treat rather than store or remove the inflow. We are actively exploring whether we can treat storm overflows using wetlands, reedbeds or other nature-based solutions located adjacent to our WRCs as shown in Figure 80.

Figure 80: 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)]

Increase capacity

This option considers providing increased treatment capacity at the WRC. We have considered traditional 'grey' solutions as well as more novel 'green' nature-based solutions, with the latter particularly acting as a side stream for smaller WRCs or as a tertiary 'polishing' treatment stage, as described in our Cromhall wetlands trial case study (Figure 81, on the following page).

Our WRC discharge permits are determined by the Environment Agency. For WRCs at risk of not achieving dry weather flow (DWF) compliance, for the DWMP we have generally adopted a 'maintenance of loads' approach, whereby an increased DWF would result in a pro-rata tightening of sanitary and nutrient parameters, such that the overall load discharged is maintained. As well as providing additional treatment capacity at WRCs, a change in DWF permit may also lead to the requirement for additional storm storage (or equivalent treatment capacity) at the WRC, with the volume required directly linked to the permit.

In some cases, above-and-beyond improvements are required to meet more stringent 'river needs' conditions, and in which case the need would be included in the WINEP. The WINEP is also the formal mechanism for the EA to ask sewerage undertakers to meet new or additional permit requirements, such as discharge limits for nutrients (phosphorus and/or nitrogen) as well as disinfection requirements.

Whilst we want to actively promote nature-based solutions for continuous sewage treatment, for anything other than small WRCs we continually find that they are neither least cost nor best value, even when accounting for carbon, natural capital and other (dis)benefits. With the ever-tightening of discharge permit parameters, a combination of physical, biological and chemical processes are required. The land area required for nature-based solutions like reedbeds or wetlands often increases exponentially with the tightening of permit limits, to ensure we can reliably provide the level of treatment required under diurnally and seasonally varying flow, incoming loads, weather conditions etc. For many of our WRCs this land is simply not available and/or comes at a price premium, especially when competing with farming, development or flood plain mitigation pressures.

In particular for phosphorus removal, our typical approach to achieving stringent phosphorus permit limits is through chemical dosing (generally ferric sulphate) followed by a tertiary solids removal process. We have trialled and continue to explore novel technologies, such as algal bioreactors and engineering biocatalysts, however these are in their infancy and generally unproven at the scale and delivery timescale required. In all cases, chemically-bound phosphorus is removed from the wastewater and transferred into sludge. For those sites with filtration processes needed for the stringent limits, the dirty backwash water containing the phosphorus requires to be further filtered/settled, leading to the requirement for additional side stream treatment capacity.

Figure 81: Case Study: Increase capacity - Cromhall wetlands trial

Cromhall wetlands trial - Natural alternatives to treating wastewater

The first of its kind in the water industry designed to remove phosphorus from sewage effluent, the pioneering project aimed to ensure the water quality and ecology of the nearby Tortworth Brook was protected and enhanced. In 2020, we started operating a 0.8-hectare wetland at our Cromhall Water Recycling Centre in south Gloucestershire, as part of our continued drive to deliver wider environmental benefits, including net zero carbon, biodiversity gains, improved river water quality and a reduction in flood risk. We had been in discussions with Tortworth Estate and the Environment Agency since 2010 to explore whether a wetland at the water recycling centre would be an option for reducing nutrient discharges into the brook.

An investigation took place to assess how the wetland removed nutrients, organic pollutants and chemicals and delivered biodiversity enhancement following its construction, with its outcomes reported to the Environment Agency in March 2022. We are leading the way in researching how effective the introduction of nature-based solutions, such as wetlands, are proving to be. The outcomes of this investigation will be closely monitored as water companies address their own environmental challenges as well as government guidance advocating using such measures to achieve water quality and wider environmental targets.

What did the investigations find?

- The effectiveness of the wetland appeared to be at its greatest during summer months, with lower water flows, warmer temperatures, more daylight and significant macrophyte growth all contributing to the positive findings.
- On average, annually the wetland reduced concentrations of phosphorus to within the proposed permit limit of three milligrams of phosphorus per litre at Cromhall Water Recycling Centre.
- There was a 27.5% reduction in total phosphorus as well as a 62% reduction in ammonia and more than 60% in nitrogen.
- The investigation also determined a 111% increase in biodiversity value, with the projected increase expected to continue significantly over a 30-year period.
- The report concluded: "To allow nature-based solutions such as Cromhall Integrated Construction Wetland to become viable alternatives to 'traditional' treatment approaches, there needs to be acceptance that the performance will vary due to the natural processes involved.''

Read the Cromhall Wetland Investigation executive summary of the report[81], which was included in the WINEP (Water Industry National Environment Programme) and reported to the Environment Agency.

Rationalisation / centralisation

This option acknowledges that improvement and operational costs are generally disproportionately expensive at smaller WRCs and considers merging or relocating smaller WRCs to a larger common WRC to allow for economies of scale.

If an improvement need had been identified at a WRC, a screening assessment was undertaken to ascertain the feasibility of transferring flows to nearby WRCs, either directly to the WRC or indirectly by connecting somewhere in the sewerage catchment. This assessment took into consideration several factors, including:

- whether the destination WRC had capacity to accommodate the additional flows without requiring further improvement itself.
- whether removal/relocation of the WRC discharge could cause a deterioration to the local ecology of the local watercourse, as in some cases our continuous treated discharge comprises a significant proportion of the receiving river flows.

Catchment management

Catchment management options are concerned with treating either diffuse or point-source non-domestic elements of wastewater before they enter the sewer system, or by treating and controlling the other contributors to the environment.

We routinely work with trade effluent customers to help them reduce both the flow and load of their effluent being discharged into our system. Trade effluent is generally more highly concentrated than domestic sewage, and so by more targeted and localised treat-at-source options this can reduce the need and/or scale of improvements required at the WRC. In most cases, however, for anything other than very dominantly contributing traders, treat-at-source options will likely only reduce rather than remove the need for improvements at the WRC itself, requiring increasing capacity needing to be considered in parallel.

To reduce both water consumption bills and trade effluent discharges, we are also seeing many traders exploring recycling their effluent on their site, such that their effluent discharges are of lower volumes but are of more highly concentrated loads. Furthermore, we have experience of trade effluent customers closing, reducing, or relocating away from WRCs, and in so far as possible consider modular type solutions if increased capacity at WRCs is required solely for trade effluent reasons.

We have many years of experience in offsetting work with the agricultural sector that demonstrate that reducing their contributions to the environment can be of lesser cost and better value than traditional ‘grey’ improvements at a WRC, providing benefits to both the farmer, us, and ultimately our customers and environment. Catchment nutrient balancing is particularly of benefit for nutrient reductions, mainly for nitrogen but also for phosphorus (Figure 82). We continue to actively explore this area – including that of stackable benefits to allow for things such as carbon or biodiversity credits – although we are aware of other sectors having their own nutrient reduction targets to achieve.

Figure 82: Case Study: Catchment management - River Stour phosphorous reduction

River Stour Phosphorus Reduction Scheme

Funding is available to farmers and land managers in the Blackmore Vale and Middle Stour for adopting practices that reduce phosphorus inputs to farmland, prevent soil erosion and buffer watercourses from run-off.

Apply for funding to/for:

- Grow cover crops after maize.
- Undersow grass into maize.
- Grow cover crops after combinable crops.
- Fencing to exclude livestock from watercourses.
- Establishing new or wider buffer strips.
- Arable reversion to zero-input grass.
- Arable reversion to low/medium-input grass.
- Arable reversion to three-year legume fallow.

Expressions of interest are invited for funding to:

- Create leaky ponds.
- Construct farm wetlands to treat field run-off and ditch/drain flow.
- Establish new hedgerows.
- Plant trees and establish small-scale woodland.

Application deadline: **23 May 2022**

For more information, including zoomable maps of eligible areas, terms, conditions, payment rates and how to apply:

www.wessexwater.co.uk/environment/catchment-management/river-stour-phosphorus

or email: riverstourphos@wessexwater.co.uk

Priority area (the area eligible for all types of funding)

Wider target area (the area eligible for funding for watercourse fencing, leaky ponds and constructed wetlands only)

574

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River catchment / dynamic permitting

Following a successful catchment permitting trial in recent years in the Bristol Avon for phosphorus removal (see Figure 83), this approach is being rolled out in AMP7/8 in the Dorset Stour and Parrett and Tone catchments. This catchment-wide approach provides flexibility with operational performance at works and minimises the amount of treatment process redundancy (with associated capital and operational costs) required to comply with more rigid targets.

Catchment permitting can be considered within any catchment or sub-catchment where the outcome is the required river water quality rather than site-specific output improvements. Although we do acknowledge that location-specific constraints may need to be factored in, such as offtakes from rivers to SSSIs whereby any improvements are required upstream of this location. Whilst not exclusive to nutrients, catchment permitting is most applicable for nitrogen and phosphorus removal.

The combination of catchment permitting and catchment nutrient balancing is a key part of our Outcomes Based Environmental Regulation strategy.

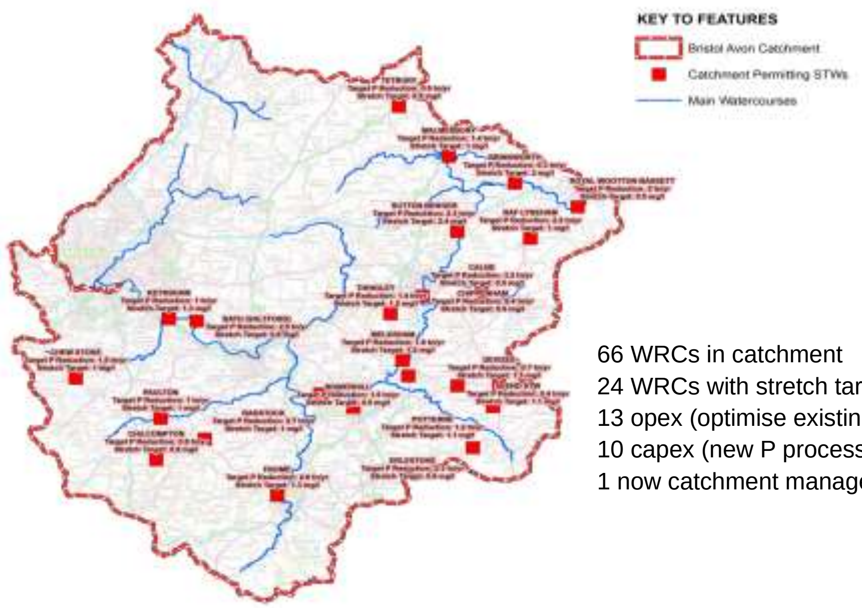
Whilst the majority of our WRCs have the same permit requirements throughout the year, a small minority have seasonal discharge permits, such as between summer and winter (to account for varying river flows) and bathing water seasons (May through to September). The permit values and timings are as determined and defined by the Environment Agency. We are undertaking investigations as part of our AMP7 WINEP in seasonal permitting for phosphorus.

Figure 83: Case Study: River catchment permitting – Bristol Avon phosphorus reduction

Bristol Avon Catchment Permitting trial for phosphorus reduction

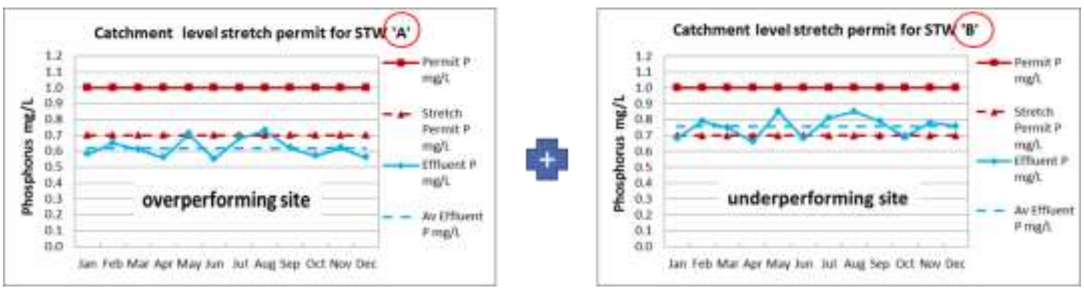
The Bristol Avon Catchment Permitting trial was the first trial of its kind in the UK. We promoted this trial in order to deliver the greatest phosphorus reduction in the catchment for the least cost, while improving the environment.

This innovative type of permitting enabled us to take different approach to risk, with more focussed and appropriate capital investment. In some cases WRC performance could be significantly improved through operational changes only, albeit at a higher risk than the conventional capital solution approach.



66 WRCs in catchment
24 WRCs with stretch targets
13 opex (optimise existing)
10 capex (new P processes)
1 now catchment management

The catchment permit links contributing polluting sources (WRCs) together to facilitate a focus on achieving the environmental outcome for the catchment. It involved the introduction of “stretch targets” at 24 WRCs together with normal regulatory permits as a “back-stop”. The details were agreed with the EA in a new Operating Technique Agreement, linked to the permits for all the WRCs in the catchment. The opportunity to take a greater risk on WRC performance at some sites, and to sweat assets to over-perform at others, meant that significant capital investment could be avoided.



Through adopting this innovative approach in the Bristol Avon, we have been able to remove a comparable amount of phosphorus within the catchment (43tpa) at less than half the capex when compared to the traditional approach (c.£22m compared to c.£47m) and at a lower overall opex and lower carbon footprint.

Effluent Reuse

We have many examples of industries and traders utilising our WRC treated effluent as grey water, particularly linked with our largest WRC at Avonmouth. Often, flows are returned to our sewer network and thus effluent reuse schemes do not fundamentally benefit either network or WRC based issues.

We have only considered effluent reuse related to water resource needs around our Poole area, related to West Country Water Resources and as detailed in our Water Resources Management Plan (WRMP). In this case, it is proposed that treated effluent from Poole WRC is transferred elsewhere to facilitate abstraction for an indirect potable supply. In any case, improved treatment is required at the WRC to meet the discharge quality requirements at the new receiving location (the River Stour).

8.3.2 Combined, foul and surface water systems

The generic options relating to combined, foul, and surface water systems included a range of traditional and nature-based solutions. Table 24 details the options that progressed through the ODA screening process across the Wessex Area.
The following sections provide further details of the options and examples of where they have previously been applied.

Table 24: Generic options considered for combined, foul and surface water systems

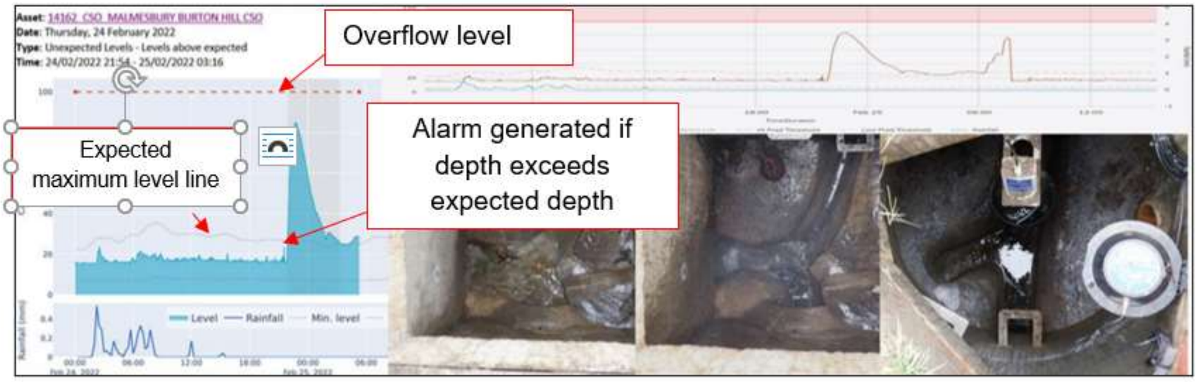
Generic options type	Generic Option description	Progressed through screening? (yes / no)
Intelligent network operation	Controlling flow movement in response to live data allows the system to be operated proactively, maximising the use of existing assets. These options cover a range of different approaches e.g., modifying the start-stop levels at strategic pumping stations, creation of new network control points which allow for flow to be temporarily held back in the catchment	Yes
Increase capacity existing foul / combined networks	Replace sewer with a large diameter sewer to increase capacity	Yes
Wastewater transfers	The movement of flow to another WRC area, or company	Yes
Sewer rehabilitation	Sewer rehabilitation to improve asset health and prevent collapses	Yes
Sewer groundwater infiltration reduction	Infiltration sealing	Yes
Property Flood Resilience (PFR)	Non return valves, pumps, flood gates etc	Yes
Attenuation	Creates additional volume to reduce storm impact	Yes
Sewer maintenance	Cleaning, repair, and rehabilitation of sewers to maintain service	Yes

Intelligent network operation

This option uses artificial intelligence to control the flow movement in sewers in response to live data. This allows the system to be operated proactively, maximising the use of existing assets. These options cover a range of different approaches e.g., modifying the start-stop levels at strategic pumping stations, creation of new network control points which allow for flow to be temporarily held back in the catchment. Smart networks. Premature discharges from the sewer can happen when there are downstream build-ups of wipes, fat or silt in the sewers which restricts the carrying capacity of the pipe. During wet weather it can be difficult to determine whether the sewer is filling up due to the sheer volume of rainwater or partial blockage. Further details can be found in Figure 85.

Our new Artificial Intelligence software can predict what the level of sewage in the sewer should be depending on the amount of upstream rainfall and the time of the day. Based on machine learning algorithms, the software predicts an expected depth. If the depth of sewage exceeds or is lower than this expected range, the monitor will send out an alarm to enable us to investigate and resolve before the overflow operates. An example of a blockage detection is shown in Figure 84.

Figure 84: Example of blockage detection software preventing an overflow from operating



This new software has proved to be highly successful in helping to prevent premature discharges caused by partial blockages. We are now in the process of applying it to all storm overflow monitors by summer 2023. Further details can be found in our Pollution Incident Reduction Plan (PIRP)[91].

Figure 85: Case study contained within the PIRP about intelligent networks

Preventative – intelligent sewer networks

What have we done?

Following the success of the Bath in-sewer monitoring trial last year, which demonstrated that a smart solution could reduce alerts by up to 97% in wet weather and identify partial blockages much earlier than traditional models, we decided to focus on intelligent sewer networks for year two of the PIRP. This approach will allow us to adopt a condition-based approach to maintenance – intervening at the right time and in the right way to prevent problems occuring.

The first phase of expanding the in-sewer monitoring programme involved applying machine learning to 500 monitors across the North Wiltshire area. Since the installation of these monitors, we have identified several partial blockages which we have been able to attend and clear before a pollution incident could occur (See Appendix 1c). The next phase of the programme will be done on a risk-based approach and will include areas of interest, such as areas with shellfish waters and inland swimming.

Lessons learnt?

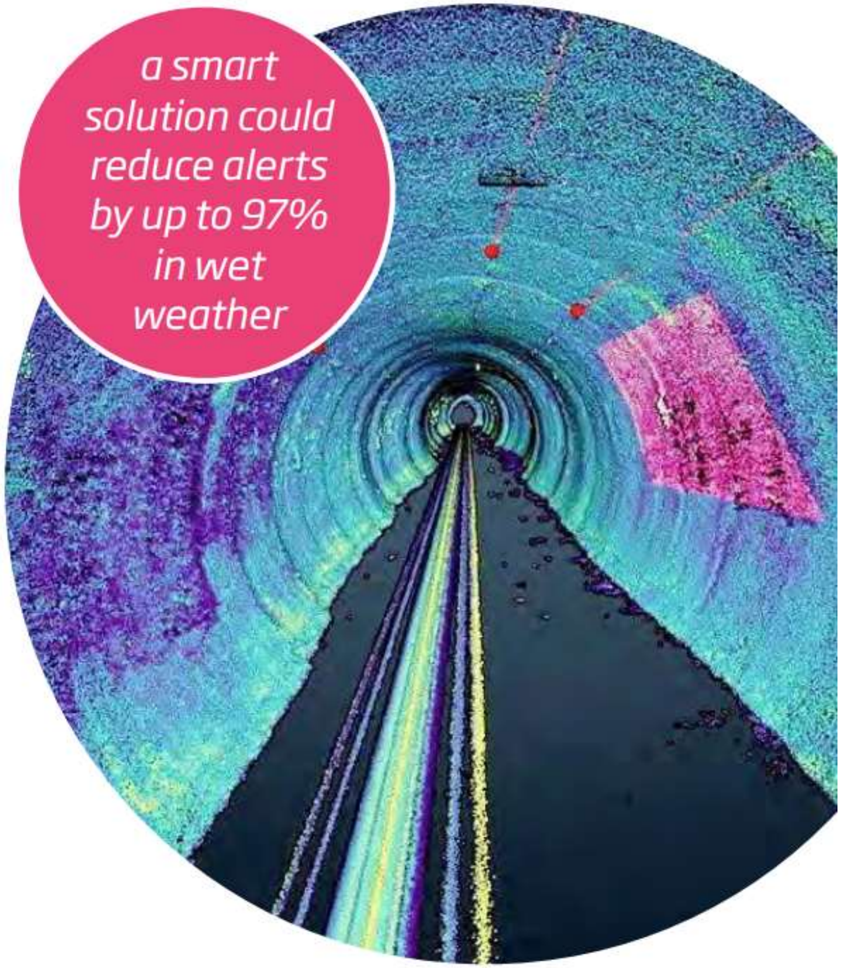
The expansion of the intelligent sewer monitoring programme continues to show that the use of smart solutions and technology allows us to identify partial blockages much earlier than traditional methods, enabling us to prevent potential pollution incidents from occurring.

The programme continues to show that industry knowledge about sensor installation in the sewer network is limited and that the current available devices are costly to install and maintain. To improve the value from in-sewer monitoring we need to consider different monitoring technologies and to adopt a higher risk approach towards our requirements around data accuracy and data pathways.

Future planned activities?

With the development of improved sensor technology and machine-learning tools, we have the ability to collect more information and provide additional insight into the behaviour of waste water systems. As a company we are in the early stages of developing a three-year strategy to extend monitoring in the network. With all event duration monitoring (EDM) sites monitored by machine learning tools by 2023, we are proposing installation of a minimum 300 additional network monitors in the next three years.

This strategy will allow us to improve our service and performance by optimising maintenance intervention based on smart data, which will reduce the risk of pollution and flooding incidents.



Increase capacity existing foul/combined networks

This option considers replacing existing sewers with larger diameter sewers to increase capacity. This can involve localised increases in the capacity of the network through: upsizing, addressing hydraulic restrictions, or by constructing new sewers and tunnels Figure 86 presents a case study of the construction of the North Bristol relief sewer and more detail can be found on our website[87].

Figure 86: The north Bristol relief sewer (Trym)

Construction of a new 6.5km pipeline began in summer 2019 and is planned to finish by spring 2023. It will connect Bristol's existing trunk sewer in Lawrence Weston to the Frome Valley relief sewer near Cribbs Causeway and will direct waste more efficiently around North Bristol to our water recycling centre in Avonmouth.

The majority of the sewer has been constructed by tunnelling underground using a tunnel boring machine, reducing the need to dig trenches. We have even tunnelled underneath the M5 motorway and Network Rail's Henbury Loop freight railway.

We are working with contractors J. Murphy & Sons Ltd to construct the tunnel and lay the pipework.

The North Bristol relief sewer forms an essential part of our long-term sewerage strategy for the next 100 years.

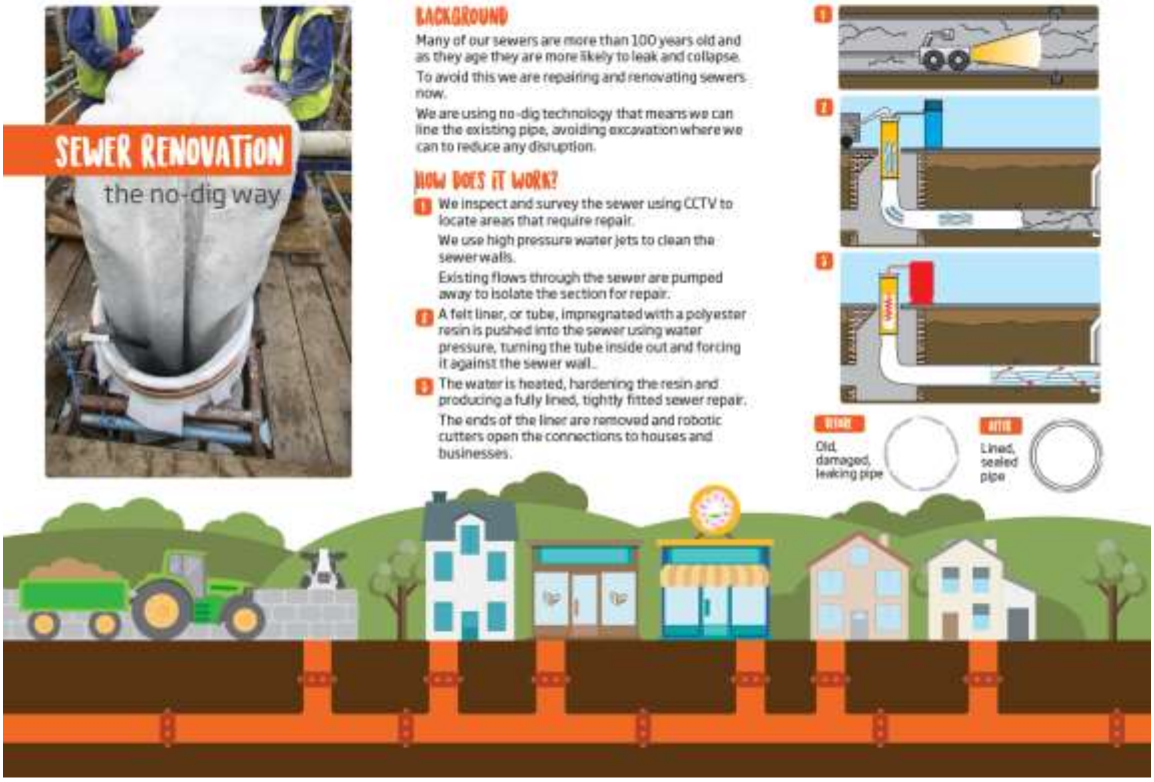
Wastewater transfers

The option of considering wastewater transfers involves the movement of flow from one WRC catchment to another WRC area or company where there is available capacity. This was considered for sites that had potential based on available capacity, however other network-focused options provide better value benefits.

Sewer rehab

Sewer rehabilitation to improve asset health and prevent collapses. An explanation of the sewer rehabilitation process we use to repair sewer and reduce groundwater infiltration into the sewers is shown in Figure 87. We assess the need for sewer inspection and rehabilitation as per Wessex Water's risk-based policies to improve asset health condition and reduce the risk of future collapses.

Figure 87: Explanation of sewer rehab used to repair sewers and reduce groundwater infiltration



Infiltration sealing

During prolonged wet periods groundwater levels rise above our public sewers and private sewers and drains. Any cracks or holes in the sewer system can allow the groundwater to infiltrate and can inundated the sewers. This can cause sewer flooding and restricted toilet use which can continue for many weeks during very wet winters. We have produced a video explaining this phenomenon and what can be done. The video is available to view on Youtube.

Figure 88: Screen shots of the 'How groundwater causes sewer flooding' video [85]

Catchments that are vulnerable to groundwater inundation are subject to Infiltration Reduction Plans. These plans are our commitment to inspecting sewers and making good any significant defects that could let the groundwater infiltrate into the sewer. This is normally achieved by lining the sewer with a watertight liner.

We have a formal progress of inspecting and sealing sewers identified to be letting groundwater infiltrate our sewers. We are currently investing over £1 million per year on our infiltration reduction programme (IRP). Further details of the groundwater infiltration programme can be found on our DWMP portal.

Options to reduce the risk of infiltration are

- to replace with new pipes by open cut,
- sewer lining
- sewer sealing using gel techniques
- or constructing wetlands to treat the very dilute sewage.

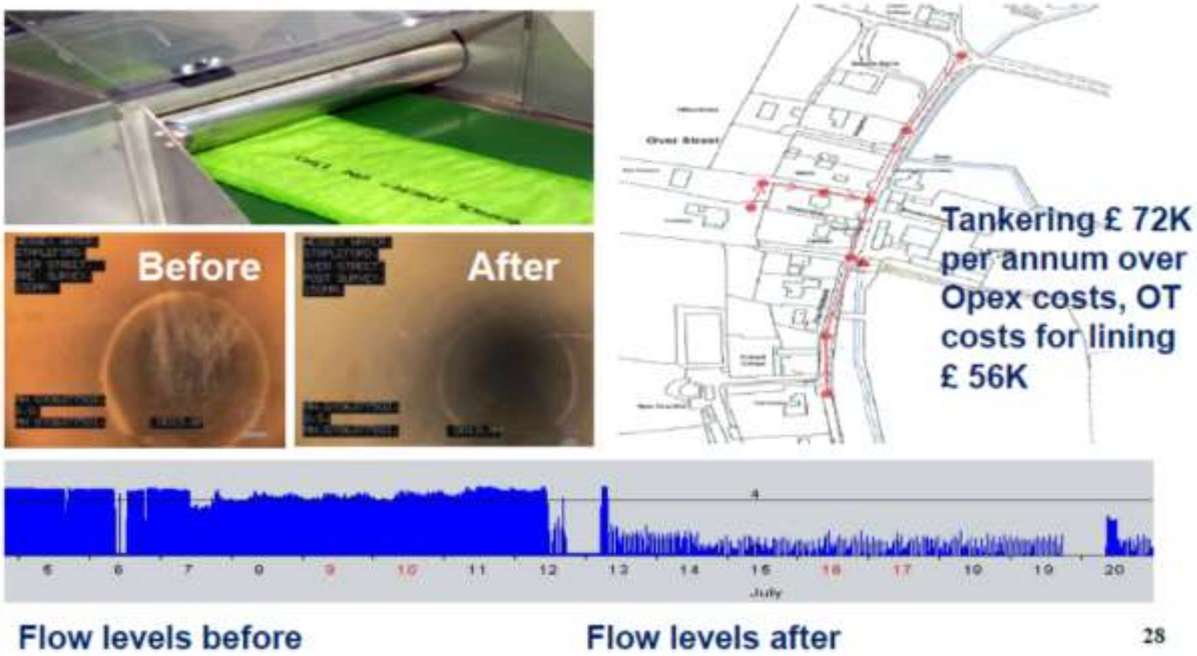
We tried using gel techniques over a decade ago because that was the cheapest option. However, several years later the gel stopped making the sewer watertight. Replacing pipes is very expensive (e.g. open cut) and disruptive to our customers. Our preferred method is full epoxy lining, but we are looking to innovate, especially at storm overflows that discharge for long durations due to the groundwater inundation (see Figure 12).

Wessex Water were amongst the first to trial epoxy Cured in Place Pipelining (CIPP) to seal sewers and laterals against ground water infiltration and escape of sewage exfiltration, from trials in 2010. Unlike other resins used in sewer renovation, epoxy adheres to the host pipe and is very effective in sealing defects, whilst maintaining and improving structural longevity of the pipe, for a further 50 – 80 years (longer if required by design). Figure 89 shows examples where groundwater is getting into the sewers. The process used to repair these defects is called sewer rehab which is described in Figure 87.

Figure 89: Examples showing groundwater entering sewers, the additional groundwater causes hydraulic capacity issues

Figure 90: Case study - CIPP Epoxy lining in Wiltshire

In 2013, all the sewers in the small hamlet of Stapleford Overstreet, were lined, (450m in total). Until that time, the local pumping station was inundated by ground water flow causing the pump to operate continuously. During periods of heavy rainfall, additional tankering capacity was required to prevent flooding at some £72k pa. Once the system was lined, the pumps returned to normal operation, power consumption for the pumps fell away, as did maintenance of pumps and treatment costs.



<u>Exfiltration</u>

We had a response to the consultation commenting that if groundwater can enter sewers, then can sewage exfiltrate sewers and potentially contaminate groundwater in drinking water areas.

There is no evidence as far as we are aware that links exfiltration to groundwater contamination. However, we looked at our mapped assets to see how many sewers we have in and near these areas and what condition the sewers were in (if we have surveyed them).

We have 3,000km of sewers (out of 35,000km in the Wessex Water region) mapped in or within 100m of drinking water safeguard zones and Strategic groundwater protection zones. Of those sewers we have surveyed (using CCTV) 650km of sewers (22%).

- 84% of the surveyed sewers were in good or average condition (structural condition grade 1 to 3).
- 11% were in deteriorating condition (SCG4)
- 5% were in poor condition (SCG5)

Some of those in deteriorating or poor condition could have been refurbished, so could have been improved already (our proactive sewer renovation programme makes such proactive repairs and is risk based prioritising SCG5 and where locate in drinking water zones).

The structural defect could be at the top of the pipe, so exfiltration is unlikely (unless it rains very heavily and the sewer becomes full temporarily).

Sewers flow by gravity, so the depth of water is small so there is not the pressure to force water out of small cracks, so exfiltration is very unlikely.

Groundwater inundation occurs because the in wet seasons the groundwater table is high, giving much more pressure - the ground water table could be metres above the sewer, which creates the head (pressure) to force the water into the sewers.

We think there is a low risk of exfiltration contaminating drinking water zone groundwater. However, we will re-inspect the SCG4 and SCG5 sewers and inspect more of the sewers in the drinking water zones for cycle 2 DWMP.

Property Flood Resilience

The use of Property Flood Resilience (PFR) measures relating to the foul, combined and surface water sewers can include a range of measures installing measures to prevent flood water from entering properties. Examples of PFR can include non-return valves to prevent wastewater from backing up into homes and businesses, installation flood doors to prevent surface water from entering properties. Examples of flood resilience measures are outlined by the flood hub (https://thefloodhub.co.uk/wp-content/uploads/2018/09/Property-Flood-Resilience-PFR-booklet.pdf) and many other providers of mitigation.

Wessex Water has a programme of flood mitigation and is currently working with Dorset Council to install flood doors for residents who experienced flooding from a combination of overland flow, surface water flooding from highways drains and the capacity of the surface water sewer. Flood doors are due to be installed in terraced properties which have experienced multiple flood incidents. This will provide passive resistance measures to stop flood water from entering properties.

Figure 91: Example of a flood air brick and underfloor flood protection

Attenuation

Attenuation measures create additional volume within the sewer network to reduce storm impact. This option can apply to foul, combined and surface water sewers and can involve grey or nature-based solutions.

Traditional methods within the wastewater industry have led to attenuation tanks being installed to attenuate and store flows during storm events for release into the sewer network at a later time. Alternative nature-based solutions could include SuDS or surface water attenuation measures.

Figure 92: Example of a storage solution for a storm overflow

Sewer maintenance

One of our core business-as-usual activities is to repair and rehabilitate sewers to maintain their operational service.

Our preferred option is to use no-dig technologies. These are less disruptive to our customers, reducing the time we need to close roads significantly compared to using open-cut methods. If the issue is a blocked sewer, then we will use jetters and jetvacs to flush and remove the cause of the blockage (e.g., wet wipes).

For collapse repairs, our innovative pipebuster technology is an example of how Wessex Water are striving to improve and use other industry technological advances and apply it to the wastewater network. The pipebuster technology took inspiration form the medical stem cell technology in human arteries. We innovated by applying the same methodology at a larger scale to allow sewers to be reformed and fitted with larger linings than the deformed sewers.

To encompass the major risks with sewers, we updated our sewer risk model (which originally only focussed on structural collapse risks) to expand and now incorporates the following risks:

- Structural collapse risk
- Pollution risk
- Operational risk (e.g., blockages)
- Capacity risk (e.g., hydraulic overload).

This allows us to target multiple investment needs in one geospatial database for multiple drivers. Numerous internal departments use the corporate database to allow efficiencies in delivery.

8.3.3 Surface water management

The generic options relating to surface water management 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. Table 25 details the options that progressed through the ODA screening process across the Wessex Area.

The following sections provide further details of the options and gives examples of where they have previously been applied.

Table 25: Generic options considered surface water management

Generic options type	Generic Option description	Progressed through screening? (yes / no)
SW source control measures 5% to 50% of the contributing area	Managing surface water and maximising its potential for re-use. Opportunities for large-scale source control installation such as retrofitting SuDS in highways and around buildings, as well as aligning with ongoing programmes like local authority highway upgrades or major opportunity area developments.	Yes
SW pathway measures - 5% to 50% of the contributing area	The need to provide safe conveyance (as opposed to storage) for floodwater during an extreme rainfall event (when the capacity of the sewer network is exceeded). Could, significantly mitigate the risk of considerable damage to public and private property and even loss of life that could result from an extreme rainfall event	Yes
Separate flows	Separate surface water from combined systems by constructing new surface water networks.	Yes
Mitigation	Surface water receptor measures. Keep floodwater away from buildings and strategic infrastructure in event of a storm. This would include property level protection (floodgates etc.)	Yes

Surface water source control measures

Surface water source control measures involves the management of surface water, maximising its potential for re-use which could be through a range of measures including the use of Sustainable urban Drainage Systems (SuDS). Opportunities for large-scale source control installation provide great opportunities for partnership working to deliver surface water management improvements through retrofitting in highways and around buildings, as well as aligning with ongoing programmes like local authority highway upgrades or major developments. Examples of SuDS can be found in Figure 93 and Figure 94.

The term SuDS can refer to a wide range of measures including the following:

- attenuating rain gardens
- bioretention
- disconnecting downpipes
- installing filter drains
- gravel paving
- green roof
- permeable paving
- pond
- rain gardens (box)
- rain gardens (surface)
- soakaways
- swales
- tree pits
- water butts
- wetlands

Figure 93: Case study: Somerset Pilot Demonstration Raingardens in Taunton (UK)

Description of the project need: Taunton is a large town in Somerset. In many of the older areas of the town, the sewerage network is a combined system, which collects surface runoff and sewage in a shared system of underground pipes, which lead to the Water Recycling Centre for treatment. During large rain storms, high surface runoff can exceed the capacity of the combined sewer pipes. This causes flooding from sewers. This project was a pilot project to disconnect surface water from the combined system to feed into raingardens providing additional capacity in the network to reduce the risk of flooding from surface water.

Description of the project: 4 raised rain garden planters were delivered on 2 council-owned housing sites in Taunton Somerset. The raingarden provided approximately 6m3 of surface water storage / attenuation which would have otherwise fed into a combined sewer system. The design of the raised rain garden structure consisted of timber walls. The structure was lined with a pond liner which was filled with different layers including:

- a gravel bed base containing an overflow pipe
- a permeable membrane to protect the gravel bed from clogging uptop
- soil with a variety plants to ensure they are enjoyed by all residents

Lessons learnt: Stakeholder engagement was key to the successful delivery of the demonstration catchment. The pilot sites were owned by Taunton Deane Borough council, who helped select suitable sites. The residents were included in discussions and provided an opportunity to input into the design. This secured the required buy in to ensure enjoyment and use of the raingarden once constructed. The plants selected for the raingarden included exotic, native, edible and decorative plants and use of dementia-friendly planting criteria to deliver multiple benefits for all. (This project was administered by Somerset County Council with funding from Wessex Water, Somerset Rivers Authority and was delivered by the Westcountry Rivers Trust.

Figure 94: Case Study: Southmead regeneration partnership Sustainable urban Drainage Systems (SuDS)

Case Study: Southmead regeneration partnership Sustainable Drainage Systems (SuDS)

Wessex Water contributed funding towards a Bristol City Council led partnership project with Homes England for the installation of SuDS features in the ward of Southmead. SuDS were installed to reduce existing flood risk through reduced flow to the surface water sewer systems. This helped to facilitate a proposed regeneration area and better protect existing residential dwellings. The location is situated within a High-Risk Surface Water area and its contributing catchment. The works were undertaken in a phased approach; Phase 1 consisted of the SuDS Pods within in the regeneration area, Arnside works and the Parking Spaces on Greystoke Avenue. Phase 2 consisted of SuDS features within the wider area, focussing on the High-Risk Surface Water Area in the vicinity of Trowbridge Road.

Benefits of the scheme for Bristol City Council, Wessex Water and the Environment Agency included:

- Reduced surface water flood risk posed to the regeneration area and existing community, providing approximately 240m^3 of additional storage capacity.
- Improved urban realm,
- Provision of amenity benefits and green infrastructure,
- Improved water quality, particularly of the receiving watercourse, the River Trym,
- Delivery of multiple benefits to the community and the area from green infrastructure,
- appropriate development through the reduction in existing flood risk.
- Reduction of the amount and time of entry of surface water entering the Surface Water Sewer system,
- an opportunity for Bristol City Council to experience design and construction of a SuDS scheme using features that align with revised sewers for adoption documents.

https://www.bristol.gov.uk/newsroom/eco-boost-for-southmead-high-street

<u>Surface water pathway measures</u>

Surface water pathway measures look for opportunities to provide a safe conveyance of surface water (as opposed to storage) to direct flood flows during extreme rainfall (when the capacity of the drainage infrastructure is exceeded). This could, mitigate the risk of considerable damage to public and private property and even loss of life that could result from an extreme rainfall event.

<u>Surface water separation and Sustainable urban Drainage Systems (SuDS)</u>

The option to separate surface water from combined systems by constructing new surface water networks can be achieved through a variety of traditional measures which could include upsizing existing surface water sewers, constructing first time surface water sewerage schemes, or by using nature-based solutions which could involve attenuation of surface water flows that would otherwise discharge into combined sewers.

Figure 95 shows the nature-based solution of a super pond, which was constructed by North Somerset Council and the EA with Wessex Water making a collaborative contribution to oversize the storage to accommodate flows from new developments.

Figure 95: Example of a super pond to attenuate surface water flows

We are aware that our hydraulic flooding allowance is not going to reduce all the propoerties at risk of flooding.

<u>Mitigation</u>

Surface water receptor measures. Keep floodwater away from buildings and strategic infrastructure in event of a storm. This would include Property Flood Resilience (PFR) measures (floodgates etc.) like those previously described

8.3.4 Customer management

The generic options relating to customer management included a range of traditional and nature-based solutions. Table 26 details the options that were considered as part of the ODA screening across the Wessex Area. We recognise the significant role that customer behaviour has on the drainage and wastewater infrastructure and have a well-established engagement programme that covers the Wessex area.

The following sections provide further explanation and gives examples.

Table 26: Generic options considered for customer management

Generic options type	Generic Option description	Progressed through screening? (yes / no)
Water efficient appliances	Supplying customers with household appliances which are designed to reduce water consumption. Reduced consumption can also benefit the wastewater system by reducing the dry weather flow to be conveyed through the sewer network and through the STWs	No
Water efficient measures	Water efficiency measures (property/ community/ industrial) can be installed within buildings with the purpose of reducing water consumption. Reduced consumption can also benefit the wastewater system by reducing the dry weather flow to be conveyed through the sewer network and through the STWs	Delivered at a Level 1 through engagement team
Customer incentive	Financially rewarding customers who sign up to a range of programs which are designed to help customers make smart choices in managing and/or utilising water and wastewater services.	Delivered at a Level 1
Domestic and business customer education	A roll out of an education programme to improve understanding of the importance of reduced flows and misuse of the system, and the impact this has on the environment and sewerage system.	Delivered at a Level 1
Greywater treatment and re-use	Install systems to treat and re-use household water (excluding toilets) for flushing toilets and gardening use. Either at property level or larger scale to reduces both flow and load to the system. The treatment levels considered vary from treatment for potable use to pre-treatment for discharge into the combined or foul sewer network.	No
Blackwater treatment and re-use	Install systems to re-use household water for flushing toilets and gardening use. Either at property level or larger scale. Options vary from pre-treatment before the wastewater is conveyed through to a STW, to complete treatment of blackwater.	No

Water efficient measures

Water efficient measures (property/ community/ industrial) can be installed within buildings with the purpose of reducing water consumption. Reduced consumption can also benefit the wastewater system by reducing the dry weather flow to be conveyed through the sewer network and through the Water Recycling Centres (WRC)

We have a well-established water saving programme to encourage customers to be more efficient with water and we provide advice on our website: Water saving tips | Wessex Water. We help customers use less water to make sure there is enough water for us and the environment while also helping to save money on bills. Our website provides advice on how customers can save water in their homes and gardens, get advice through the home check service and use our 'GetWaterFit' calculator to help understand ways to save water. The option to reduce water consumption will also deliver a small reduction in sewer flows.

Customer incentive

Financial rewards are available to customers who sign up to a range of programs which are designed to help them make smart choices in managing and utilising water and wastewater services. We currently offer reduced sewerage bills[97] to customers who can prove that the majority of the rainwater from their property doesn't drain to a public sewer.

The installation of water butts will not address the challenges associated with the drainage and wastewater infrastructure relating to climate change, but it will raise awareness of the issue and the fact that during an average 60-minute rainfall event the run-off generated from one property is equivalent to the sewage from 128 properties, all of which is arriving at the water recycling centre. We offer discounted water saving measures for the home and garden including water butts: Outdoor & Garden (savewatersavemoney.co.uk).

Domestic and business customer education

Wessex Water clears approximately 15,000 sewer blockages each year, costing over £5 million. Data shows that around 75% of these blockages are caused by misuse – predominantly wet wipes and fats entering the sewerage system. Wipes, sanitary products, fats, oils, and greases can build up to form blockages that in turn cause sewerage to back up and 'escape' from sewers into homes, gardens, and the environment. These flooding incidents can be detrimental to the environment and distressing for our customers in addition to being financially costly to clear up.

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 96 provides examples of the engagement material that has been developed to support domestic and customer education.

Figure 96: example of engagement material developed to support domestic and customer education

We have also worked with local businesses to get them to help us in the fight against fatbergs. In communities where high levels of blockages are understood to be caused by the food sector, we have visited flood service establishments including restaurants, pubs, cafes, fast food outlets, takeaways, and schools to review their daily kitchen practices and what equipment – if any – they have installed to trap fats, oils, and grease (FOG) to prevent them from entering the sewer network.

Community engagement

We have regular engagement with communities regarding drainage and wastewater infrastructure through correspondence and attendance at established forums with the Lead Local Flood Authority and support to the flood warden network of volunteers that exists across many communities within the Wessex Area.

This regular engagement with communities enables flood wardens and representatives to gain a good understanding of roles and responsibilities relating to flood risk and understand how to report any concerns. Wessex Water has supported annual flood warden training sessions across all 4 Level 2 areas and provided updates on progress on the DWMP.

Figure 97 presents a case study of a new way we are piloting to engage with communities through our community connectors project.

Figure 98 provides details of our Water Guardian scheme we deliver in partnership with local organisations.

Figure 99 provides details of our Stream Clean team, who investigate and resolve misconnections.

Figure 97: Case Study: Community connectors

We have recently launched our Wessex Water Community Connectors project, which is a ground-breaking new approach that aims to transform the way we work with the communities we serve to deliver a range of mutual benefits. The project was initiated by our Environment and Public Value Committee.

The two pilot projects who will be based in Chippenham and Bridport where they will be trialled over the next two years. These locations have been strategically chosen based on their population sizes, demographics and profiles. The initial part of the two-year project will focus on working with and listening to the local community. The team will work to agree outcomes for the project by bringing people from the community together, starting conversations, co-ordinating activities and helping to co-design improvements for the community and local environment. The projects also aim to work internally with colleagues across Wessex Water to coordinate and report on our impact on each community.

The project will enable us to help communities understand complexities of drainage and wastewater management and have informed discussions about options to pilot new solutions and operational processes including nature-based solutions and alternatives to traditional infrastructure.

This will enable us to get a better insight into local areas as well as customer and business behavioural activity which could help us look at a measurable reduction in water usage. We will be able to explore social and environmental action to enable local communities to work together on solutions for the future.

This will further improve community engagement and our reputation and support local communities to reach their own environmental goals. The information gathered through this work will help inform future collaborative opportunities in these communities.

Figure 98: Case study water guardians from the PIRP [91]

Preventative - Water Guardians

What have we done?

Over the last year the Wessex Water Guardian community project has expanded to include both Somerset Wildlife Trust (SWT) and Wiltshire Wildlife Trust (WWT). Between the two trusts we now have ~80 active volunteers that cover 200 miles of river way in Wiltshire and Somerset.

The volunteers have recorded 1,000 hours of volunteering and during this period we have received 14 reports which include sightings of litter, third-party pollutions from slurry run off and river foam. Two issues have been raised concerning phosphorous levels in South Petherton where we currently have a phosphorous removal scheme and a silted culvert which we have since cleaned and where we have installed a camera.

Lessons learnt?

Over the last year SWT and WWT have raised several issues with Wessex Water including technical issues, undesirable or inaccessible areas and issues with reporting. To combat the reporting issues our customer service teams have now been trained on how to handle calls from Water Guardians and to forward information to the correct department or company.

Future planned activities?

Now that we have successfully set up Water Guardian community projects in Somerset and Wiltshire, we have started to expand the project to include Dorset Wildlife Trust. The aim will be to recruit approximately 25 volunteers across the region in pollution hotspots and in catchments where the trusts are active.

We will also be increasing our involvement and engagement with the trusts and Water Guardians by holding biannual meetings to share updates, receive feedback and arrange webinars for volunteers to discuss hot topics such as storm overflows. SWT volunteers will also be looking to provide additional training for their volunteers on, eg, invasive species and plat ID.

Figure 99: Case study stream clean (see our website)[88]

WHAT IS OPERATION STREAMCLEAN?

We are committed to looking after the environment in the communities we serve and established Operation Streamclean to help reduce pollution to local streams.

Much of this pollution stems from incorrect domestic drainage arrangements and problems associated with the sewerage system.

Operation Streamclean aims to find the sources of such pollution and identify the cause and has located numerous properties with wrong connections since it began.

Many of these have been put right by property owners but in some cases enforcement by government agencies is necessary.

WHY DO WE NEED IT?

Most housing areas, particularly those completed in the latter part of the last century, have two completely separate drainage systems.

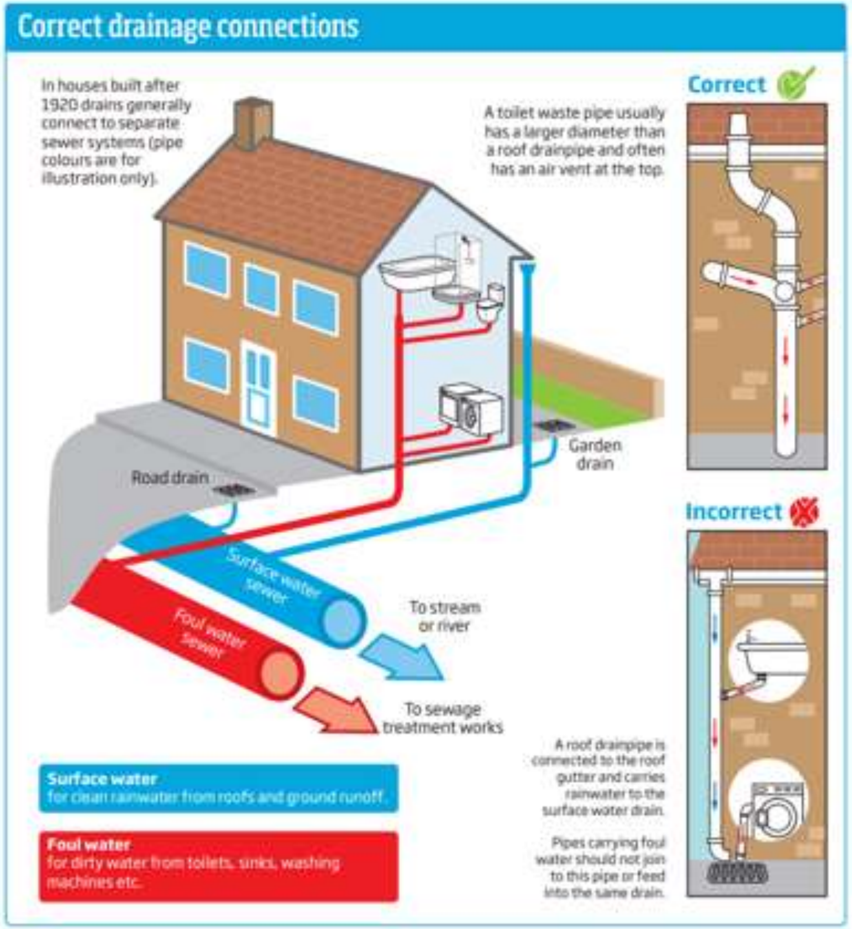
Surface water sewers collect rainwater and drain into streams. The foul sewer collects waste water, which is taken to the local sewage treatment works.

One of the major problems we face is that in some households appliances have been wrongly connected to the rainwater drains – all household waste water should go into the foul sewer.

These misconnections often occur during renovation work or when extensions are built but in some instances faulty plumbing has been found in properties.

In those cases, waste water from washing machines, dishwashers, drains and toilets can be discharged directly into rivers and streams.

As well as damaging the environment this is a potential public health risk.



8.3.5 Partnership working

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 Figure 100. Table 27 identifies the options we have used to categorise partnership working.

Figure 100: Generic options that stakeholders are interesting on working with us on

Partnership working is a cross-cutting theme that can be applied to many of the generic options considered within the DWMP. During our 2nd annual stakeholder workshop in March 2021, stakeholders identified the generic options shown in Figure 100. Given the importance that our stakeholders associated with partnership working, we have identified this as an additional generic option to consider as well as developing a bespoke planning objective.

The approach to partnership working needs to be able to be flexible to adapt and suit the opportunities that may arise to work together, respect a need for flexibility for timing of delivery (as collaborative projects are often influenced by stakeholders' resources or funding which adds an element of risk to timing of delivery and successful project completion).

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.

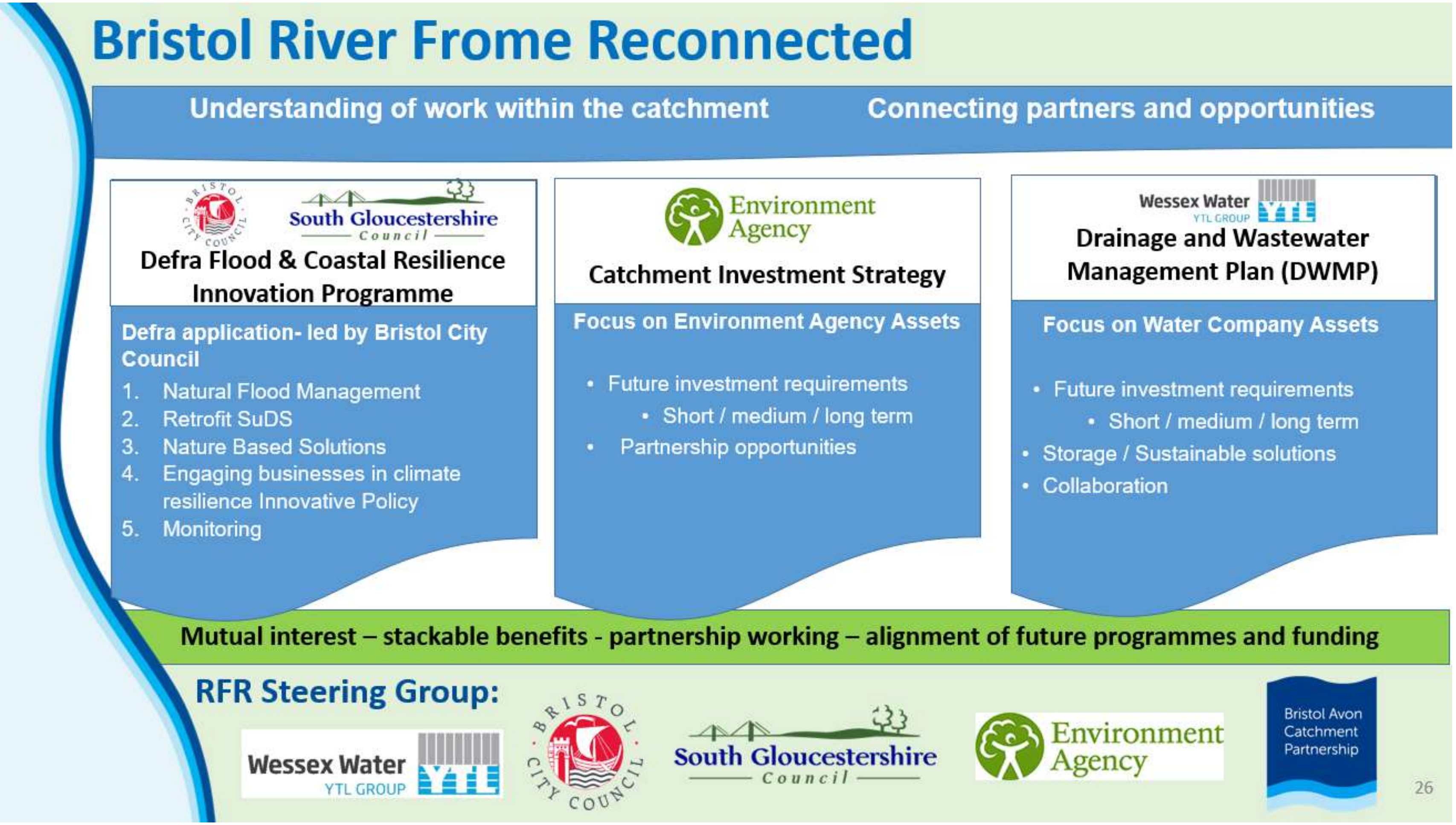
Given the variability of partnership working, we evaluate partnership opportunities on a case-by-case basis. As a result, partnership working can include a range of different approaches for example:

- contributions to
- contributions from
- small scale
- large scale
- investigations
- modelling
- strategy development

Table 27: Generic options considered for partnership working

Generic options type	Generic Option description	Progressed through ODA screening? (yes / no)
Making space for water	Integrated flood risk management Improved evidence base Land use management Integrated urban drainage management Coastal issues	Not modelled
Surface water separation	Managing surface water through separation in collaboration with other stakeholders, through the development, design, and delivery.	Not modelled
Contributions to and from partnership schemes	Contributions are an essential element to collaborative projects that aim to deliver multiple outcomes and to support the progression of best value options instead of lowest cost. The WINEP methodology sets an aspirational target for companies to secure 20% co-funding of non-statutory actions and to seek further co-funding beyond this level at their discretion – we are not sure what this means and when it should be applied. Partnership contributions can include contributions in kind (where quantifiable and directly related to the project).	Not modelled
Alignment of programmes and works	A key element to demonstrating commitment to funding contributions towards partnership projects is through having clarity on partnership priority areas and alignment of programmes and works and funding streams. Collaborative projects and programmes of work require flexibility in the delivery and timing of work.	Not modelled

Figure 101: Case study River Frome reconnected - alignment of projects



8.3.6 *Indirect measures*

Indirect measures can be applied at company level to achieve our outcomes (Table 28). This can include influencing policy, for example working Defra in their consultation on storm overflows, working with councils to influence and inform planning policy, or looking to develop future technology.

Table 28: Generic options considered for indirect measures

Indirect measure	
Influencing policy	Growth and planning, Surface Water etc.
Investigate and monitor	Understand root cause and risk
Future technology	Await or develop

Influencing policy

We have a track record of influencing policy at a national and local level.
Wessex Water's Director of Assets and Compliance has represented WaSC's on the Defra / EA storm overflows taskforce and has chaired the storm overflow legislation options review task and finish group. This has enabled us to influence national policy on the storm overflow task force to promote reduction in use of wet-wipes and to reduce surface water getting into the sewers, together with promoting separation and SuDS. Additionally, a Wessex Water Technical Manager was seconded to work for Defra (2021-2022) to help with policy thinking on legislation review regarding the implementation of Schedule 3 of the Flood and Water Management Act (2010). We also actively contribute to various Water UK groups and are contributing to the water industry groups set up to consider and prepare for enactment of Schedule 3 of the Flood and Water Management Act.

We have also contributed to and helped shape the following policy reports

- CIWEM – survey on surface water management: (https://www.ciwem.org/policy-reports/ciwem-survey-on-surface-water-management-for-risk-management-authorities)
- National Infrastructure Commission report on reducing the risks of surface water flooding (https://nic.org.uk/studies-reports/reducing-the-risks-of-surface-water-flooding/)
- Provided input in to the Jenkins review of surface water and drainage responsibilities (https://www.gov.uk/government/publications/surface-water-and-drainage-review-of-responsibilities)
- DWMP Framework: https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/

At a local level we have worked closely with our lead local flood authorities (LLFA) to inform the local flood risk management strategies and development of strategic flood risk assessments and provide additional support through the Regional Flood and Coastal Committee. We have also introduced our surface water policy for minor development[96] which reiterates the need for developments to follow the SuDS hierarchy.

a. surface water run-off is collected for use
b. discharge into the ground via infiltration
c. discharge to a watercourse or other water body
d. discharge to a surface water sewer, highway drain or other drainage system discharging to a watercourse or other surface water body
e. discharge to a combined sewer

Investigate and monitor

The option to investigate and monitor covers a variety of measures which could include progressing surveys on installing new monitors, to get a better understanding of the risks. Where there are complex flooding mechanisms, it could be appropriate to construct 2D models which consider overland surface water flows. This could provide opportunities for other partners to secure additional funding to act as partnership contributions. As part of the WINEP process we have an established mechanism for investigating water quality impacts on the environment which will be followed as part of the DWMP. Figure 102 summarises the Warleigh Weir water quality investigation.

Figure 102: Warleigh Weir water quality investigation

Warleigh Weir, a location along the River Avon near Bath, is visited by people who use the stretch of river for recreation, including swimming. We have been working with the landowner, the Rivers Trust, Bristol Avon Rivers Trust and the Environment Agency to discuss river water quality at the location, which can be affected by several factors – from our storm overflows and treated wastewater from our water recycling centres being returned to the river upstream to agricultural run-off, septic tanks, road drains and wild animals.

In September 2020 intensive water quality monitoring took place, involving a partnership with The Rivers Trust with Bristol Avon Rivers Trust, Wessex Water, Sewage Free Swimmers and the Environment Agency, and a team of volunteers. To understand more about water quality at this location, investigative work is underway to find out more about the factors in the large river catchment upstream of the site which influence the condition of the river water and the role our assets have. This work involves collecting water quality information and river flow and weather data from Warleigh Weir and the catchment upstream, as well as trialling real-time water quality monitoring sensors in the river.

Real-time bacteria monitoring trial - The quality of bathing waters is measured by looking at the concentration of faecal indicator bacteria present in them. There is currently no technology that can continuously measure the concentration of these bacteria in rivers, which means we can't provide people with this information in real time. Instead, samples have to be collected by hand and taken to a laboratory where the bacteria are analysed under controlled conditions, which takes around three days.

However, there are many readily available sensors that can provide robust real-time measurements of other water quality indicators, including temperature, pH, conductivity, dissolved oxygen and river flow. We are working with UnifAI, a company specialising in the use of artificial intelligence (AI) technology, to trial an approach that uses algorithms to develop relationships between these readily measurable parameters and the concentration of bacteria in water. The trial, taking place between 2021 and 2023, will involve installing a series of sensors, collecting water samples and analysing bacteria in the laboratory. As more data is collected, the AI will develop these relationships, which will hopefully allow us to stop analysing samples in the laboratory and start providing the public with real-time water quality notifications.

Further details can be found on our website.

Future technology

Technology has changed significantly over the past 25 years. The replacement of PSTN lines is an example of how technology can impact our business by £7m. It will change again over the next 25 years, hopefully to improve service and reduce costs.

For example, we are proposing to construct 28 constructed wetlands to treat groundwater induced storm overflow discharges, which was not possible a decade ago. We have assumed in our plan that this treatment solution will become viable solution for groundwater induced storm overflow discharges.

Changes in technology is very subjective and uncertain, so in this DWMP we have assumed that we will continue using current technology, including wetlands.

But it would be fantastic to think that in a few years that communication technology advanced so that very low-cost monitors could be installed in every manhole giving near real time data on how our vast sewerage system is behaving. Artificial intelligence software could automatically compare the performance data with 'live' hydraulic computer simulations to see if something is going wrong, and we could react proactively. This could lead to having more active control in our sewers to enable automatic optimisation of the performance.

Some of this technology is available already, we have examples of active control such as the North Bristol strategy and the Bournemouth coastal interceptor sewer, but only apply it to the larger systems (where there is data and more storage available). Live modelling is also possible, as we trialled in Weymouth for our PR19 business plan.

If water recycling to treat sewage at property level could be made efficient then we could roll that out to all properties and convert all the sewers to surface water only sewers. That would make sewer flooding less likely and have a lesser impact (although surface water flooding can have large impacts too). There is a flaw in this that trade discharges that currently discharge into the foul/combined sewer would also need on-site treatment which may not be possible.

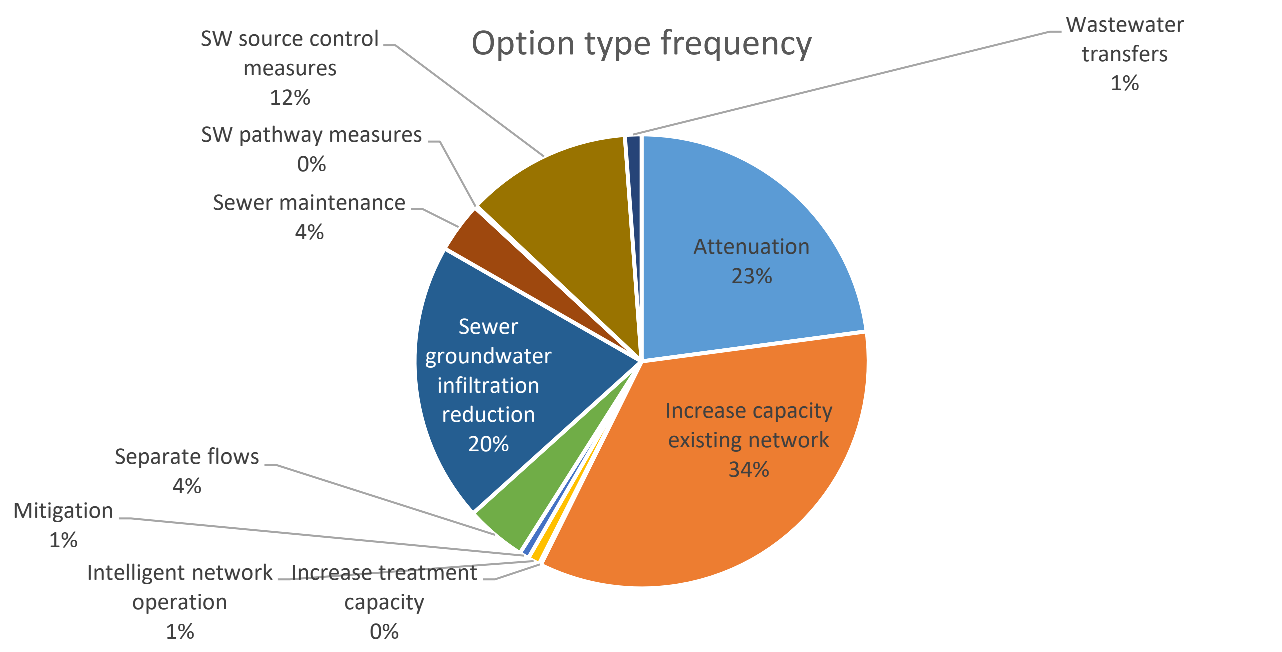
8.4 ODA outputs

The feasible options selected through the hydraulic assessment of the ODA screening phase were taken forward to the programme appraisal phase to inform development of our Best Value Plan (Section 10) to progress through an optimisation to identify the best value plan. The outputs of the programme appraisal informed the proposed timing and options to be included as part of the draft DWMP as detailed in drainage strategies (Appendix A).

8.4.1 ODA outputs unconstrained options

The feasible options that were identified through the ODA screening process have already been detailed in section 8.3. Figure 103 presents the frequency of the different options that were identified thought the hydraulic modelling exercise.

Figure 103: Representation of proportions of each option type modelled for networks assessment



It is recognised that the outputs for the draft DWMP are in line with the current framework. However, government policy on storm overflows may tighten standards, so we will need to re-evaluate options for storm overflows between the draft and final plan. This draft DWMP uses Defra's Storm Overflow Evidence Project[3] (SOEP) to give an indication of applying different policies to storm overflow reduction. Additionally, projects identified to be completed as part of the WINEP and feedback from the consultation may all lead to changes between the draft and final plan.

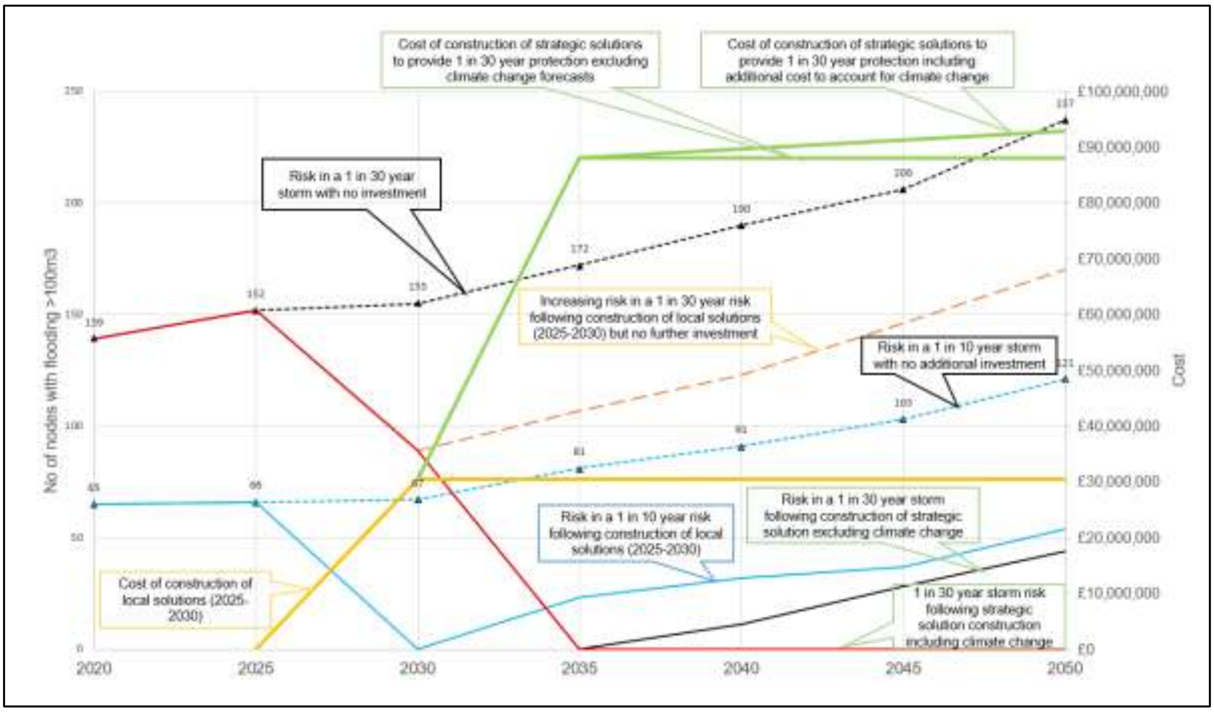
8.4.2 ODA outputs adaptive pathways

In accordance with the DWMP framework, adaptive planning has been applied where appropriate. Given the challenges posed by the complex catchments, we selected to apply an adaptive pathways assessment to the unconstrained options identified within the ODA.

The variables that influenced adaptive planning decision making included climate change, growth, urban creep and level of risk. Findings from adaptive pathway assessments demonstrated the scale and timing of climate change had the greatest influence.

Figure 104 provides an annotated example of one of the outputs of the adaptive pathways. The left axis indicates the level of flood risk there is for the 1 in 10 year and the 1 in 30-year storm. The right access indicates the cost of construction of the proposed options. The black and blue dotted lines show no investment, while the yellow line shows the level of risk if local solutions are constructed (i.e., network enhancements / storage solutions). In 2030 a decision point is required to decide whether investment in strategic solutions (i.e., tunnels) that provide a higher standard of protection are better value in the long term rather than investment in local solutions. At that point in time, understanding of the scale and timing of climate change may also be a factor influencing investment decisions.

Figure 104: An annotated example of an adaptive pathway showing unconstrained options for catchments identified for complex ODA



For this final DWMP we have undertaken more work on presenting our adaptive planning process, which is presented in Section 11.

8.4.3 ODA outputs – high level costing

High level investment needs have been developed for the flooding and overflow solutions using high level cost curves based on parameters such as volume of storage, contributing area removed, or length and depth of new pipework. These were initially based against historical schemes. For proposed schemes a cost was assigned for each measured option based on the relevant parameter and the scale of the solution. These were totalled together to provide the overall works cost for a proposed option. Finally, an allowance for design, 3rd party costs and risk has been allowed for and applied as a % of measured items.

A selection of proposed schemes were priced in detail by the Wessex Water in house estimating team and compared with the outputs generated by the high-level cost curves to ensure they were suitable. There was some variation as would be expected for individual sites but overall, the cost curves were considered acceptable and proportionate to the level of detail included in each option. Given the high-level assessment of the costings, there are limitations and risks associated with the data.

- The curves assign a cost based on an option type and one or two key parameters, costs can vary due to a variety of factors it was not practical to consider for every project.

- Accuracy of cost curves is dependent on the amount of historical evidence available, for most option types including retrofitting SuDS the information base is very limited and costs should be treated with caution due to potential inflation.
- SuDS costs are not based on Wessex Water data
- Prices are likely to change in the future and this will need to be considered when projects are scheduled further into the future.

8.4.4 ODA outputs – high level carbon assessment

A high-level estimate of capital carbon assessments were made on the feasible options that were put forward through the ODA process. Several solution types could not be modelled as they did not have a suitable driver unit to enable capital carbon quantification. These included: water efficient appliances, sewer rehabilitation, property level resilience (PLR), investigate and monitor, influencing policy, customer incentive and catchment management. It is expected these option type impacts will also overlap with other investment programmes, such as WRMP water efficiency/demand management interventions.

A capital carbon assessment was undertaken to estimate the scale of emissions associated with each of the intervention types. This has involved linking available sizing information for each intervention type, along with assumption on typical asset sizing and design criteria, to carbon modelling emissions factors and asset level carbon models.

The current carbon assessment provides an early and indicative view of the scale of emissions associated with the DWMP plan. Due to the significant level of assumptions required to be made to cover the scale of options and early strategic stage of planning the level of uncertainty within the assessment remains high. The greatest uncertainty fell within SUDS options. The carbon values were used as part of the optimisation process within to inform programme appraisal and selection of best value plan.

8.4.5 ODA outputs – high level risks / benefit assessment

Throughout the ODA screening process, best value considerations have been made to derive the feasible options. As a result, options that have been promoted that will be prioritised, for example lining technologies as described in Figure 105.

The outputs from the unconstrained plan are subject to optimisation through the programme appraisal phase detailed in Section 10 which informed the development of our best value plan.

Figure 105: Case Study - Benefits of CIPP Lining

Case Study - Benefits of CIPP Lining Beyond the obvious benefits of CIPP lining as opposed to open cut replacement, of reduced cost, reduced mobilisation and occupation periods on site, noise, dust etc., there are less obvious benefits.
CIPP lining creates 95% less carbon dioxide (CO_2) than open cut. Over a period of time, we lined £1000k of large diameter sewers in Clifton Bristol, and we used the British Columbia University Carbon Calculator derived by Dr O'Sullivan for the North American Society of Trenchless Technology (NASTT). We calculated the total carbon emissions of open cut technology compared to CIPP lining.

The '*Total for open cut*' the equivalent quantum of CO_2 generated by open cut is 2766 tonnes, whereas the '*Total for CIPP*' is just 80 tonnes. If we were to utilise LED or UV photo-catalysed resins in the liners, removing the need to energise the liners during the cure process with hot water or steam, this would be halved to 40 tonnes.

From Wessex Water's perspective, across the £10 million spend each year, we avoid excavation and removing to tip, of some 125,000 tonnes of road surfacing, granular backfill and potentially contaminated ground, and hence we do not require an equal amount of backfill to be imported into the trench. This 250,000 tonnes of material, represents some 30,000 'muck away' lorries a year, which do not appear on our customers roads, with all the health and safety benefits that accrue.

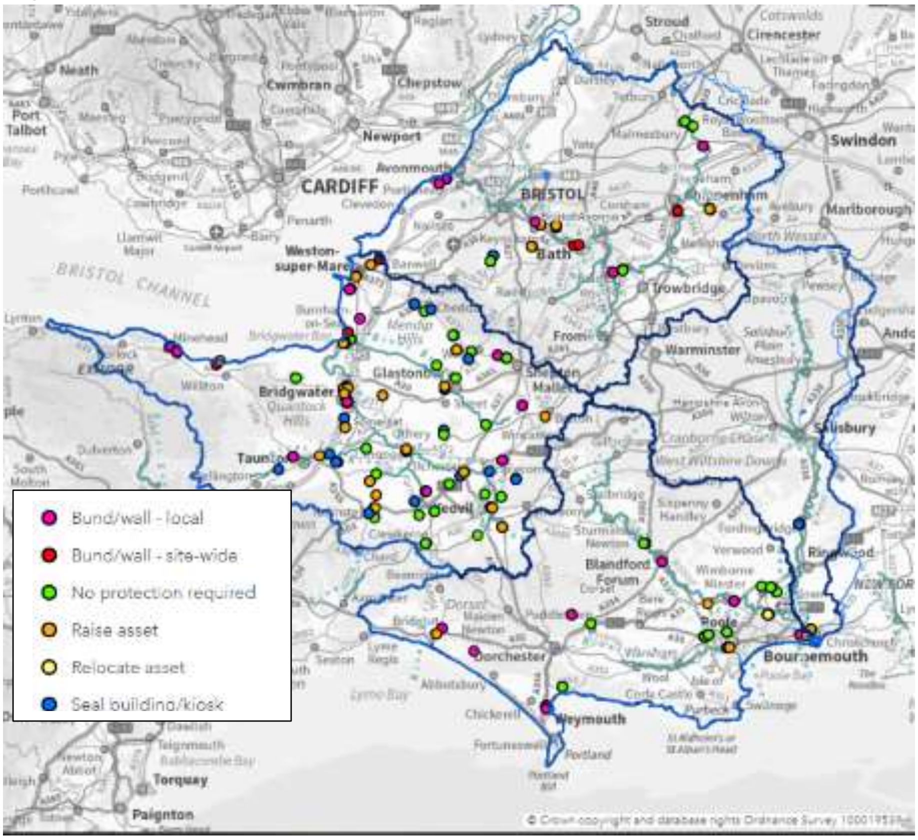
8.5 Resilience options

The DWMP resilience assessment comprised of five different components including flood risk, power, communications, response recovery plans and coastal erosion.

The flood risk assessment considered fluvial, coastal, and surface water flood risk and undertook a sequential approach to identify and develop appropriate flood resilience measures, with the aim of minimising costs overall and impacts to third parties:
- Can the existing equipment be raised above flood levels?
- Can the existing equipment and key apparatus be protected locally?
- Can the site be relocated away from flood risk?
- If a flood defence is built to protect the site, can it be designed with a minimised footprint?

Further to this assessment, the preferred solution or combination of solutions were proposed as shown in Figure 106.
. These included:
- Option A: Raise Equipment: Raise control panel / kiosk / other equipment
- Option B: Seal Building / Kiosk: Waterproofing treatment to existing assets/buildings incl. flood doors, air bricks etc
- Option C: Wall / bund: Localised
- Option D: Wall / Bund: Site-wide (defence height < 1.2m, 1.2 to 2.1m, 2.1 to 5.3m, > 5.3m)
- Option E: Relocate equipment
- No sites fell into this category at this stage. Subsequent design stages may determine that this option is more cost effective as design details are developed.

Figure 106: Flood alleviation options required for Wessex Water assets at risk of flooding



Note: Green dots are where no investment is needed, other colours reflect what type of measures are required

The coastal erosion risk was assessed through reference to the current shoreline management plan (SMP) policy for each area. Site visits identified a prioritised list of This identified a prioritised list of sites requiring mitigation measures in the short, medium, and long term. it was highlighted that any changes to the SMP policy would require an update to the assessment.

The power resilience assessment evaluated approaches and mitigation measures. This confirmed that risk management systems are in place to continually improve the system as required through established processes.

The communication resilience assessment recognised the criticality of communications and future risks associated with the implementation of national modernisation of technology. It also confirmed that a programme of work is underway to deliver improvements to achieve future communications resilience.

The review of business resilience, response and recovery plans identified that Wessex Water champion industry leading recovery practices including C-Mex, levels of service, and targets to attend site. Each regional team has developed bespoke Local Emergency Plans (LEPs), operational mitigation plans and other planned emergency controls and measures. The resilience action plan was able to demonstrate a systems-based approach to resilience that underpins operations, future planning and has a clear governance structure to inform required investment to improve the resilience of assets.

9. Strategic environmental assessment

9.1 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.

9.2 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.

9.2.1 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).

9.2.2 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 29.

Table 29: 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 29 above have informed the proposed assessment framework that has been used to assess the effects of the draft DWMP (Table 30).

9.2.3 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 29. For each objective, guide questions are provided. The assessment framework that has been used to assess the DWMP measures is shown in Table 30.

Table 30: 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.

9.2.4 Summary of Effects

High-level intervention effects

Generic assessments of each of the 17 option types (Section 8.2) 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).

9.2.5 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'.

10. 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.

10.1 Developing our best value plan

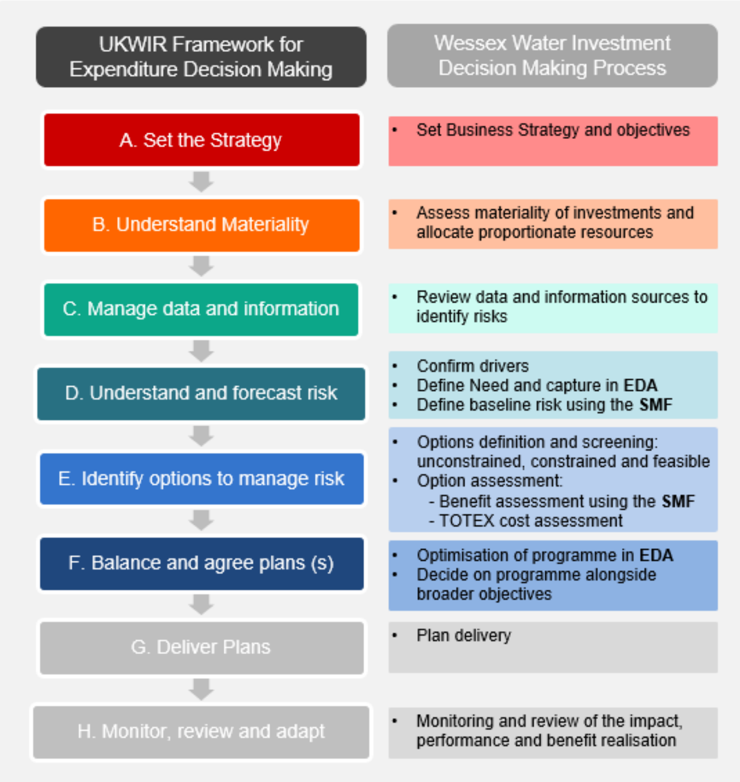
10.1.1 Our approach to developing a best value plan

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.

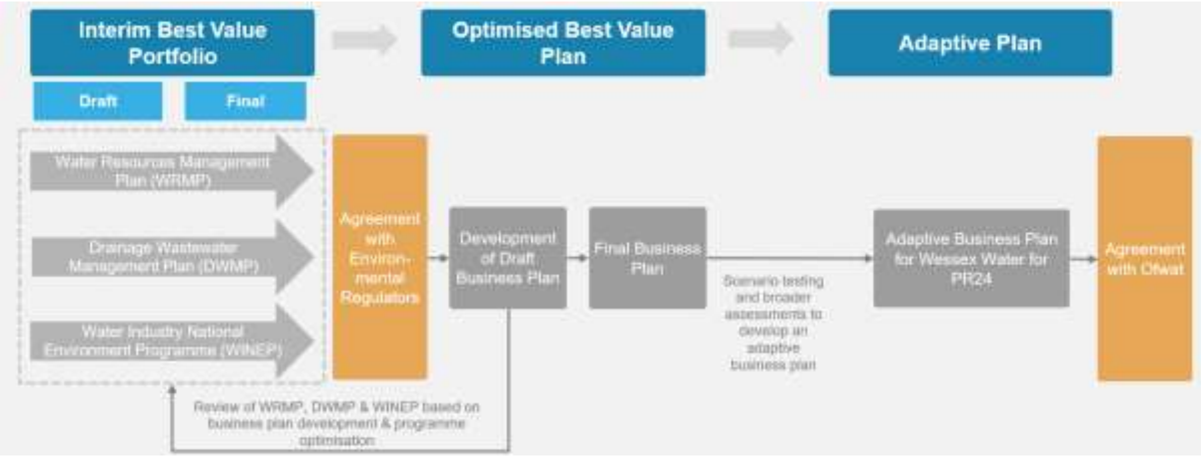
Figure 107: Aligning investment decision making with the UKWIR framework



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 108: Alignment of best value DWMP and our business plan



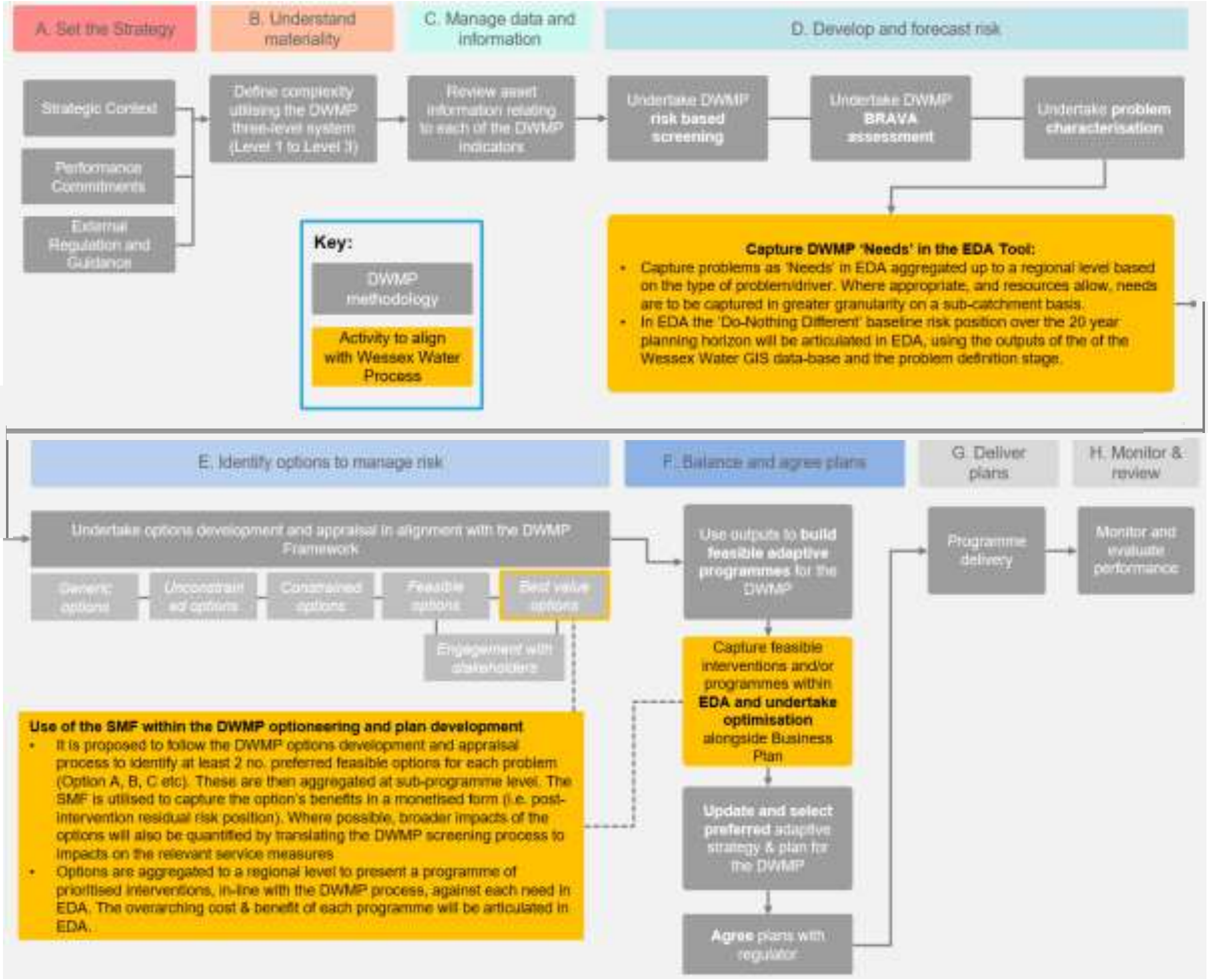
Within the DWMP process, to ensure alignment between the DWMP framework and our internal investment decision-making process, the process outlined in the flow-chart (Figure 109) is followed at sub-programme level. It involves the use of the Wessex Water EDA and SMF to support the DWMP optioneering and 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 asterisk in the above list shows which elements use the SMF tools for the benefits.

Figure 109: 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 111), 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.

10.1.2 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 nutrient 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.

10.1.3 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.

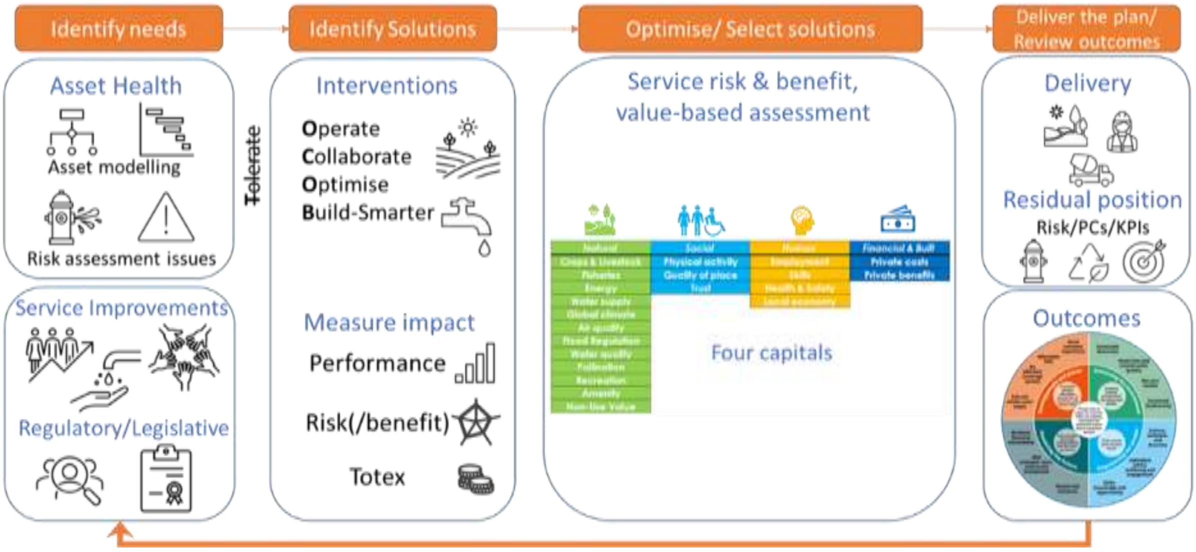
Our corporate DST for investment planning is the Enterprise Decision Analytics (EDA) from Arcadis. EDA was discussed in Section 10.1.1 summarised in the following section. The DWMP investment needs and benefit values have been entered into EDA at a regional (Level 1) level of detail for each sub-programme 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 110: 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 111 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 111: 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		

<u>Optimatics DST</u>

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 112 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 112: Optimatics output showing different optimised flooding programmes

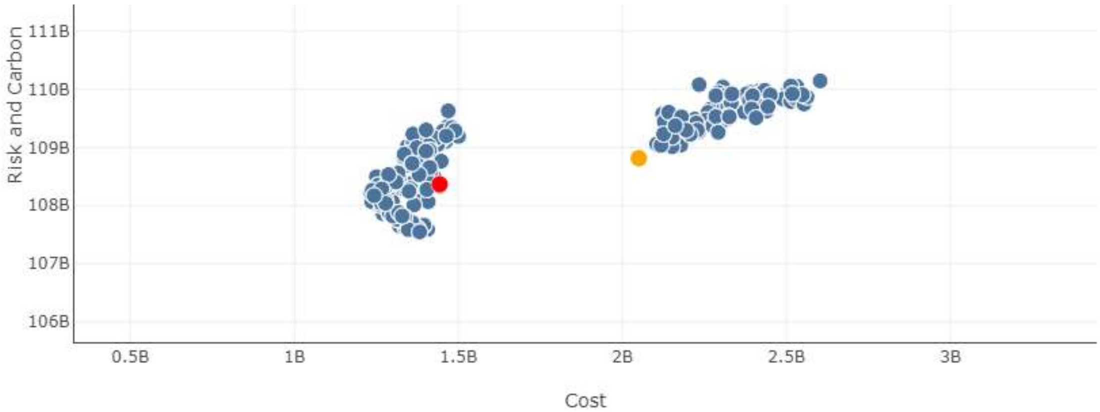


Figure 114 shows a decision support tool of constrained investment requirement per 5-year AMP cycle (8 to 13).

Figure 113 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 11.6).

Figure 113: Prioritised flooding schemes that have been appraised

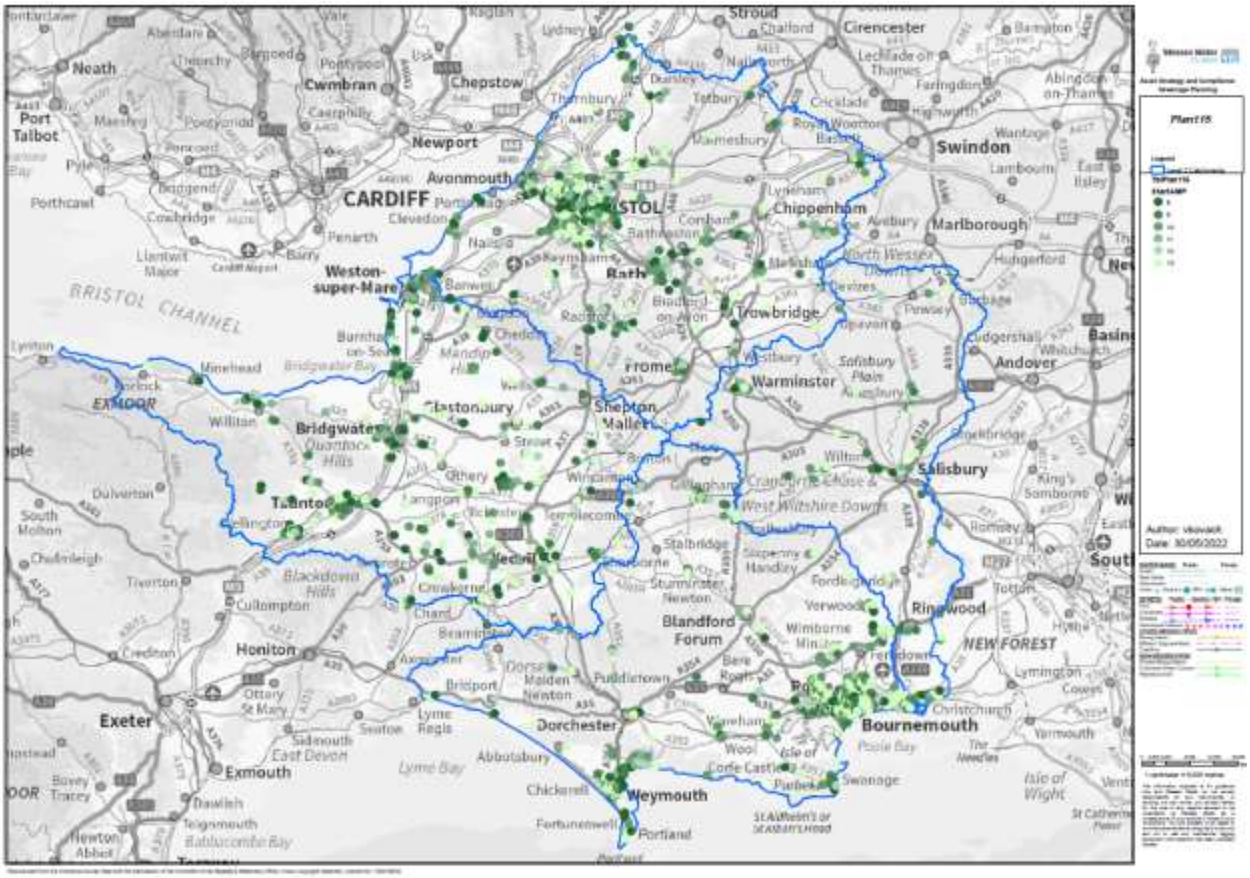
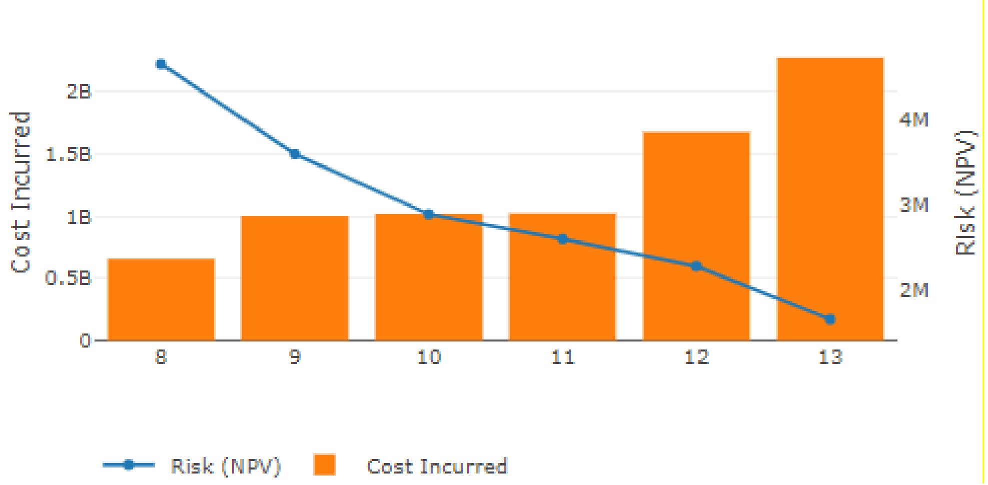


Figure 114: DST example of constrained investment requirement per 5-year cycle (AMP8 to AMP13) – note this is an example and not our plan.



10.1.4 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
- sewer 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
- continued maintenance of pumping stations and sewers
- 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 10.5.
- Sewer rehabilitation. See section 10.8.
- Sewer sealing to prevent groundwater inundating sewers. See section 10.9.

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.

10.1.5 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.

10.1.6 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. These have been assigned a high level of confidence in project progression and funding contributions in delivery are summarised in Table 31

- 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.

Table 31: Partnership flood alleviation schemes with medium to high confidence in progressing during AMP 8

Individual Scheme title	Brief Description of Problem and Proposed Solution
Hamworthy and Upton FDS	Both the Hamworthy and Upton areas were identified as tidal flood risk areas in the Poole and Wareham Strategy. Recent detailed modelling has quantified the risk and proposed two sites where earth banks need to be constructed to provide a 1200 SOP up to 2060 for tidal protection, however a surface water and sewerage strategy is required to be developed in alignment with this work to inform work to prevent any disbenefit from the tidal scheme and increase the resilience of the community to manage surface water risk behind the tidal defence.
Bristol Avon Strategy - Phase 1	Bristol City Council and the Environment Agency have identified that there is a significant risk to Bristol city centre from tidal and fluvial river flooding. The risk of flooding increases significantly with sea level rise which results in up to approximately 2,800 residential properties may also be at risk in 2110. This project proposes a strategic solution to manage the risk of climate change, localised solutions to manage the risk in the short term may also be required. Contribution will fund improvements to storm overflows and surface water outfalls that will be impacted by higher river levels tin locations of phase 1 of the flood scheme in the short term while a longer-term drainage and wastewater strategy for Bristol is refined.
Bristol Resilient Frome	Bristol City Council led a successful collaborative bid to the DEFRA Flood and Coastal Resilience Innovation fund for a series of measures to adopt a catchment-based approach to increasing flood resilience using a variety of measures including NFM, SuDS, improved monitoring, innovative financing and policy change. This contribution is to deliver surface water management measures to increase the resilience of drainage and wastewater infrastructure and wider multiple benefits.
Swanage Town Coastal Scheme	Contribution towards a coastal flood alleviation scheme to reduce risk of coastal flooding but to also ensure the design of the new scheme does not compromise routine and emergency access to the Swanage WRC.
Weymouth Harbour & Esplanade FCERM Scheme Phases 1 & 2	Contribution towards short term measures to reduce the risk of surface water and sewer flooding in conjunction with work to increase the flood protection from harbour walls within Weymouth harbour, Weymouth Town Centre and Park District properties behind them. This contribution is towards measures to deliver increased resilience of surface water infrastructure and explore additional opportunities to separate highways drainage from the combined system. Long term measures will be progressed in parallel to provide further refinement and development of options considered in the Weymouth DWMP strategy.
Sherborne Sewerage and Surface Water Strategy	Completion of a surface water management plan and delivery of measures to reduce flood risk within the Sherborne catchments and deliver asset improvements to culverted watercourses.
North Allington	Completion of a sewerage and surface water strategy for the North Allington Area of Bridport, delivering a range of multiple benefits including the reduction in risk of surface water flooding.
Piddle Groundwater and Surface Water Strategy	Communities within the piddle valley have received funding from the EA as part of the frequently flooded communities allowance. The community suffers from groundwater flooding. This project will look at ways to divert groundwater that is often pumped into the sewer network into that watercourse and look at other measures within the catchment to attenuate water in the catchment and reduce groundwater inflows in to the sewer network.
Portishead Sewerage and Surface Water Strategy	North Somerset Council have identified Portishead as one of their priority locations given more frequent flood incidents from a combination of surface water, river, Rhyne and sewers. Given the complexities of the drainage and wastewater infrastructure in Portishead, this work will produce a new Integrated Catchment Model (ICM) to provide greater understanding of combined flood risk within the area and to inform development of integrated flood alleviation measures.
Chard Flood Alleviation Scheme	Construction of a range of surface water flood alleviation measures to increase drainage and wastewater resilience in Chard following multiple intense surface water flood incidents.
Minehead Integrated Flood Alleviation Scheme	Somerset Council, Wessex Water and partners from the Somerset Rivers Authority have completed construction of an integrated catchment model for Minehead and identified a series of hybrid measures to reduce the flood risk of surface water, sewer, river and drainage infrastructure (viable for FDGiA funding). Proposed measures need to also be integrated with the Minehead Community Development Trust vision, regeneration proposals and policy measures within the shoreline management plan.

Bridgwater Tidal Barrier	Rising sea levels and deterioration of existing defences along the River Parrett will decrease flood protection to Bridgwater and surrounding areas. The project will reduce flood risk to10,000 properties in Bridgwater and surrounding areas through a new tidal surge barrier on the River Parrett and to deliver improved downstream defences. This will also provide flood alleviation the Wessex Water Chilton Trinity WRC.
Taunton (TSFAIS option TTC5)	Somerset Council and the Environment Agency have developed the Taunton Strategic Flood Alleviation Scheme, which will be delivered in phased sections over the next 100 years. This contribution recognises opportunities to progress separation and surface water management improvements to align with aspects of the fluvial flood alleviation scheme. The flood alleviation scheme proposed to provide fluvial flood alleviation to ~ 289 residential properties, 200 commercial and public buildings and infrastructure.
Ilminster Surface water strategy	Somerset Council have led the development of a joint integrated catchment model following multiple flooding incidents resulting in Section 19 reports. This funding will look to progress schemes to deliver improved surface water management and progress surface water separation measures to increase the resilience of the drainage and wastewater network in the area. This will complement the Ilminster fluvial flood alleviation study due for completion in 2024.
Somerset Frome Sewage and Surface Water Strategy	Somerset Council and Wessex Water have identified a need to further investigate surface water management in Frome that are particularly vulnerable to surface water flooding. The work identified as part of this strategy will look to target sub catchments upstream of storm overflows that are particularly at risk from surface water flooding.
Yate Station Road regeneration	There is a history of surface water flooding in the Station Road area of Yate. This project plans to align works to deliver SuDS to improve management of surface water as part of proposed regeneration, highways and active travel improvements. This will also deliver improvements to water quality, biodiversity and amenity in the area.
Chippenham Sewerage and Surface Water Strategy	Wiltshire Council's flood risk management team have identified Chippenham as a priority area to construct an integrated catchment model to understand surface water flood alleviation measures that could be incorporated within the Chippenham masterplan work to provide increased resilience to the drainage and wastewater infrastructure in the area, reduce the frequency of storm overflow operation, and increase wider multiple benefits for the community.

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 Table 32.

Table 32: Collaborative water quality improvement projects - co-created with catchment partnership stakeholders

WINEP catchment partnership led project	Brief Description of Problem and Proposed Solution
Cam & Wellow Partnership Project	The Bristol Avon Catchment Partnership (BACP) has recognised the Cam and Wellow Partnership Project as one of the 8 Strategic Partnership Programmes in the Bristol Avon Catchment. The BACP is also supporting the development of the Bristol Avon Fish Recovery Strategy and Action Plan. This will provide a set of guiding principles to deliver a targeted and prioritised approach to support and restore riverine habitats to support healthy fish populations, informing future actions required in the Cam and Wellow catchments. - There is also a strong existing partnership to work with in this area of the catchment; the Somer Valley Rediscovered (SVR) Partnership was established in 2020. This is identified as a strategic green infrastructure project in the West of England's Joint Green Infrastructure Strategy (JGIS), which aims to improve biodiversity and, by increasing people's connections to nature, improve health and wellbeing.
Chew Valley	The Chew Valley Partnership Project has evolved from smaller-scale projects delivered in specific locations within the catchment. One example is the work undertaken by Bristol Water and Bristol Avon Rivers Trust (BART) to connect a section of river downstream of Chew Valley Lake. The collaboration between Bristol Water and BART also included their engagement with local communities, delivering training on river fly monitoring and developing a network of volunteers. Similarly, both Wessex Water and Bristol Water have worked with the University of Bristol to support PhD research understanding nutrient contributions within the sub-catchment
Stour Chalk Streams and Clay Vales Partnership Project	The principle environmental pressures in the project area include sediment and nutrient inputs from the water industry and agriculture influencing water quality, winter high surface flows in the clay catchments causing flooding and summer low fluvial flows in the chalk catchments reducing climate resilience and potential for future water resources issues. The project will be led by Dorset Wildlife Trust, in partnership with Wessex Rivers Trust, FWAG SW, Wessex Water, Bournemouth Water and supported by other organisations within the Dorset Catchment Partnerships as relevant. The programme will contribute to wider environmental outcomes of natural environment, net zero, catchment resilience, and access, amenity and engagement by co-ordinating strategic delivery in three core themes: water, soils, wildlife and habitats.
Resilient Avon Project	The Hampshire Avon is one of the country's finest and most biodiverse chalk streams. Like many of our chalk streams, pressures associated with water quality, water quantity, and habitat, are negatively impacting the health of the natural environment for wildlife and people. Significant changes are needed if we are to protect and enhance the health of the river for present and future generations in the face of our ever-changing climate. The Resilient Avon Programme (RAP) will contribute to wider environmental outcomes through delivering improvements to water quality, water quantity, biodiversity, and climate change resilience. The RAP encompasses the whole of the Avon Hampshire Operational Catchment. Adopting a catchment scale approach will enable the partnership to respond to emerging challenges and opportunities which deliver the biggest gains for the environment and local communities in the right places.
Groundwater project	Details to be confirmed.

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.

Table 33: Risks identified with development and delivery of partnership schemes

Risk	Mitigation measure
Resources within LLFAs - Enactment of schedule 3 - Significant flood incident	One of the biggest challenges for developing partnership projects is the availability of skilled drainage engineers to scope, shape and steer development of partnership projects. A bid has been submitted for joint partnership funding to recruit graduate engineers to work within our Sustainable Operations and Engineering team to progress the options assessment to provide the evidence base to secure future funding for a pipeline of surface water projects to be delivered in AMP8 and beyond.
Changing programmes of work	It is also recognised there is a requirement for flexibility within partnership working projects, to adjust work to fit in with other funding contributions. This is why a funding block approach has been proposed for flood risk partnership projects to accommodate the potential risk
Data sharing	We will continue to use established data sharing protocols through licencing our data to inform future flood alleviation solutions. We will continue to work with the national project that the National EA project are leading to overcome any challenges with data sharing.

Planned engagement following publication of the Final DWMP

After the submission of the Final DWMP, we plan to continue our ongoing dialogue with stakeholders about partnership working opportunities to further develop projects to provide further evidence to support the PR24 business plan.

The project development stage for a selection of projects will continue until the beginning of AMP 8 to continue to develop and agree governance arrangements, refine the scope and detail of projects, ensure appropriate resources are available to facilitate project development and delivery between 2025-2030.

Given the step change in scale of ambition of proposed partnership work, a formal governance structure will be established with new DWMP partnership programme meetings will be scheduled with key stakeholders to facilitate clarity on aims, objectives, critical milestones. Programmes will be shared with wider stakeholders to assist with identification of future opportunities for collaboration.

Our approach to the engagement will continue to be flexible across the Wessex Area to recognise different structures and scale of resources. We will continue to work closely with our catchment partnerships to support with bringing in wider stakeholders and support with workshops where appropriate to assist with development and alignment of integrated strategies.

10.1.7 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 34.

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 34: 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.

10.2 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.

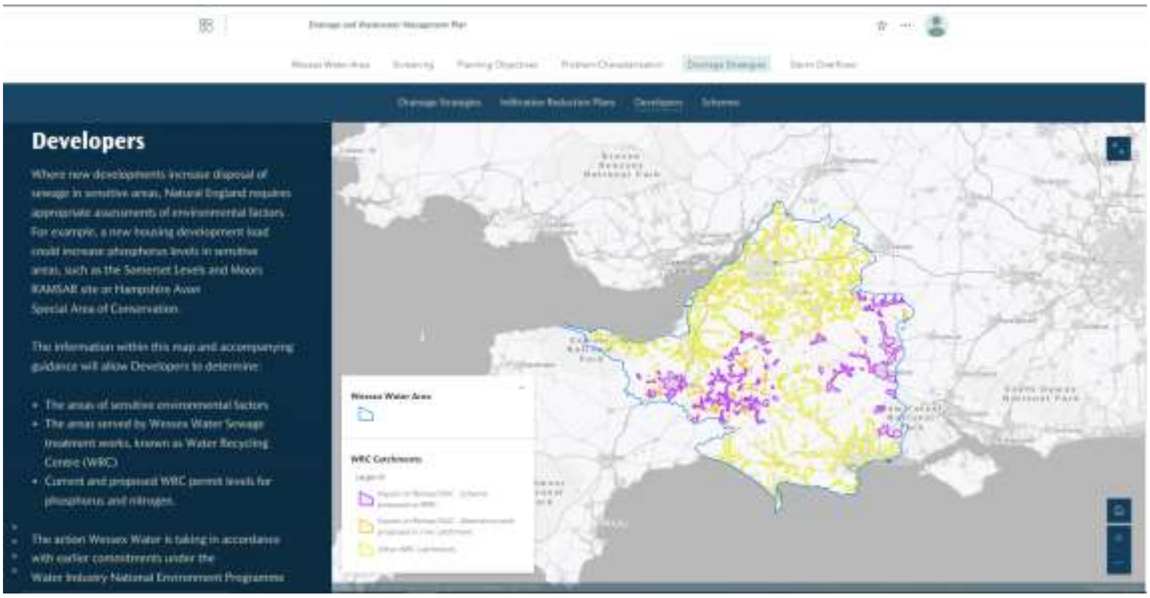
- Hampshire Avon SAC
- Poole Harbour SPA/Ramsar
- Somerset Levels & Moors Ramsar
- Chesil and the Fleet SAC/Ramsar/SPA

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 sewerage undertakers 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 115) 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 115: 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 35: 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 35 for improvements at WRCs is £52 per year for each average household by 2030.

10.3 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 116). 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 116: 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.

10.3.1 Setting storm overflow targets and costs of improvement

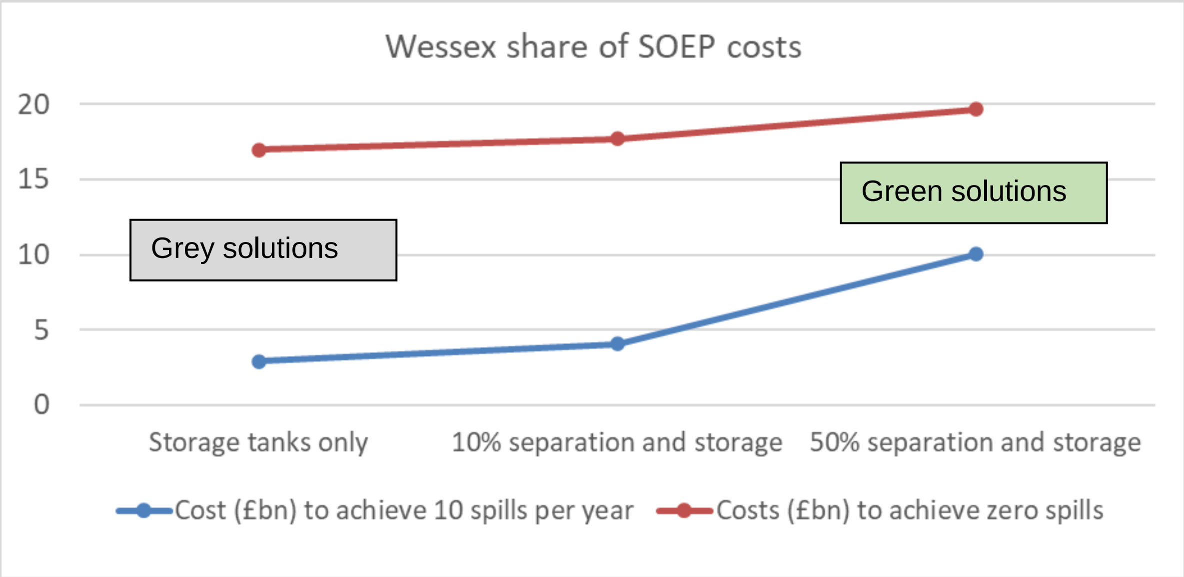
Ideally, storm overflows targets should be based on impact. However, this is complicated and will take many years to establish, so Defra's SODRP uses frequency based targets.

<u>Defra Storm overflow evidence project</u>

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 117 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.

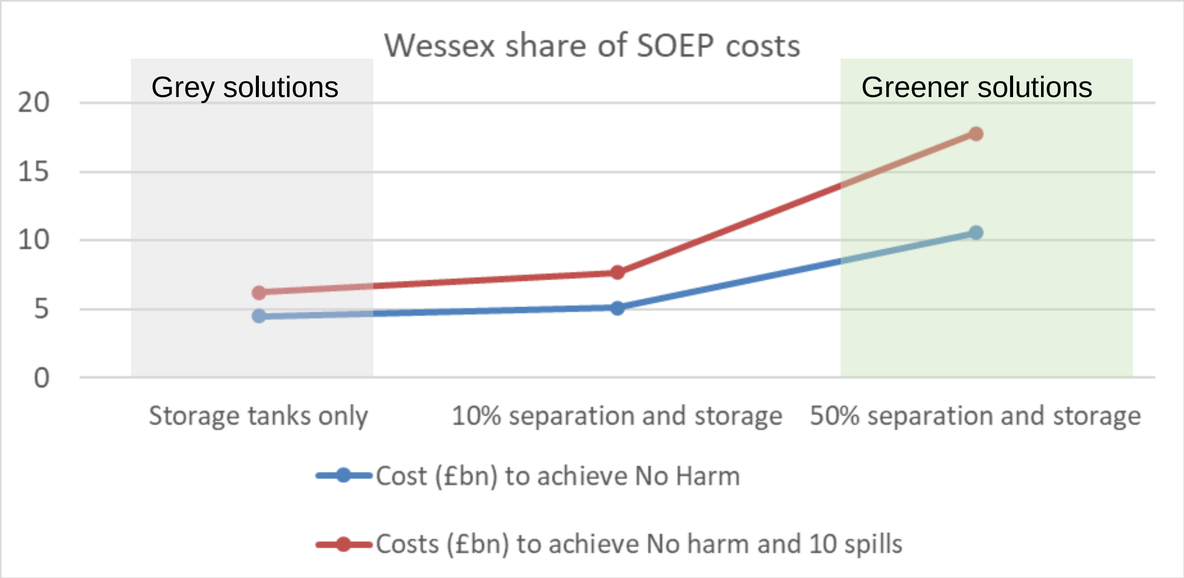
Figure 117: Wessex Water costs to reduce overflow discharges to 10 and zero spills



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 118 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 118: 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.

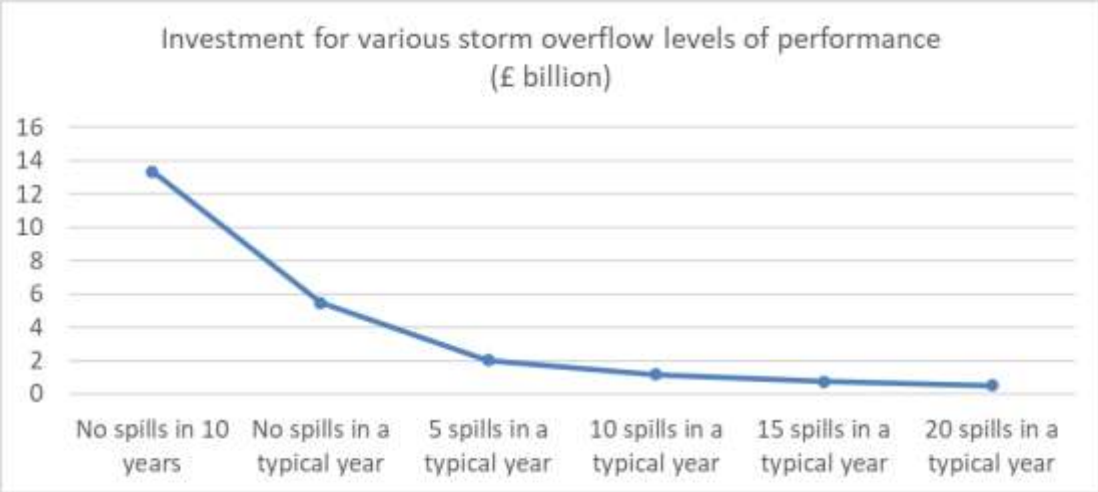
<u>Wessex Water analysis of storm overflow costs</u>

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 119 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 119: 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.

10.3.2 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.

10.3.3 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 36: 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 34.
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.

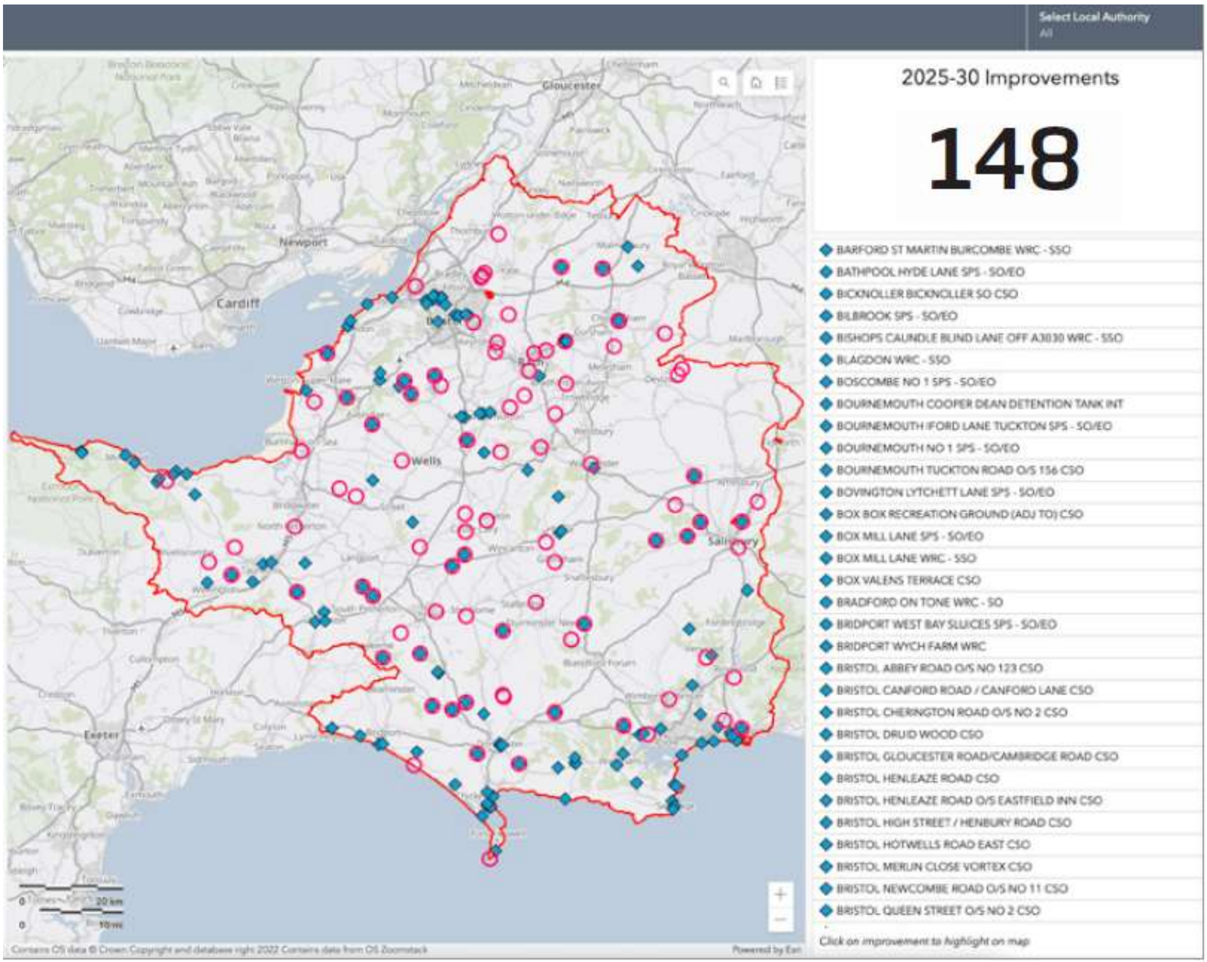
These costs exclude reducing seasonal groundwater inundation which can cause prolonged overflow discharges. We have water quality evidence that concludes groundwater induced storm overflow discharges do not harm the waterbodies. The water quality of the discharges is like the final effluent of a WRC.

Table 37: 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 37 for the statutory storm overflow reduction programme is £31 per year for each average household by 2030.

Figure 120: Proposed investment in storm overflows during AMP8 (2025-2030)



10.4 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.

10.4.1 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 121. The impact scores were generated from our PR09 customer research and confirmed by the recent DWMP customer research (Appendix B).

Figure 121: 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	6	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).

10.4.2 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 38.

Table 38: 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.

For PR24 we are going to:

- continue to use our hydraulic risk grid
- have another risk grid for 'other causes'.

Then both flooding risk grid scores can be added together to produce an overall flooding risk score. Over time we will aim to halve that number, as per our outcome measure.

10.4.3 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 39 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 considered for optioneering 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 39: 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 40: 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 40 for our flooding programme is £5 per year for each average household by 2030.

10.5 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 to see a 10% reduction in pollutions every AMP, we will need an additional £40m of totex. For a 20% reduction in pollution incidents per AMP, then a totex cost of £85m 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 41: 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 41 for pollution reduction is £2 per year for each average household by 2030.

10.6 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 42: 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 42 for network development is £1 per year for each average household by 2030.

10.7 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 43: 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 43 for partnership working is £1 per year for each average household by 2030.

10.8 Collapses and rising main bursts

This investment needs for long term stewardship of our infrastructure assets as introduced in the planning objective in section 5.12 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 44. 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 44: 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

10.8.1 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[4] in 2017 suggested that 8 times current investment for sewer infrastructure is needed for intergenerational fairness of not leaving a legacy to future generations.

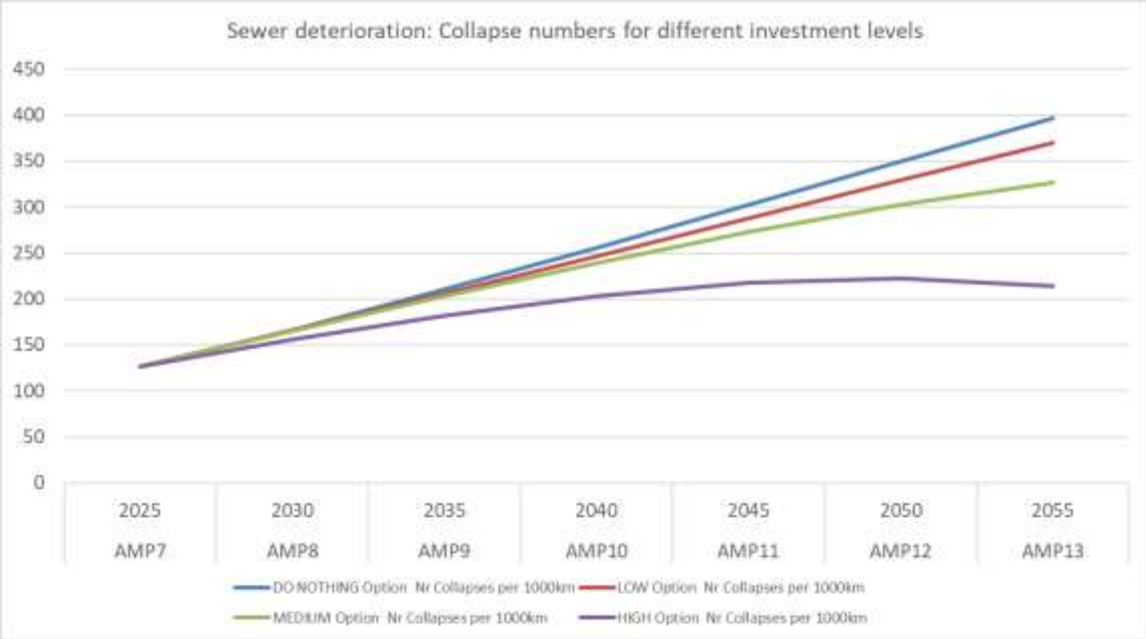
- The 2022 WaterUK report ‘Options for a sustainable approach to asset maintenance and replacement’ also concurs with more investment needed for the sustainability of future performance and legacy.

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 122 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)

[4] UKWIR project ‘Long term Investment in Infrastructure’, 2017

Figure 122: Sewer collapse rates for different levels of investment



The end of AMP position and the costs associated with the scenarios are provided in Table 45. 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 45: Investment levels for collapse scenarios shown in Figure 122

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.

10.8.2 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 46 – this is a step change.

Figure 123 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 123: Rising main deterioration requirements

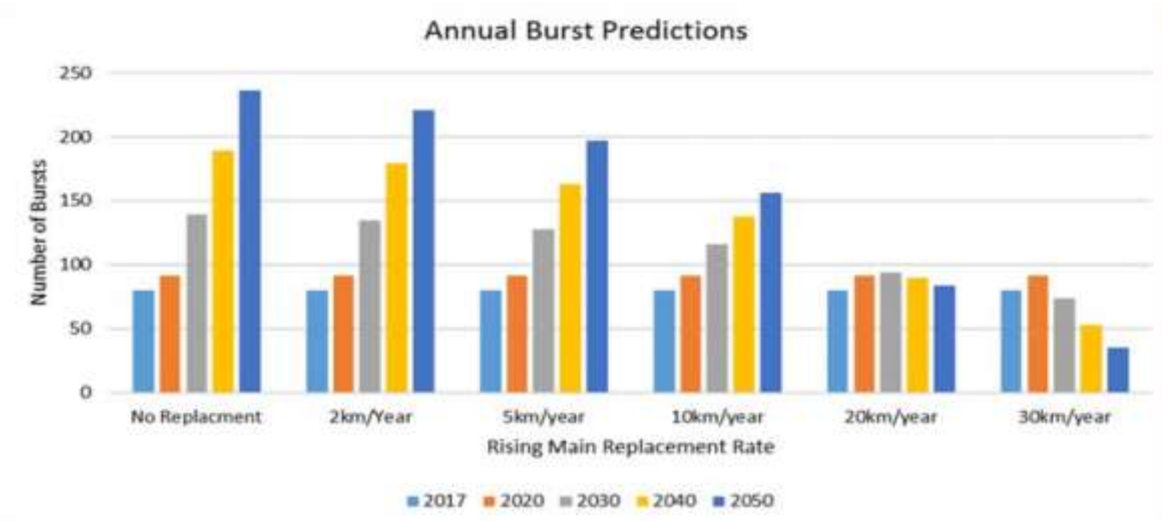


Table 46 provides detail of how our current base investment needs to be increased significantly to stay stable to have less bursts.

Table 46: 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 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 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 47: 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 47 for collapse and burst improvements is £2 per year for each average household by 2030.

10.9 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 48: 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 48 for storm overflow inundation sealing resilience is £1 per year for each average household by 2030.

10.10 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 49: 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 49 for is resilience investment is negligible by 2030.

10.11 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 £1.4billion 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 50: 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

11. Adaptive planning

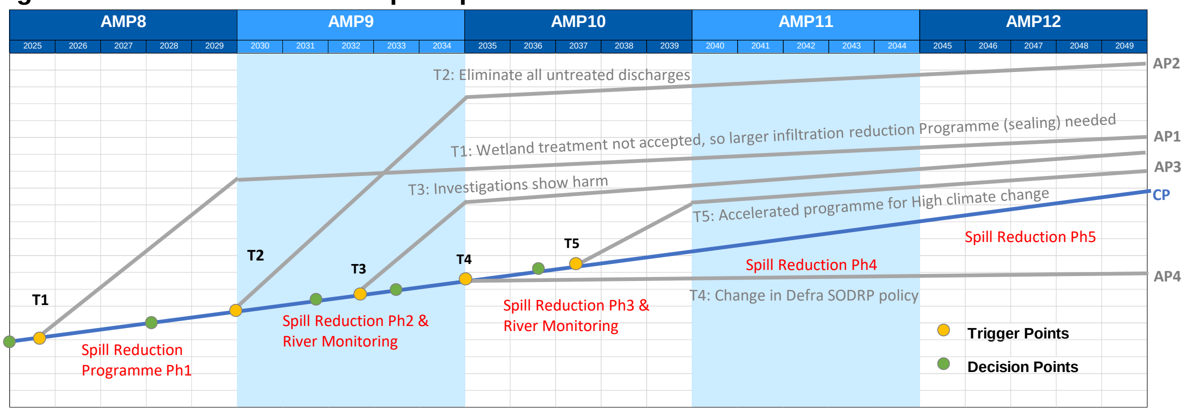
Our best value plan, detailed in Section Our best value plan10, is our core plan. It has our best estimate of what is required by 2030 and has a line of sight for delivery of the long term plans. However, there are current uncertainties (such as continuous water quality monitoring and investigations) 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 124** 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 124: Storm overflow adaptive plan



11.1 Preferred plan

Our preferred plan is different to our core plan (detailed in Section 10) 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.

11.2 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. We do not think that is material, when we have already allowed for the increase in intensity for climate change.
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.

11.3 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 10.3. 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.

11.4 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 10.5 This would be a cost saving adaptive pathway.

The trigger and decision point would be the change in legislation to ban wet wipes.

11.5 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.

11.6 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 39 the cost to address this scale of flooding would be £2.5 billion.

11.7 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.

11.7.1 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.

11.7.2 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 10.5. We have also recently innovated in using AI to automatically code CCTV footage. This will save costs allowing us to inspect more sewers.

12. Publishing our plan and next steps

12.1 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.

12.1.1 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.

12.1.2 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.

12.1.3 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.

12.1.4 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 12.1.6 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 7 and Appendix A.

12.1.5 DWMP Appendices

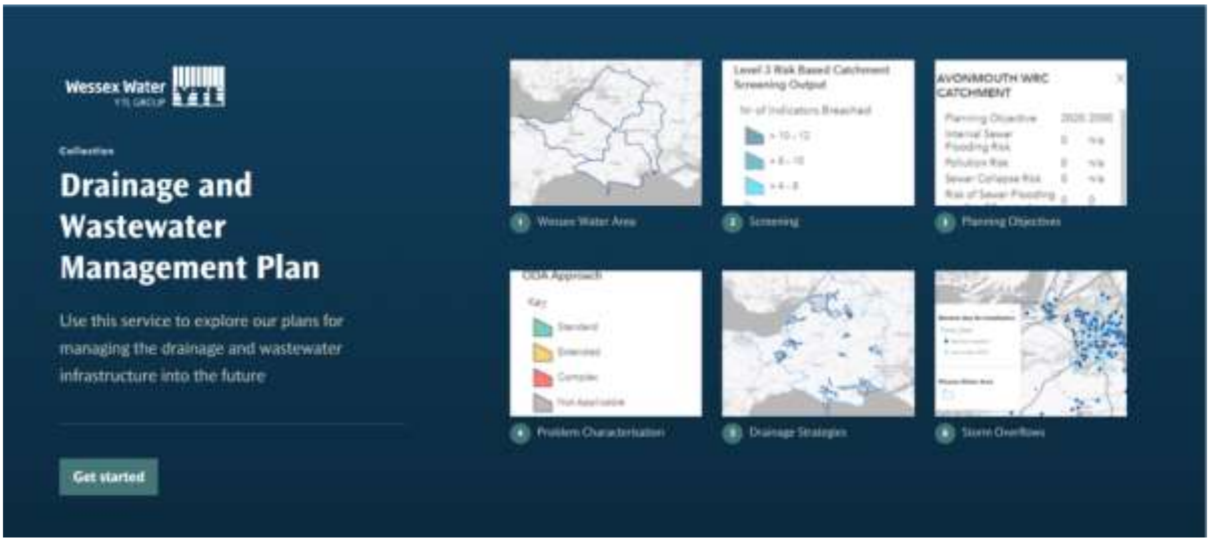
The eight appendices that are downloadable from our website[83] are:

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

12.1.6 The DWMP website and portal

The Wessex Water DWMP website[83] (Figure 125) 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.

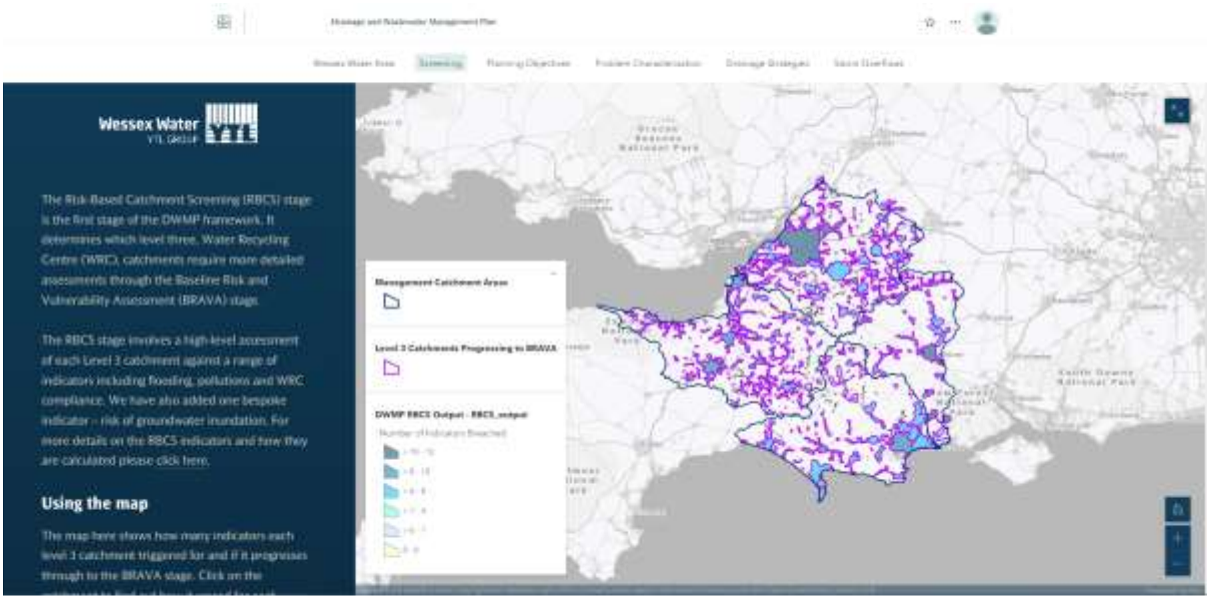
Figure 125: Wessex Water's DWMP website



Risk based catchment screening results

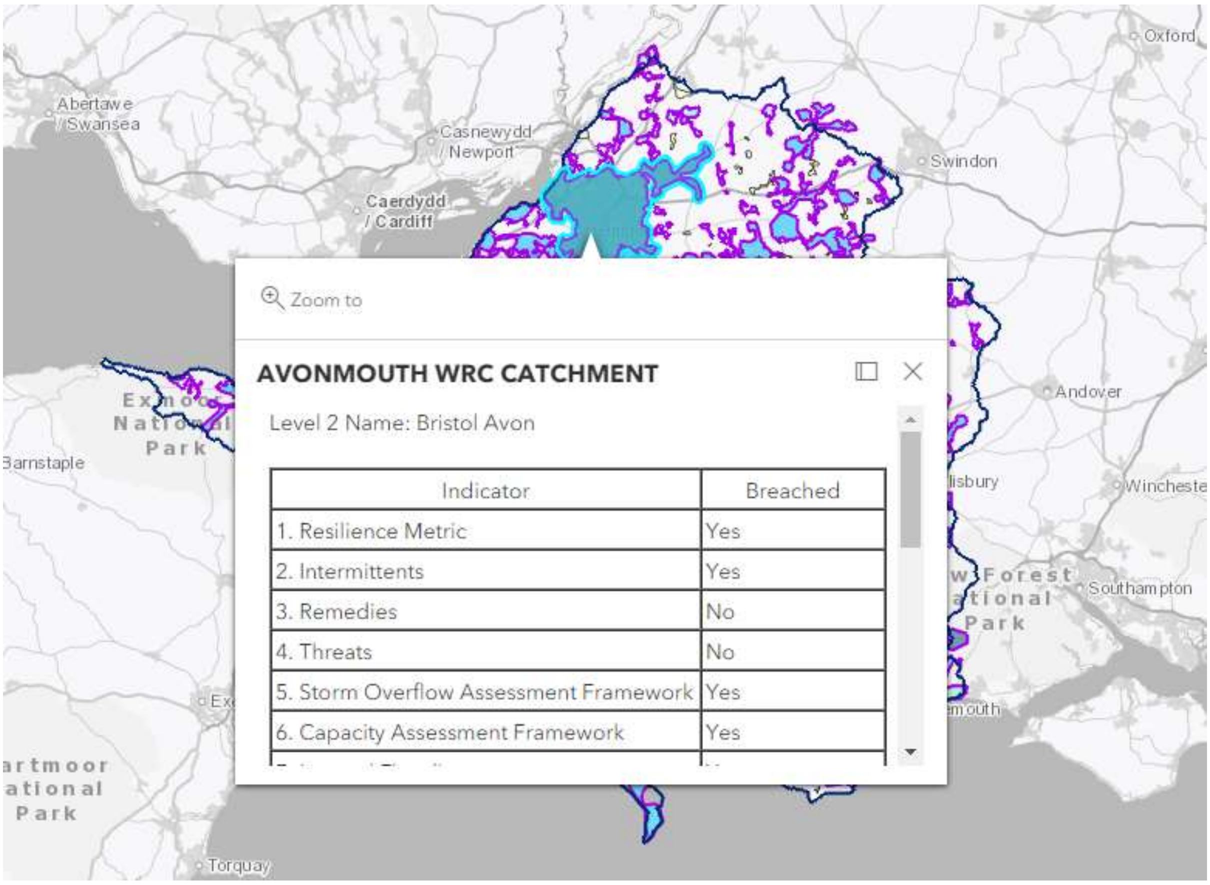
The 'screening' tab refers to the risk-based catchment screening results. For each of the level 3 (WRC catchment) areas you can see the results of the RBCS process including which of the 18 indicators were breached in the catchment. A breach doesn't mean a failure – it just indicates a risk. Figure 126 shows an example of the RBCS results on the portal.

Figure 126: 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 127: RBCS results



<u>Planning objectives (BRAVA results)</u>

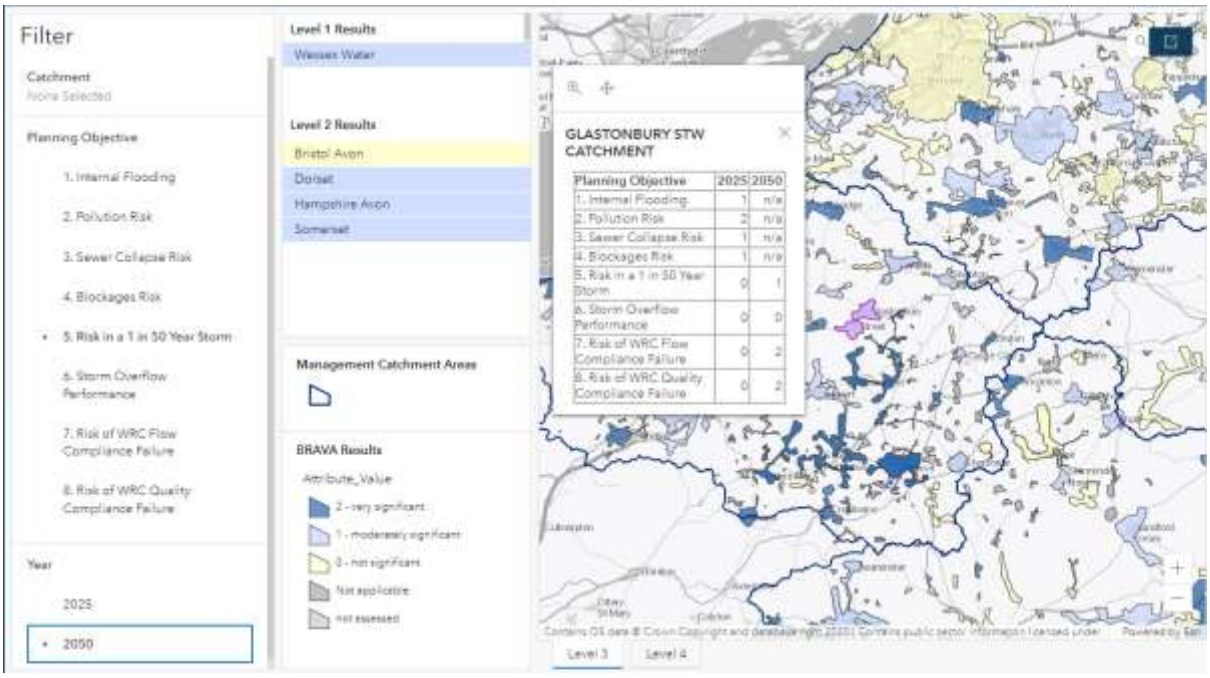
The Baseline risk and vulnerability assessment (BRAVA) stage of the DWMP assessed the level of risk for each level 3 WRC catchment that progress through the RBCS screening stage. Each of these level 3 catchments, were assessed whether the catchment contained risks for the 12 planning objectives, now and in some cases in the future.

Figure 128 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 128: Planning objectives (BRAVA) results

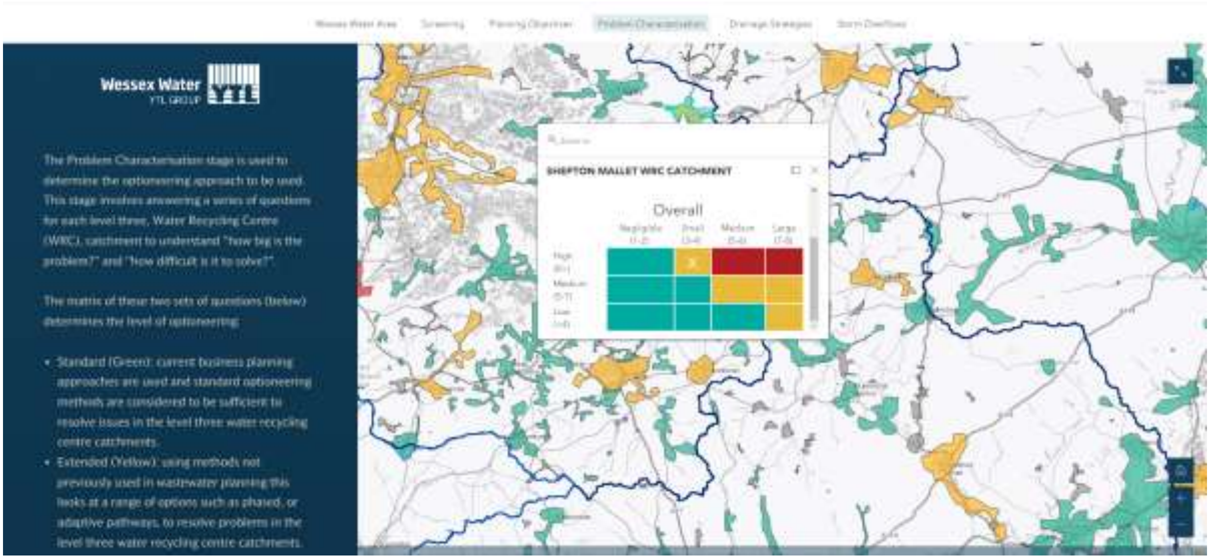


Problem characterisation results

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 129 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 129: 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 130 shows the drainage strategies tab on the portal.

Figure 130: Wessex Water's DWMP portal showing local Drainage Strategies

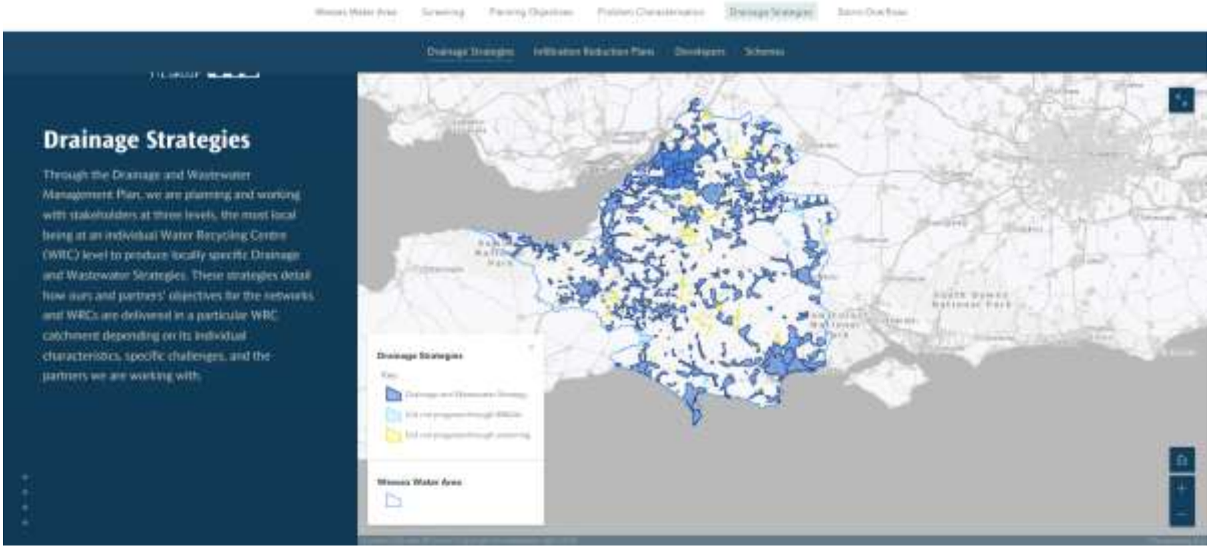
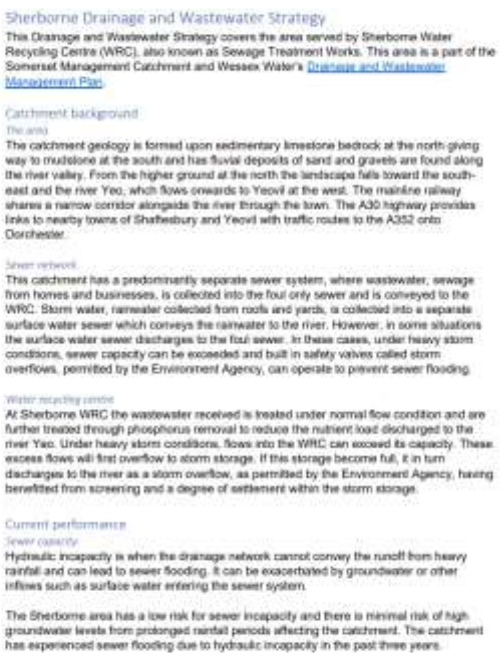


Figure 131: Wessex Water's DWMP portal showing local Drainage Strategies (2)



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 132).

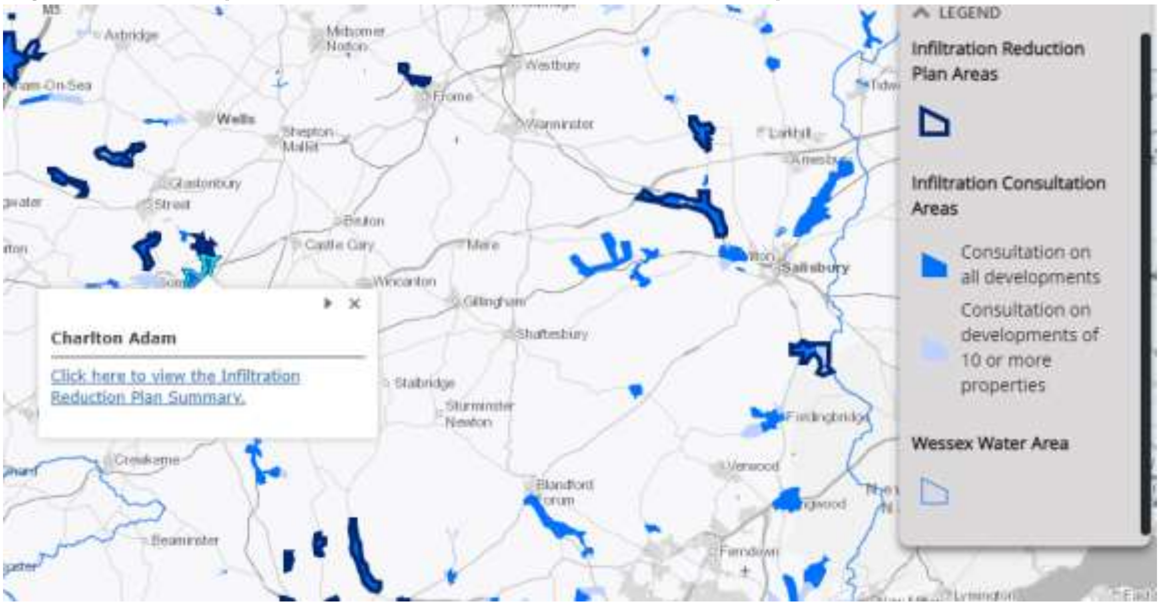
You may need to click on the right arrow to see the more local drainage strategy.

Figure 132: Wessex Water's DWMP portal showing local Drainage Strategies (3)

<u>Infiltration reduction plans</u>

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 133. 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 133: 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 134. This data is also available in a downloadable excel file containing the historical performance of storm overflow where available.

Figure 135 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 134: Storm overflow performance – regional view

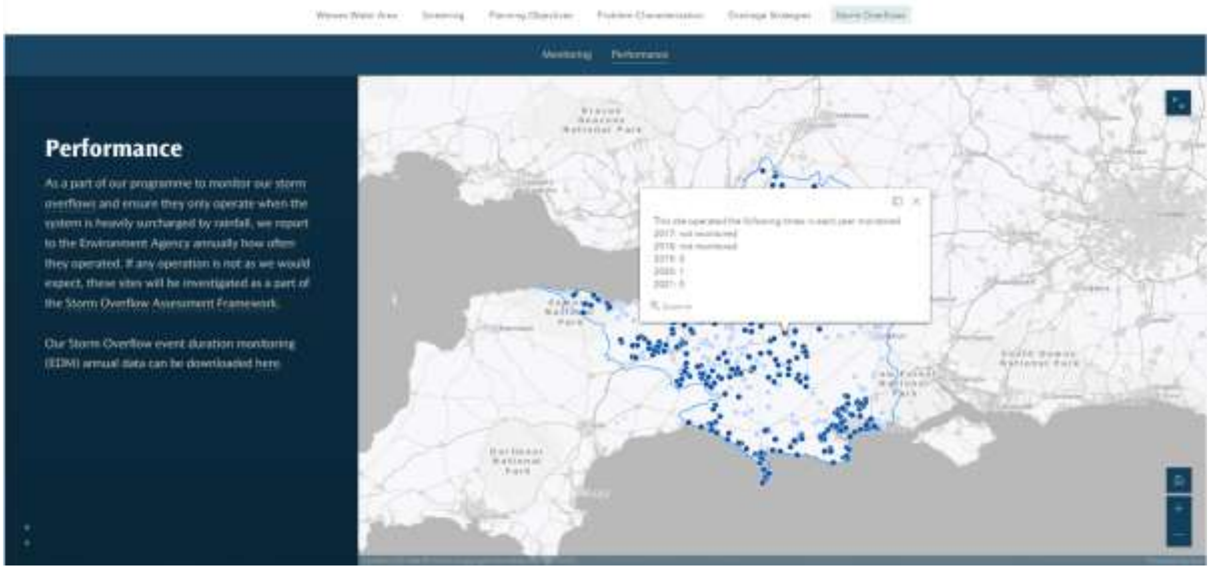
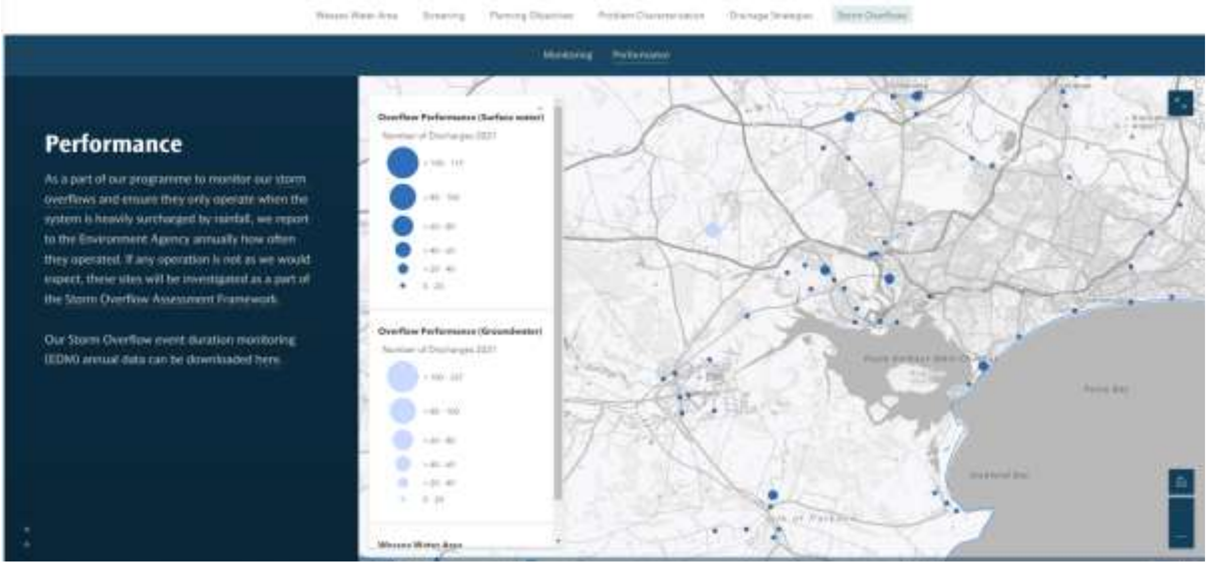


Figure 135: Storm overflow performance – zoomed in view



12.2 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 and our regulators 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 pathway 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. Level 2 assessment – Bristol Avon

This annex provides level 2 detail for the Bristol Avon catchment.

It starts by introducing the catchment and level of investment identified within the core plan for the Bristol Avon.

Later sections in this annex include:

- catchment factsheets (Figure 136)
- level 2 detail of the DWMP stages, such as the RBCS and BRAVA results
- an indication of the level of enhancement investment that is required
- an indication of storm overflows improvements
- example of adaptive pathways for flooding
- the latest partnership working schemes.

Bristol Avon introduction
The population of the Bristol Avon catchment is 1,783,049 pe (domestic and commercial flow equivalent). We anticipate this will increase to 2,040,673 pe by 2050.

There are 659 storm overflows in the Bristol Avon catchment. These will need investment as will the 121 WRCs. The DWMP core plan proposes £3bn is invested in the Bristol Avon catchment by 2050 to enhance the drainage and wastewater systems. That is £132m per year on average.

We have already made significant investment in the Bristol Avon catchment. Work completed to date can be found in the Bristol Avon Catchment Factsheet (duplicated below).

12 WRCs are being upgraded for Phosphorous removal in 2020-2025. 13 WRCs are also being upgraded for either increased flow or storage capacity. The North Bristol strategy is due to be completed in 2023 to accommodate new developments to improve water quality and reduce flood risks. This £55m scheme is detailed on our website[87].

Also see the Bristol partnership website[51].

More details are provided in the factsheets below (Figure 136).

Bristol Avon factsheet
See overleaf.

Figure 136: Bristol Avon catchment factsheet detailing investments made and planned for completion by 2025

BRISTOL AVON CATCHMENTS – THE FACTS

We operate in several catchments in the Bristol Avon region:

- The North Somerset Streams catchment (draining to the Severn Estuary)
- The South Gloucestershire catchment (draining to the Severn Estuary)
- The Bristol Avon (Rural and Urban) catchment

KEY ISSUES

Sewage treatment

Within the Bristol Avon Catchments, we operate 121 water recycling centres (WRC - formerly known as sewage treatment works), 714 sewage pumping stations (SPS) and more than 670 storm overflows (SO).

Nutrients

One of the main issues to affect the Bristol Avon catchment is the impact of nutrients on rivers and wetlands. This is primarily from phosphorus, although nitrogen can also have an effect particularly around our coasts and estuaries. Phosphorus causes eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands and is a particular problem for the streams and rivers in the catchment, as well as on the North Somerset Levels. Nutrients come from our own sewage assets but also from diffuse sources, such as agricultural and urban run-off.

Bathing waters

It is important to protect bathing water quality for recreational users of our seas and some inland waters. Water quality on the Severn Estuary coast is affected by many factors, including our own discharges from treatment works and storm overflows, but also by diffuse pollution in river catchments upstream of bathing waters. We support the ambition to reduce impacts from our storm overflows and improve water quality, both for amenity use and the environment. For inland waters this is a complex issue which will take many years to improve and requires changes in both legislation and regulatory approach.

We have invested in upgrading our sewerage and sewage treatment infrastructure at various locations to improve bathing waters by:

- increasing storage in our network (to reduce the number of discharges from storm overflows)
- installing Event Duration Monitoring equipment so that we understand when our storm overflows operate
- investigating whether Wick St Lawrence WRC affects the Sand Bay and Clevedon Bathing Waters. Our investigation concluded that the WRC is not significantly affecting bathing water quality at either beach and our passive ultraviolet (UV) light lagoons are as effective as standard UV disinfection technology at reducing bacteria levels in the discharge.

Water supply and resources

Within the catchment we operate 13 water treatment centres, 13 water sources, 10 stream supports (where we add water to rivers when flows are low) and more than 85 distribution sites (such as storage reservoirs or pumping stations).

The aquifers beneath the northern (Malmesbury) part of the Bristol Avon catchment have long been used for public water supply from the two limestone aquifers - an Upper and a Lower Oolite. Wessex Water uses the upper aquifer while Bristol Water abstracts from the lower. The volume abstracted has increased as the population has grown, and water is also exported from the catchment.

During the 1970s, trials showed that increasing abstraction was having an effect on river flow, due to this we now add groundwater to the Bristol Avon to maintain target flows through 10 stream support sites. Despite this, during drier summers since the 1990s some sections of the river have dried up. Working with the Environment Agency, Bristol Water and local people our abstractions and stream supports have been better balanced. To achieve a sustainable abstraction regime, Bristol Water will reduce abstractions from the lower aquifer during a long dry summer/autumn and Wessex Water will supply replacement water from the upper aquifer.

The UV lagoon at Wick St Lawrence

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KEY INVESTMENTS COMPLETED UP TO 2020

Nutrients

By the end of AMP6 (2020) we had installed phosphorous removal at the following treatment works:

Site	Installation Year	Approximate Cost (£k)	Approximate Phosphorous removed (kg/yr)
Saltford	2004	1,250	51,700
	2009	650	
Bowerhill	2005	1,200	4,500
Bradford On Avon	2004	500	4,900
Calne	2002	500	9,600
	2018	2,000	
Chew Stoke	2005	1,250	5,800
Chilcompton	2018	700	800
Chippenham	2002	700	20,000
Devizes	2003	350	3,700
Erlestoke	2018	500	300
Frome	2005	1,750	13,900
Keynsham	2005	600	5,400
Lyneham	2018	850	2,200
Malmesbury	2005	2,500	5,800
Melksham	2003	750	8,600
Paulton	2015	900	4,100
Potterne	2005	350	5,300
Radstock	2005	350	11,000
Seend	2018	850	300
Sutton Benger	2018	600	2,700
Tetbury	2008	1,150	2,000
	2018	2,200	
Thingley	2005	450	6,500
Trowbridge	2005	500	26,800
	2019	500	
Westbury	2003	800	9,400
Wootton Bassett	2006	2,650	6,000
	2018	1,500	

Catchment permitting

During AMP6 (2015-2020) we trialled a new approach to reducing nutrients in the catchment which has proven successful and continues to operate today.

Traditionally, we would install new treatment processes at each WRC to remove phosphorus. This is not sustainable as they are expensive to construct and consume large amounts of energy and chemicals to operate. Instead, we manage nutrients at a catchment scale with a single permit covering all WRCs across the catchment which spreads the required phosphorus reduction across a number of sites.

Individual WRCs are optimised with tighter permits at sites that either contribute the most phosphorus or are best able to reduce existing contributions. This reduces the overall phosphorus entering the catchment without having to build additional treatment processes at a larger number of WRCs and delivers the greatest length of river improved by phosphorus reductions at sites throughout the catchment.

Brinkworth Brook phosphorus offsetting project

The Brinkworth Brook phosphorus offsetting project runs from 2018 to 2023 and aims to reduce phosphorus entering the Brook from agricultural sources by 300kg phosphorus/ year by 2022/23. Halfway through the project, Wessex Water funding has resulted in approximately 150 kg/year less phosphorus entering the brook. More than 70 farmers from across the 5,800ha catchment have engaged in the project to date, typically by attending events or receiving one-to-one advice visits from our nutrient and soil management specialists.

Types of measure promoted to farmers for reducing soil and nutrient loss include growing overwinter cover crops, subsoiling to improve water infiltration, exclusion of livestock from watercourses (with over 6km of fencing grants approved to date), farm track upgrades to reduce soil and manure run-off and farmyard infrastructure improvements to reduce dirty water runoff. A major focus has also been given to funding nature-based solutions such as creation of buffer strips, wetlands and woodlands and reversion of arable fields to low input pasture. Improved manure management on cattle farms is actively encouraged and a slurry transport scheme is due to be piloted in early 2021 to facilitate export of slurry from dairy farms with a surplus of soil phosphorus to nearby arable farms which have a deficit.

Sewage treatment and sewerage networks

48 major schemes were completed during AMP6 (2015-20), including:

- Flood alleviation schemes in Trowbridge, Bristol, Westerleigh, Bowerleaze, Melksham, Berkeley, Midsomer Norton and Lower Stanton St Quintin.
- Increased capacity in sewer networks to accommodate development, notably the Trym and Frome Valley Relief Sewers.
- Phosphorus removal installed at 10 WRCs.
- Expansion or improvements at five further WRCs (Saltford, Blagdon, Grittleton, Kilmersdon and Wanstrow).

Water supply

We have a rolling programme of business-as-usual maintenance at a number of our water treatment centres and distribution sites in the area as well as ongoing improvements to service new development, improve the resilience and reduce leakage.

Environmental investment

At Cromhall WRC we have invested £2 million to construct the first wetland in England to provide permitted tertiary treatment for phosphorus removal from a rural WRC. Completed in early 2020, this is a demonstration of our approach to deliver nature-based solutions. Working with three PhD studentships (Universities of Bath and Bristol) the wetland will be monitored over AMP7 (2020-2025) to assess how effectively it removes nutrients and its wider benefits, for example to wildlife.

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Environmental investigations

We completed 11 investigations between 2010 and 2020, including:

- **Sand Bay and Clevedon Bathing Waters** - bathing water investigations to understand the influence of our discharges on bathing water quality.
- **Water quality in the Tickenham, Nailsea and Kenn Moors SSSI** - understanding the causes of water quality problems in the SSSI.
- **Water quality in Blagdon Lake** - assessed the impact of our WRCs upstream of the lake and the Congresbury Yeo immediately downstream.
- **Hydrology of the Maiden Bradley Brook** - understanding the effects of our abstraction on the river ecology of the brook.
- **Biss Brook abstraction impact** - understanding the impacts of groundwater abstraction to determine whether this contributes to Water Framework Directive (WFD) failures
- **Chemical and phosphorus removals trial Bowerhill and Devizes WRC** - trialling new treatment processes to remove phosphorus and chemicals from sewage effluent.
- **Hydrology of the Malmesbury Avon -** river flow and groundwater monitoring in the Malmesbury Avon and By Brook to assess the effects of water abstraction
- **Collaborative public health project** - we led a project in Bath and North East Somerset Council to investigate sustainable options for reducing the amount of pharmaceuticals in the environment.
- **Water quality in the Bristol Avon catchment** - understanding the effects of our WRCs and other assets on water quality (phosphorus and nitrogen).

Streamclean team

Tackling sewerage misconnections across the catchment.

Biodiversity Partners Programme

Provided more than £185,000 funding to projects in the region since 1998, including:

- Water Voles & Crayfish project (1998-2006 with Avon Wildlife Trust).
- St Catherine's Valley project (2006-2010 with Avon Wildlife Trust).
- Avon Pond Project (2006-2010 with Avon Wildlife Trust).
- North Somerset Levels and Moors Restoration Project (2015-2020 led by Avon Wildlife Trust).
- Sherston River Improvement and Marvellous Marden Projects (both 2015 with Bristol Avon Rivers Trust).
- Bring back the Buttercup (2015 with South Gloucestershire Biodiversity Action Group).
- Riparian Habitat Enhancement Project (2015 with Bristol Zoological Society).

Conservation Access and Recreation

Fifteen projects delivering improvements for biodiversity and access on our sites, including: tree and bat roost assessments; management of woodland, improvements to Public Rights of Way and visitor interpretation.

Bristol Avon Catchment Partnership

We co-host the Bristol Avon Catchment Partnership (with West of England Rural Network from 2020, and prior to that Bristol Avon Rivers Trust) and provide £80k annual funding, including hosting the roles of the catchment co-ordinator, support officer and independent Chair.

PLANNED INVESTMENT 2020-2025

In addition to ongoing expenditure on our waste and water supply treatment and network assets, our business plan sets out the following key expenditure:

Phosphorus removal

New or additional phosphorus removal at the following WRCs:

Site	Installation Year	Approximate Cost (£)	Approximate Phosphorous removed (kg/yr)
Blagdon	2024	4,000	900
Charfield	2024	1,100	3,100
Leyhill	2024	850	500
North Nibley	2024	850	700
Radstock	2021	2,000	11,700 (additional 800)
Rode	2021	1,800	300
Rowde	2021	3,500	2,500
Trowbridge	2021	3,650	28,700 (additional 2,000)
Ubley	2024	4,000	1,000
Wickwar	2024	1,500	700
Wotton under Edge	2024	1,000	2,200
Wrington	2024	2,250	2,100

Under normal flow conditions, Ubley WRC currently discharges via a pipeline to downstream of Blagdon Lake. Under storm conditions, the site has a permitted discharge of dilute storm spills into the lake. This AMP, we will be laying a new pipeline sized to take the vast majority of flows, effectively removing Ubley's discharge into Blagdon Lake (except for extreme storm events).

Sewage treatment and sewerage networks

Expansion or improvements at a further 13 WRCs, including:

- Flow capacity improvements at Avonmouth, Lacock, Saltford (Bath) and Compton Bassett WRCs.
- Additional stormwater storage at Doynton, Leigh on Mendip, Shoscombe, and Wellow WRCs.

Improvements to sewerage assets, including:

- Major maintenance at five sewage pumping stations - Twerton, Bristol (Ashton Avenue and Dalby Avenue), Bishop Sutton and Kingston.
- Major maintenance at five storm overflows – Watleys End, Monkton Combe, Bath, Willsbridge and Bradford on Avon.
- As of November 2020, nine storm overflows will be investigated as they are categorised as frequently operating overflows, and cost benefit assessments and/or improvements will be undertaken at these sites
- Enhancement of the sewer network to accommodate growth in North Bristol, Corsham, Harry Stoke (Bristol) and Trowbridge.

Environmental investigations

- Invasive non-native species (biosecurity improvements) at Backwell Lake and Monkswood Reservoir and at our largest WRCs including Avonmouth and Saltford.
- Invasive non-native species (raw water transfer risk assessment) at Limpley Stoke.
- Working with landowners and farmers to reduce nitrate losses and identify opportunities for biodiversity improvements in the Drinking Water Protection Areas at our Cherhill, Goodshill and Divers Bridge sources.
- Somer Valley Rediscovered, the umbrella partnership project which is delivering our Innovative Pathway Control investigation to assess options for social prescribing to reduce concentrations of pharmaceuticals in sewage, working with B&NES, Natural England and the University of Bath.
- Middle Bristol Avon investigation, understanding the effect of our groundwater abstractions between Chippenham and Trowbridge on the WFD status of the Avon and tributaries in the area.
- Cotswold Scarp Slope investigation, to determine the effect of groundwater abstraction for stream support on the WFD status of watercourses flowing into the Severn Vale.
- Nailsea partnership project, contributing to a partnership project addressing pollution from urban surface water drainage to the Tickenham, Nailsea and Kenn Moor SSSI.
- Cromhall WRC wetland monitoring, to determine the water quality and biodiversity benefits of the wetland. This includes investigating emerging contaminants and pathogen reduction, as well as nutrients.
- Chemical Investigations Phase 3, working with other water companies to improve understanding of WRCs discharging to coastal and transitional water bodies, reduce uncertainties with regards to specific substances and the effectiveness of removal processes and emerging issues such as microplastics and antimicrobial resistance.
- Clevedon Beach bathing water ambition investigation, identifying the improvements required to our assets to achieve Excellent status at Clevedon Beach bathing water.
- Assessing the environmental benefits delivered through the Catchment Permitting approach
- Inland bathing water investigation, working with stakeholders around a proposed inland bathing water near Bath to assess the current status of the river against public health criteria and understand the potential impact of our assets on the area

Catchment market

We are working with Avon Wildlife Trust and Wiltshire Wildlife Trust to develop a catchment market within the Bristol Avon catchment. This will look at developing and stimulating investment into a trading system for carbon, biodiversity, nutrient and flood risk credits. It is likely to centre on woodland planting within the catchment.

Biodiversity and partnership funding

Wessex Water Foundation's Partners Programme is supporting two projects in the catchment:

- A Better Biss Approach, with Wiltshire Wildlife Trust (£20,000 per year).
- Wilder Waterways, with Avon Wildlife Trust and Bristol Avon Rivers Trust (£15,000 per year).

In addition, Wessex Water is also supporting the West of England Nature Partnership (£10,000 per year), Bath and North East Somerset Council Waterspace study (£3,750 per year) and Wiltshire Wildlife Trust Nature Recovery Network (£10,000 per year).

The following projects will be undertaken across the Wessex Water region but are likely to include sites within the Bristol Avon:

- Maximising opportunities for birds at our water recycling centres.
- Priority habitat restoration and recreation.

Cromhall WRC wetland

FIND OUT MORE

You can access more information about our work in the Bristol Avon catchments on our website – wessexwater.co.uk/environment

- Use our interactive investigations map to download more information on each investigation.
- Read more about our catchment management work.
- Find out about our Drainage and Wastewater Management Plans including the location and frequency of operation of our storm overflows.
- View sample results and flow data from our water recycling centres on our Marketplace website.
- Read our business plan for details of our investments over AMP7 (2020-2025).

wessexwater.co.uk

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Bristol Avon Risk based catchment screening (RBCS) outputs
The RBCS stage screened each WRC catchment against 18 indicators. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5. Table 51 provides a summary of the RBCS for the Bristol Avon.

Of the 122 level 2 catchments in the Bristol Avon catchment, 83 had some risk in them and proceed to BRAVA stage. The 39 catchments that did not proceed were all small (<2000pe) in size, and in total 9,221 pe.

Table 51: Bristol Avon RBCS output summary

Indicator	No. level 2 catchments with RBCS risk identified
Catchment Characterisation (Tier 2)	41
Bathing or shellfish waters	2
Discharge to sensitive waters (part A)	3
Discharge to sensitive receiving (part B) (Tier 2)	0
SOAF	27
CAF	4
Internal Sewer Flooding	30
External Sewer Flooding	43
Pollution Incidents	34
WwTW Q compliance	0
WwTW DWF compliance	4
Storm overflows	36
Other RMA systems	10
Planned residential development	32
WINEP	37
Sewer Collapses	51
Sewer Blockages	102
Groundwater (bespoke indicator)	11
Number of Indicators Breached*	314
Proceed to BRAVA?	83

*Excluding Blockage & Collapse

Figure 137: Example showing the evidence we performed this calculation at level 3 (see website for readable results)

Level 1 Company Name	Level 2 Strategic Planning Area	Ref	Name	Total Population Equivalent (Per APR Table 4S Line 16)	Number of Indicators Breached (Excl Blockage & Collapse)	Proceed to BRAVA?	Data Baseline	Analysis Date	potential modelling exclusion	LLFA
Wessex	Bristol Avon	27273	ALDERTON STW CATCHMENT	89	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23006	ALMONDSBURY STW CATCHMENT	2,958	2	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23007	ALVESTON STW CATCHMENT	2,453	2	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	27297	ASHWICKE STW CATCHMENT	7	0	No	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23012	AUST STW CATCHMENT	823	0	No	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23013	AVONMOUTH STW CATCHMENT	820,497	12	Yes	31/03/2021	03/12/2021	No	CITY OF BRISTOL
Wessex	Bristol Avon	23016	BATH STW CATCHMENT	125,932	9	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23017	BECKINGTON STW CATCHMENT	1,193	3	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23020	BEWLEY STW CATCHMENT	129	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23025	BLAGDON STW CATCHMENT	1,071	2	Yes	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23028	BOWERHILL STW CATCHMENT	9,669	5	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23029	BOX STW CATCHMENT	2,525	4	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23031	BRADFORD ON AVON STW CATCHMENT	12,232	7	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23035	BRINKWORTH STW CATCHMENT	905	1	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23041	BURTON STW CATCHMENT	284	1	Yes	31/03/2021	03/12/2021	Yes	WILTSHIRE
Wessex	Bristol Avon	29509	BUSHTON STW CATCHMENT	67	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23042	BUTCOMBE STW CATCHMENT	117	2	Yes	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23044	CALNE STW CATCHMENT	22,025	5	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23045	CAM VALLEY STW CATCHMENT	8,323	5	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23054	CHARFIELD STW CATCHMENT	4,659	3	Yes	31/03/2021	03/12/2021	No	GLOUCESTERSHIRE COUNTY
Wessex	Bristol Avon	23058	CHEW STOKE STW CATCHMENT	8,373	6	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23059	CHEWTON KEYNSHAM STW CATCHMENT	9	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23061	CHILCOMPTON STW CATCHMENT	2,092	3	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23064	CHIPPENHAM STW CATCHMENT	42,987	7	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23068	COLD ASHTON STW CATCHMENT	95	0	No	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23069	COLEFORD STW CATCHMENT	2,273	4	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23070	COLERNE STW CATCHMENT	2,690	2	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23075	COMPTON BASSETT STW CATCHMENT	5,146	6	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23076	COMPTON DANDO STW CATCHMENT	479	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23390	CORSLEY HEATH STW CATCHMENT	41	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23083	CRANMORE STW CATCHMENT	427	0	No	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23086	CROMHALL STW CATCHMENT	1,912	7	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23378	DALLESTON STW CATCHMENT	57	0	No	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23090	DEVIZES STW CATCHMENT	15,081	5	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23091	DIDMARTON STW CATCHMENT	638	1	Yes	31/03/2021	03/12/2021	No	GLOUCESTERSHIRE COUNTY
Wessex	Bristol Avon	23092	DILTON MARSH STW CATCHMENT	1,845	3	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23100	DOYNTON STW CATCHMENT	264	1	Yes	31/03/2021	03/12/2021	Yes	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23103	DUNDRY STW CATCHMENT	92	0	No	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23106	EAST HARPTREE STW CATCHMENT	427	1	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23113	EDFORD STW CATCHMENT	1,841	2	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23115	ENGLISHCOMBE STW CATCHMENT	54	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23116	ERLESTOKE STW CATCHMENT	1,198	1	Yes	31/03/2021	03/12/2021	Yes	WILTSHIRE
Wessex	Bristol Avon	23121	FARMBOROUGH STW CATCHMENT	1,212	1	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23130	FRESHFORD STW CATCHMENT	1,555	1	Yes	31/03/2021	03/12/2021	Yes	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23131	FROME STW CATCHMENT	36,112	9	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23136	GREAT BADMINTON STW CATCHMENT	698	2	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23137	GREAT SOMERFORD STW CATCHMENT	983	2	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23148	HILMARTON STW CATCHMENT	582	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23150	HINTON BLEWETT STW CATCHMENT	165	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23157	HULLAVINGTON STW CATCHMENT	1,376	2	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23164	KEEVIL STW CATCHMENT	3,919	2	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23165	KEYNSHAM STW CATCHMENT	23,490	8	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23171	KINGSTON SEYMOUR STW CATCHMENT	60,126	8	Yes	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23173	LACOCK STW CATCHMENT	758	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23026	LANSDOWN STW CATCHMENT	9	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23177	LAVINGTON WOODBRIDGE STW CATCHMENT	4,501	6	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23178	LEIGH ON MENDIP STW CATCHMENT	495	0	No	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23112	LEYHILL STW CATCHMENT	1,331	1	Yes	31/03/2021	03/12/2021	Yes	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23180	LONG DEAN STW CATCHMENT	1,193	3	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23184	LUCKINGTON STW CATCHMENT	368	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23185	LULSGATE DOWNSIDE STW CATCHMENT	120	0	No	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23522	LYNEHAM STW CATCHMENT	5,802	4	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23193	MALMESBURY STW CATCHMENT	12,939	9	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23200	MARSHFIELD STW CATCHMENT	1,742	3	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23204	MELKSHAM STW CATCHMENT	20,542	7	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23205	MELLS STW CATCHMENT	344	1	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23209	MICHAELWOOD STW CATCHMENT	2,969	4	Yes	31/03/2021	03/12/2021	No	GLOUCESTERSHIRE COUNTY
Wessex	Bristol Avon	23213	MILE ELM STW CATCHMENT	87	1	Yes	31/03/2021	03/12/2021	Yes	WILTSHIRE
Wessex	Bristol Avon	23217	MOORLEDGE STW CATCHMENT	35	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23218	NEMPNETT THRUBWELL STW CATCHMENT	16	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23222	NORTH NIBLEY STW CATCHMENT	743	1	Yes	31/03/2021	03/12/2021	No	GLOUCESTERSHIRE COUNTY
Wessex	Bristol Avon	23224	NORTH STOKE STW CATCHMENT	2	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23512	NORTH WRAXALL STW CATCHMENT	21	0	No	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23225	NORTON MALREWARD STW CATCHMENT	66	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23226	NORTON ST PHILIP STW CATCHMENT	1,361	1	Yes	31/03/2021	03/12/2021	Yes	SOMERSET COUNTY
Wessex	Bristol Avon	23227	NUNNEY STW CATCHMENT	1,273	3	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23229	OAKHILL STW CATCHMENT	1,458	3	Yes	31/03/2021	03/12/2021	No	SOMERSET COUNTY
Wessex	Bristol Avon	23234	PARKFIELD STW CATCHMENT	144	0	No	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23235	PAULTON STW CATCHMENT	12,300	8	Yes	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23243	PORTBURY WHARF STW CATCHMENT	35,316	4	Yes	31/03/2021	03/12/2021	No	NORTH SOMERSET
Wessex	Bristol Avon	23244	POTTERNE STW CATCHMENT	13,375	6	Yes	31/03/2021	03/12/2021	No	WILTSHIRE
Wessex	Bristol Avon	23247	PRISTON STW CATCHMENT	175	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET
Wessex	Bristol Avon	23248	PUCKLECHURCH STW CATCHMENT	3,165	6	Yes	31/03/2021	03/12/2021	No	SOUTH GLOUCESTERSHIRE
Wessex	Bristol Avon	23251	QUEEN CHARLTON STW CATCHMENT	9	0	No	31/03/2021	03/12/2021	No	BATH AND NORTH EAST SOMERSET

Bristol Avon BRAVA outputs

The BRAVA stage looks at the risk now and in the future for the common planning objectives. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5.

Table 52 provides a summary. The planning objectives at the top of the table are risk based. A score of 0 indicate not a significant risk (yellow), score of 1 some risk (light blue) and a score of 2 (dark blue) if there is or will be a significant risk.

The bottom four bespoke performance commitments are activity-based planning objectives. A score of 0 indicate no significant work risk (light green), score of 1 some activity (green) and a score of 2 (dark green) if there is significant planned. The future planning objective scores for the have been made ‘n/a’. This is because performance in these areas depend on the levels of ambition in these areas. We await feedback from our draft consultation, to see if the core level of planning is preferred or whether we can go to the unconstrained targets.

Table 52: BRAVA results for Bristol Avon

Bristol Avon	2025 score	2030 Score	2035 Score	2050 Score
Common - Internal Sewer Flooding Risk	0	0	0	0
Common - Pollution Risk	0	0	0	0
Common - Sewer Collapse Risk	0	0	0	1
Bespoke - Blockages Risk	0	0	0	0
Common - Risk of Sewer Flooding in a 1 in 50-year storm	0	0	0	0
Common - Storm Overflow performance	1	1	1	1
Common - Risk of WwTW Quality Compliance Failure	0	0	0	1
Bespoke - WwTW Flow Compliance Performance	0	1	1	2
Bespoke - Groundwater improved	1	n/a	n/a	n/a
Bespoke - Sustainable drainage	1	n/a	n/a	n/a
Bespoke - Waterbodies improved	1	n/a	n/a	n/a
Bespoke - Partnership working	2	n/a	n/a	n/a

Storm overflow improvements

Table 53 summarises coastal and inland storm overflow sites in the Bristol Avon that may need improvement in 2025 to 2035.

Table 53: Storm overflows that may need improvement by 2035

Reasons for potential improvement	Number of storm overflow
Bathing water	5
Shellfish waters	0
RNAG	66
Chalk stream	0

Bristol Avon feasible options

The screening of generic options through the ODA process identified various combinations of ‘feasible options’ to deliver required solutions. Different blends of these options may be applied across the Bristol Avon catchment.

The feasible options selected for the Bristol Avon catchment are as follows:

- **Customer management:** domestic and business customer education.
- **Surface water management:** source control, pathway measures and separating flows.
- **Combined foul and sewer systems:** intelligent network operation, increased capacity of networks, wastewater transfers, groundwater infiltration reduction and attenuation.
- **Wastewater treatment:** treatment at overflows, increasing capacity (through both grey and green solutions), rationalisation and catchment management.
- **Indirect measures:** influencing policy, investigating, and monitoring.

Given the high level, strategic assessment of options selected through the DWMP process, specific detail of option combinations will not be confirmed until detailed design is undertaken (outside the scope of the DWMP).

Best value considerations were considered throughout the ODA screening process to derive feasible options that formed the unconstrained DWMP. This was then subject to optimisation through the programme appraisal to inform different DWMP scenarios for the Draft Plan. The findings from the consultation informed the core plan that was submitted as part of the Final DWMP. The drainage strategies have been updated to reflect the core plan which outlines our short-, medium- and long-term investment requirements.

Adaptive pathways

Two catchments within the Bristol Avon were identified in the problem characterisation stage as requiring complex options development and appraisal. These included Avonmouth and Bath. The adaptive pathways developed for the unconstrained plan are outlined below.

Bristol Avon adaptive pathways for the unconstrained plan

The adaptive pathways for the unconstrained plan for the Avonmouth catchment show an increase in risks from flooding and storm overflows over the next 25 years, with significant increases when climate change is applied. Adaptation pathways form an effective planning approach to respond to uncertainties and are sequences of potential actions that can be implemented as conditions evolve in response to climate change risks. This helps to develop flexible planning for multiple features, identify which short-term decisions could limit future adaptation and assist in the identification of interested parties.

The model was assessed at the following planning horizons (shown in the Table 54):
• 2035
• 2050

The uncertainties that were considered were:
• Population growth
• Urban creep
• Rainfall intensity
• Sea level
• Per capita consumption (PCC) and trade-flow.

Table 54: Adaptive planning scenarios used for the Avonmouth complex catchment ODA

	Scenario	Rainfall (%)	Imp area (yrs)	Sea level (m)	PE	PCC & trade (%)
	2035 low	0	0	0.12	809 451	-10
A	2035 Med	10	5	0.2	835 750	-10
	2035 High	20	10	0.28	862 050	0
	2050 Low	14	5	0.15	816 330	-30
B	2050 Med	20	10	0.27	845 578	-10
C	2050 High	35	15	0.39	874 826	0

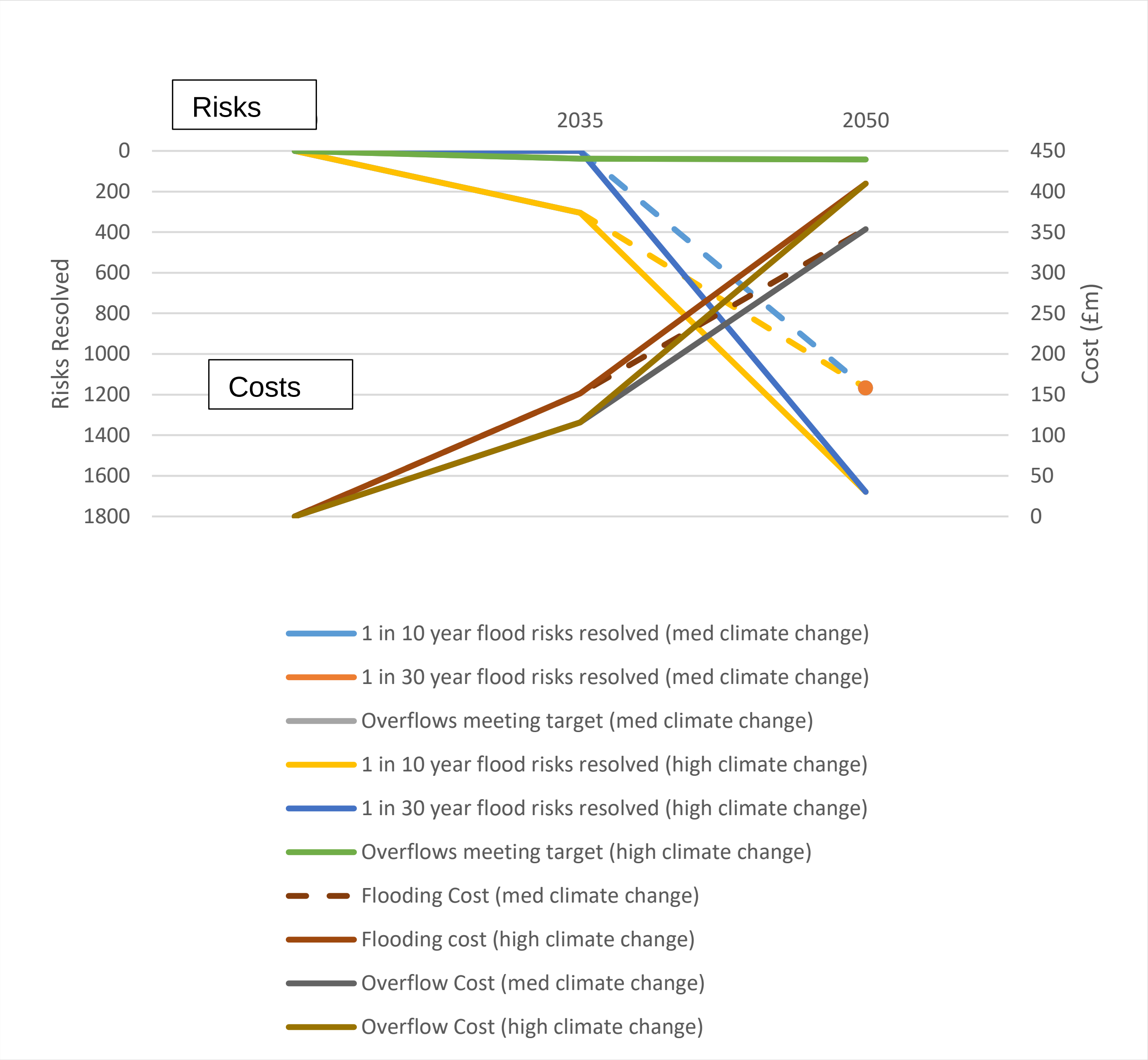
Each planning horizon had low, medium and high estimates of the uncertain changes, generating 6 scenarios. Given the time constraints of Cycle 1 of the DWMP two extreme scenarios (2035 Medium “Scenario A” and 2050 High “Scenario C”) and an intermediate 2050 Medium “Scenario B” of the uncertainty changes, were selected (three total) and formed the Adaptation pathways (shown in the figure below).

The adaptive pathway for the Avonmouth catchment (Figure 138) which serves Bristol and parts of South Gloucestershire is predicted to experience 304 significant flooding locations and 38 overflows to break triggers by 2035 (Scenario A - see table) which will cost £267m to resolve.

In a medium climate change scenario, by 2050 (Scenario B), the number of significant flooding locations increases to 1167 and the number of overflows to 42. This is expected to cost £354m to resolve.

In a high climate change scenario, by 2050 (Scenario C) the number of significant flooding locations increases to 1679 and the number of overflows remains at 42. This is expected to cost £410m to resolve.

Figure 138: Adaptive Pathways - Bristol (Avonmouth Catchment)



Bath adaptive pathway – unconstrained plan

The adaptive pathway for Bath proposed a series of phased strategic measures that would be required to increase resilience of the drainage and wastewater network to predicted storm overflow operation and flooding. For an unconstrained plan, this could be achieved with a design and delivery programme spanning more eight years (shown in Table 55).

Table 55: Adaptive planning Bath strategic phased approach

It is recognised that given uncertainties regarding storm overflows and their impact to the water quality, further understanding is initially required to provide a sound evidence base. We will look to achieve this through an Urban Pollution Management (UPM) study in AMP 8. This will assist with informed decisions regarding further development of strategic measures which promote best value, lowest cost solutions.

There is also the opportunity to align the adaptive planning for the DWMP with other strategic plans being developed and promoted by BaNES and the EA. The programme appraisal is likely to extend timing of the delivery of these measures over a longer timescale to reduce impact on customer bills to help deliver an affordable plan.

Bristol Avon partnership working

Partnership priority locations within the Level 2 Bristol Avon Catchment have been identified by stakeholders. It is expected that approximately 14 partnership projects in this area could be developed as candidates for consideration within the PR24 Business Plan.

Partnership funding or contributions from other stakeholders will be required for partnership projects to progress. It should be highlighted that projects identified in the DWMP are not guaranteed funding through the PR24 business plan. Where funding is secured, the partnership projects have the potential to deliver a range of outcomes dependent on the project maturity. The project lead for partnership projects will be assessed individually.

Work could include:
- further development and improvement in our understanding of risk, impact and interconnections of different drainage infrastructure.
- investigate resilience improvements to drainage and wastewater infrastructure to align with other strategic capital schemes and adaptive pathways.
- Progress design and delivery of collaborative schemes.

Annex B. Level 2 assessment – Somerset

This annex provides level 2 detail for the Somerset catchments.

It starts by introducing the catchment and level of investment identified within the core plan for the Somerset catchments.

Later sections in this annex include:

- catchment factsheets (Figure 139 and Figure 140)
- level 2 detail of the DWMP stages, such as the RBCS and BRAVA results
- an indication of the level of enhancement investment that is required
- an indication of storm overflows improvements
- example of adaptive pathways for flooding
- the latest partnership working schemes.

Somerset introduction
The population of the Somerset catchment is 811,797 pe (domestic and commercial flow equivalent). We anticipate this will increase to 920,437 pe by 2050.

There are 310 storm overflows in the Somerset catchment. These will need investment as will the 155 WRCs. The core plan proposes £1.5bn is invested in the Somerset catchment by 2050 to enhance the drainage and wastewater. That is £60m per year on average.

We upgraded our WRCs for phosphorous removal before 2020 and continue to operate these. In 2020-2025 there is one large nutrient improvement scheme. We are also working closely with farmers to reduce levels of phosphorous from their land management.

Nutrient neutrality is a concern in the Somerset catchment, so we have included details of our WRC phosphorus in the DWMP portal to assist developers.

Following the levels and moors floods of 2014, the EA are designing the Bridgwater barrier to better protect the area from coastal flooding.

Also see the Somerset partnership website[65].

More details are provided in the factsheets below.

This section starts by summarising the investments already made within the Somerset catchment area an planned for delivery by 2025 (Figure 139) before setting out the scale of investment proposed at a Level 2, with an overview of the options that will be considered as part of the detailed design if funding is secured in PR24.

Somerset factsheet
See overleaf.

Figure 139: Somerset catchment factsheet detailing investments made and planned for completion by 2025

SOMERSET CATCHMENTS – THE FACTS

Within the county of Somerset, we operate in several major hydrological catchments:

- The Parrett catchment.
- The Tone catchment.
- The West Somerset Coastal Streams catchment.
- The Bristol Avon, Brue and Axe catchments and the headwaters of the Otter and Stour catchments.

KEY ISSUES

Sewage treatment

Within the Somerset Catchment Partnership area, we operate 155 Water Recycling Centres (WRC, formerly known as sewage treatment works), 601 Sewage Pumping Stations and 311 Storm Overflows (SO).

Nutrients

One of the main issues to affect the Somerset catchments is the impact of nutrients in rivers and wetlands. This is primarily from phosphorus, although nitrogen can also have an effect particularly around our coasts and estuaries. Phosphorus causes eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands and is a particular problem for protected sites in the Somerset Levels.

Bathing waters

It is important to protect bathing water quality for recreational users of our seas and some inland waters. Water quality around the Somerset coast is affected by many factors, including our own discharges from treatment works and SOs, but also by diffuse pollution in river catchments upstream of bathing waters.

We have invested in upgrading our sewerage and sewage treatment infrastructure at various locations to improve bathing waters by:

- increasing storage in our network (to reduce the number of discharges from SOs)
- installing ultraviolet treatment to improve the quality of our discharges
- installing monitoring equipment so that we understand when our SOs operate.

For example, at Burnham-on-Sea in 2019 we completed a £39 million scheme to upgrade infrastructure around the mouth of the River Parrett and in Bridgwater to help improve the bathing water quality of Burnham Jetty.

Water supply

Within the catchment, we operate 11 water treatment centres and nearly 200 distribution sites (including 10 large surface reservoirs).

Pesticides and source protection

Land upstream of our large surface reservoirs has been designated as drinking water safeguard zones by the Environment Agency. Within these areas, certain substances must be managed carefully to prevent the pollution of the raw water sources (including fertilisers and pesticides).

We work with farmers in these zones to:

- raise awareness of surface water quality issues
- share results of water, soil, crop and manure testing that we have carried out for them
- provide advice and information
- compensate farmers (where appropriate) for adopting more water friendly alternative practices (such as buffer strips).

In AMP7 (2020-2025), we will extend our work with farmers in the River Tone catchment upstream of the abstraction point for Durleigh Water Treatment Centre to reduce pesticide runoff from agricultural land.

Key investments completed to 2020

Nutrients

By the end of AMP6 (2020) we have installed phosphorus removal at:

Site	Approximate cost (£k)	Year	Approximate Phosphorus removed (tonnes/year)
Pilton	700	2020	0.2
Bruton	850	2020	1.1
Ilton	800	2020	0
Thornford	2,000	2020	0.9
Sparkford	750	2020	0.4
Ilchester	700	2020	0.5
Taunton	2,850	2019	44.3
Wellington	1,150	2018	4.1
Yeovil	3,700	2014	19.6
Sherborne	1,400	2014	4.1
Wells	1,000	2014	7.8
Shepton Mallet	3,800	2013	5.1
Evercreech	1,400	2014	2.3
Glastonbury	2,000	2015	7.1

Environmental investment

- **Durleigh Wetlands Project** - in 2019 we completed construction of a new large-scale wetland (at an approximate cost of £1 million) upstream of our reservoir at Durleigh (Bridgwater) to remove heavy suspended sediments in the water entering the reservoir and prevent it silting up. We also improved habitats in the Durleigh Brook and reverted eight hectares of arable land to biodiversity grassland.
- **Sutton Bingham, Durleigh, Ashford, Hawkridge, Leigh and Luxhay Catchment Biodiversity Projects** - we mapped priority habitats for wildlife within these catchments and provide advice and funding to landowners to make biodiversity improvements alongside steps to reduce risk of pollution.
- **Biodiversity Partners Programme** - provided more than £280,000 to projects within Somerset since 1998, including:
  - Somerset Floodplain & Catchment Woodland project (2010-2015 with FWAG SW)
  - Parrett Rivers Project (2002-2006 with Somerset Wildlife Trust & FWAG SW)
  - Somerset Biodiversity Partnership (2010-2015)
  - Ham Wall Reedbed (1998-2006, with the RSPB)
  - Westhay Reedbed and Heath (1998-2002, with Somerset Wildlife Trust)
  - Resource protection in the Parrett Catchment (2006-2010 with FWAG SW)
  - Brue Valley Living Landscapes Project (2006-2010 with Somerset Wildlife Trust)

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- Rewe Mead Nature Reserve Improvement Project and Blackwater & Brown hairstreaks projects (2015-2018, with Somerset Wildlife Trust)
- **Conservation, Access and Recreation** - 26 projects delivering improvements for biodiversity and access on our sites, including: tree and bat roost assessments; management of woodland and scheduled ancient monuments; enabling beaver trials on the headwaters of the River Otter; improved visitor interpretation.
- **Streamclean team** - tackling sewerage misconnections.

24 investigations completed 2010-2020:

- **Lam Brook** - evaluating the impacts of our abstractions on the stream.
- **Cannington Stream, River Tone, Durleigh Brook, River Tone & Yeo and Sutton Bingham Stream** - investigations into impacts associated with our reservoirs on these watercourses (including ecology) and implementation of measures to improve environmental quality at some locations.
- **Minehead, Burnham-on-Sea and Weston-super-Mare** - bathing water investigations to understand the influence of our discharges on bathing water quality.
- **South & West Wessex Catchments** - understanding phosphorus levels from our discharges on the receiving environment and also affecting our assets.
- **Sutton Bingham, Clatworthy and Durleigh** - quantifying risk from grazing livestock around reservoirs as a potential option for managing grassland for biodiversity.
- **Somerton WRC** - investigation to discover the effectiveness of reed beds for sewage treatment and nutrient removal at Somerton WRC, and more widely at WRCs discharging to the Somerset Levels and Moors.
- **Nutscale, Clatworthy, Hele Bridge, River Yeo, Hawkridge, Durleigh, Ashford, Bridgwater and Currypool** - eel investigations.

Somerset Catchment Partnership

We have supported the Somerset Catchment Partnership since its inception and provide £10,000 annual funding.

Planned investment 2020-2025

In addition to ongoing expenditure on our waste and water supply treatment and network assets, our business plan sets out the following key expenditure:

New phosphorus removal

Site	Approx Phosphorus removed (at 2020) (tonnes/year)	Additional Phosphorus removed by 2024 (tonnes/year)	Approximate Cost (£m)
Brue & Axe			
Upper Brue	2.3	0.6	8
Lower Brue	7.1	2.9	
Sheppey	12.9	5.6	
West Somerset Coastal Streams			
Stogursey Brook		0.4	0.8
Parrett			
Cary		6.0	44
Isle, Fivehead and West Sedgemoor		15.6	
Lower Parrett		3.5	
Lower Parrett Western Streams		1.5	
Parrett Headwaters		14.4	
Yeo	25.5	14.5	
Parrett (Tone)			
Lower Tone	55.8		4
Northern Tone		3.7	
Upper Tone	4.1	1.4	
Total	**107.7**	**70.1**	**56.8**

Catchment nutrients

- **Catchment nutrient balancing** - within parts of the River Tone and Parrett catchments, we intend to work with farmers to reduce levels of phosphorus from their land management to balance the need to reduce phosphorus levels from our WRCs. This is a more sustainable and nature-based approach which combines nutrient reduction with other benefits, such as improvements for biodiversity and flooding.
- **Somerset Levels and Moors Wetland** - delivering water quality (nutrients) and biodiversity improvements to nationally and internationally important sites for nature conservation.

Environmental investigations

- **North Petherton WRC** - determine the impact of the WRC on the Petherton Stream.
- **Nitrogen and phosphorus reductions** - Durleigh Reservoir.
- **Invasive non-native species (biosecurity Improvements)** - at Nutscale, Clatworthy, Hawkridge, Currypool, Ashford, Durleigh, Luxhay, Leigh and Sutton Bingham.
- **Invasive non-native species (raw water transfer risk assessments)** - at Albert Street, Currypool, Wimbleball, Hele Bridge and Otterhead.
- **Improvements to assets for Eel Passage** - Clifton Maybank (near Yeovil), Albert Street (Bridgwater).

Biodiversity

The following projects will be undertaken across the Wessex Water region, but are likely to include sites within Somerset:

- Maximising opportunities for birds at our water recycling centres.
- Priority habitat restoration and recreation.

FIND OUT MORE

You can access more information about our work in the Somerset catchments on our website – **wessexwater.co.uk/environment**

- Use our interactive investigations map to download more information on each investigation.
- Read more about our catchment management work.
- Find out about our Drainage and Wastewater Management Plans including the location and frequency of operation of our storm overflows.
- View sample results and flow data from our water recycling centres on our Marketplace website.
- Read our business plan for details of our investments over AMP7 (2020-2025).

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Figure 140: West Somerset coastal streams catchment factsheet detailing investments made and planned for completion by 2025

West Somerset Coastal Streams catchment factsheet

We provide water supply and wastewater treatment services for many of the coastal streams and rivers on the north coast of Somerset which flow into the sea. This includes the Stogursey Brook, Kilve Stream, Doniford Stream, Washford, Avill, Horner and Hawkcombe Streams. The area to the west of Porlock and south of Wheddon Cross is served by South West Water.

Key issues

Sewage treatment

Within the West Somerset catchment, we operate 9 water recycling centres (WRC, formerly known as sewage treatment works), 31 sewage pumping stations (SPS) and over 20 storm overflows (SO).

Nutrients

One of the main issues to affect the West Somerset catchment is the impact of nutrients on its rivers and catchments. This is primarily from phosphorus, although nitrogen can also have an effect. Phosphorus causes eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands and is a particular problem for the streams and rivers in the catchment. Nutrients come from our own sewage assets but also from diffuse sources, such as agricultural and urban run-off.

Storm overflows

We operate over 20 storm overflows in the catchment, many at Water Recycling Centres. In an ideal world we wouldn't have storm overflows at all - they are a legacy from the past. They have always been part of the sewerage network in the UK because the majority of sewers carry both rainwater and foul sewage and they prevent properties from flooding following intense rainfall. We are now getting more intense rainfall due to climate change, which can affect when overflows operate. Under storm conditions, any foul water released from a storm overflow is diluted by large volumes of rainwater. Flows are further diluted by the watercourse as this will also be swollen by the same heavy rain. They are designed in such a way as to avoid adverse environmental impact on the receiving waters.

Although overflows are permitted by the Environment Agency, we agree that they have no place in the 21st century, but it will take time and significant investment to progressively eliminate them.

We are committed to completely eliminating the discharge of untreated sewage, starting with storm overflows that discharge most frequently and those that have any environmental impact. Our Storm Overflows Improvement Plan sets out how we will begin this journey.

Information on how often these assets discharge, and for how long, can be found on our Drainage and Wastewater Management Plan Portal (Managing Drainage and Wastewater, Planning the future (wessexwater.co.uk)).

Our website contains further details on Storm Overflows (Storm overflows (wessexwater.co.uk)) and on our plans for tackling overflows which will be set out in our Drainage and Wastewater Management Plans.

Water supply and resources

Within the catchment, we operate over 30 distribution sites (such as storage reservoirs or pumping stations) with one reservoir.

Environmental investments completed up to 2020

Environmental investigations

- Blue Anchor Bay bathing water - this investigation set out to measure the contribution made by our Water Recycling Centres at Minehead, Watchet and sewerage infrastructure to the bathing water
- Nutscale reservoir water quality - the investigation studied the water quality of the feeder streams within the catchment upstream of the reservoir
- Eels investigation - this considered the degree to which Nutscale Reservoir posed a barrier to Eel passage and whether screens were required at the offtakes

Biodiversity Partners Programme

We have provided support and funding of more than £60,000 to projects working in West Somerset, or more widely within its catchment since 1998, including:

- The Somerset Floodplain & Catchment Woodland project (FWAG SW, 2010-2015)
- Somerset Biodiversity Partnership (Somerset Biodiversity Partnership, 2010-2015)

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West Somerset Coastal Streams catchment factsheet

Planned investment 2020-2025

In addition to ongoing expenditure on our waste and water supply treatment and network assets, our business plan sets out the following key expenditure:

Nutrients

WRC	Permitted Phosphorus Level (mg/l)	Approximate phosphorus removed (kg/yr)
Stogursey	2.1	370

Other investment

In addition to the above, we will also be carrying out the following major projects:

- Major maintenance works at Minehead WRC

Environmental Investigations

- Invasive non-native species (biosecurity improvements) - at Nutscale reservoir
- Bathing Water ambition investigations – identifying the improvements required to our assets to achieve Good and Excellent status at Blue Anchor West, Dunster North West and Minehead Terminus bathing waters.

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Somerset Risk based catchment screening (RBCS) outputs
The RBCS stage screened each WRC catchment against 18 indicators. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5. The Table 56 provides a summary, while outputs are demonstrated in Figure 141.

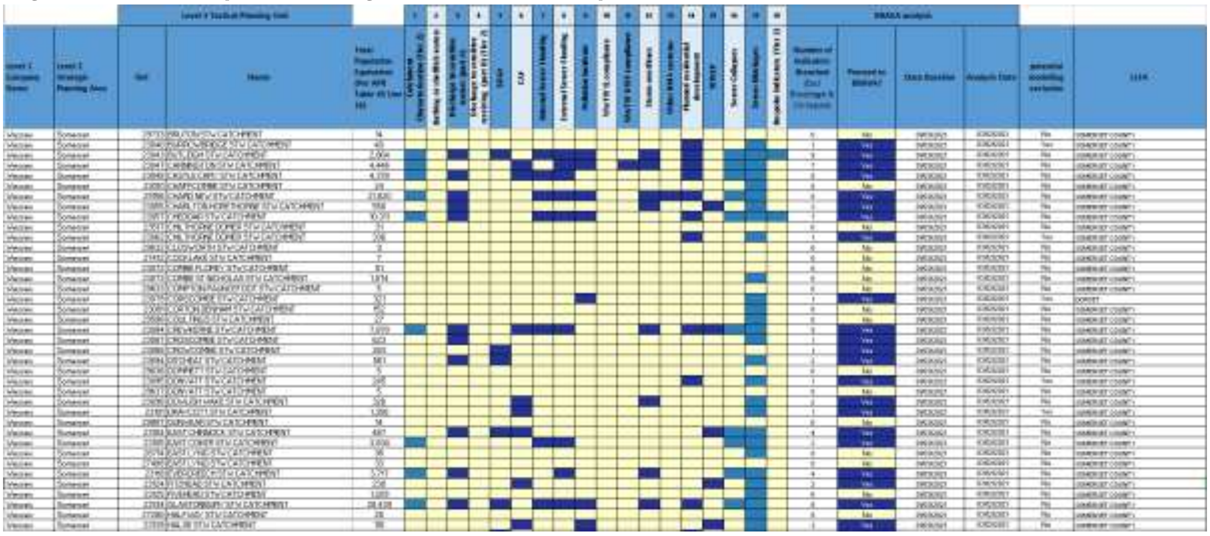
Of the 151 level 2 catchments in the Somerset catchment, 151 had some risk in them and proceed to BRAVA stage. The 65 catchments that did not proceed were all small (<2000pe) in size and in total 7867 pe.

Table 56: Somerset RBCS output summary

Indicator	No. level 2 catchments with RBCS risk identified
Catchment Characterisation (Tier 2)	34
Bathing or shellfish waters	6
Discharge to sensitive waters (part A)	40
Discharge to sensitive receiving (part B) (Tier 2)	0
SOAF	27
CAF	36
Internal Sewer Flooding	28
External Sewer Flooding	34
Pollution Incidents	40
WwTW Q compliance	1
WwTW DWF compliance	6
Storm overflows	35
Other RMA systems	10
Planned residential development	39
WINEP	36
Sewer Collapses	39
Sewer Blockages	81
Groundwater (bespoke indicator)	22
Number of Indicators Breached*	394
Proceed to BRAVA?	86

*Excluding Blockage & Collapse

Figure 141: Example showing the evidence we performed this calculation at level 3



Somerset BRAVA outputs

The BRAVA stage looks at the risk now and in the future for the common planning objectives. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5.

Table 57 provides a summary of the BRAVA outputs. The planning objectives at the top of the table are risk based. A score of 0 indicate not a significant risk (yellow), score of 1 some risk (light blue) and a score of 2 (dark blue) if there is or will be a significant risk.

The bottom four bespoke performance commitments are activity-based planning objectives. A score of 0 indicate no significant work risk (light green), score of 1 some activity (green) and a score of 2 (dark green) if there is significant planned. The future planning objective scores for the have been made 'n/a'. This is because performance in these areas depend on the levels of ambition in these areas. We await feedback from our draft consultation, to see if the core level of planning is preferred or whether we can go to the unconstrained targets.

Table 57: Summary BRAVA results for Somerset

Somerset	2025 score	2030 Score	2035 Score	2050 Score
Common - Internal Sewer Flooding Risk	0	0	0	0
Common- Pollution Risk	0	0	0	0
Common - Sewer Collapse Risk	0	0	1	2
Bespoke - Blockages Risk	0	0	0	0
Common - Risk of Sewer Flooding in a 1 in 50-year storm	0	0	0	1
Common - Storm Overflow performance	0	0	0	0
Common - Risk of WwTW Quality Compliance Failure	0	1	1	2
Bespoke - WwTW Flow Compliance Performance	0	0	0	0
Bespoke - Groundwater improved	1	n/a	n/a	n/a
Bespoke - Sustainable drainage	2	n/a	n/a	n/a
Bespoke - Waterbodies improved	2	n/a	n/a	n/a
Bespoke - Partnership working	2	n/a	n/a	n/a

Somerset Storm overflow improvements
Table 58 summarises coastal and inland storm overflow sites that may need improvement in 2025 to 2035.

Table 58: Storm overflows that may need improvement by 2035

Reasons for potential improvement	Number of storm overflow
Bathing Water	27
Shellfish Water	0
RNAG	9
Chalk stream	0

Somerset feasible options

The screening of generic options through the ODA process identified various combinations of 'feasible options' to deliver required solutions. Different blends of these options may be applied across the Somerset catchments.

The feasible options selected for the Somerset catchments are as follows:
- **Customer management:** domestic and business customer education.
- **Surface water management:** source control, pathway measures and separating flows.
- **Combined foul and sewer systems:** intelligent network operation, increased capacity of networks, wastewater transfers, groundwater infiltration reduction and attenuation.
- **Wastewater treatment:** treatment at overflows, increasing capacity (through both grey and green solutions), rationalisation and catchment management.
- **Indirect measures:** influencing policy, investigating, and monitoring.

Given the high level, strategic assessment of options selected through the DWMP process, specific detail of option combinations will not be confirmed until detailed design is undertaken (this is outside the scope of the DWMP).

Best value considerations were considered throughout the ODA screening process to derive feasible options that formed the draft DWMP. These have been updated for the final DWMP following the consultation.

Taunton adaptive pathway for the unconstrained plan

The DWMP framework identified a need for adaptive planning where appropriate, we have developed different approaches for our complex catchments. The main adaptive variables have been on trigger points (level of protection) and the amount of climate change, growth and urban creep.

We developed an adaptive pathway for the unconstrained plan for Taunton (Figure 142), which shows that the installation of local solutions in the short term would help reduce flooding in a 1 in 10 and 1 in 30-year storm until 2030.

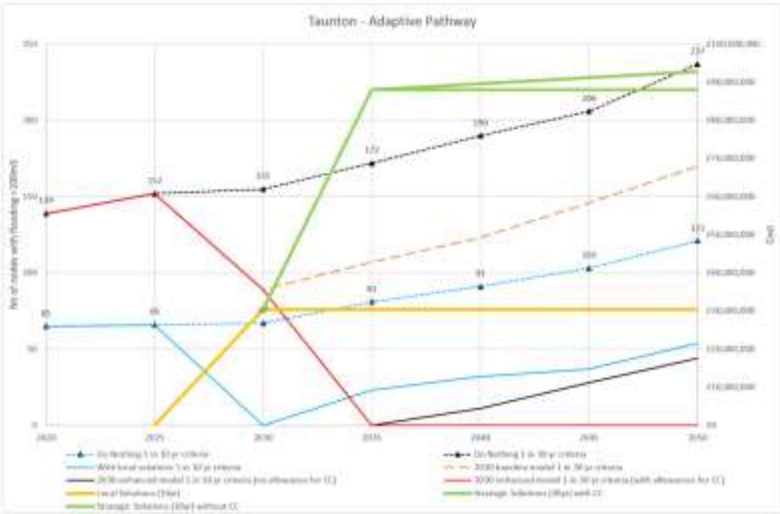
After 2030 a decision point is required in the adaptive planning process. If no further expenditure and a 1 in 30-year design criteria, the number of flooding nodes will steadily increase as shown by the orange line with large dashes.

Between 2030 and 2035 expenditure on a strategic solution (required to meet the 1 in 30-year criteria) is shown in green. This expenditure would reduce the number of flooding nodes to zero by 2035 as shown by the red and black solid lines.

It is recognised that given uncertainties with the evidence, further understanding is initially required to provide a sound evidence base. This will assist with informed decisions regarding further development of strategic measures which promote best value, lowest cost solutions.

There is also the opportunity to align the adaptive planning for the DWMP with other strategic plans being developed and promoted by Somerset West and Taunton, the EA and Somerset County Council.

Figure 142: Adaptive pathway for Taunton



Somerset partnership working

Partnership priority locations within the Level 2 Somerset Catchments have been identified by stakeholders. It is expected that approximately 12 partnership projects in this area could be developed as candidates for inclusion within the PR24 Business Plan.

Partnership funding or contributions from other stakeholders will be required for partnership projects to progress. It should be highlighted that projects identified in the DWMP are not guaranteed funding through the PR24 business plan. Where funding is secured, the partnership projects have the potential to deliver a range of outcomes dependent on the project maturity. The project lead for partnership projects will be assessed individually. Work could include:

- further development and improvement in our understanding of risk, impact, and interconnections of different drainage infrastructure (where appropriate).
- investigate resilience improvements to drainage and wastewater infrastructure to align with other strategic capital schemes and adaptive pathways.
- Progress design and delivery of collaborative schemes.

Annex C. Level 2 assessment – Hampshire Avon

This annex provides level 2 detail for the Hampshire Avon catchment.

It starts by introducing the catchment and level of investment identified within the core plan for the Hampshire Avon.

Later sections in this annex include:

- catchment factsheets (Figure 143)
- level 2 detail of the DWMP stages, such as the RBCS and BRAVA results
- an indication of the level of enhancement investment that is required
- an indication of storm overflows improvements
- example of adaptive pathways for flooding
- the latest partnership working schemes.

Hampshire introduction

The population of the Hampshire catchment is 264,047 pe (domestic and commercial flow equivalent). We anticipate this will increase to 325,022 pe by 2050.

There are 53 storm overflows in the Hampshire catchment. These will need investment as will the 37 WRCs. The core plan proposes £375m is invested in the Hampshire catchment by 2050 to enhance the drainage and wastewater. That is £15m per year on average.

Hampshire has a wealth of environmentally protect sites, is affected by nutrient neutrality, and has many chalk rivers.

Also see the Hampshire Avon partnership website[59].

More details are provided in the factsheets below.

Hampshire factsheet
See overleaf.

Figure 143: Hampshire Avon catchment factsheet detailing investment made and planned for completion by 2025

Hampshire Avon catchment factsheet

We recognise the international importance of the chalk streams of the Hampshire Avon catchment and the iconic habitats and species they support. We provide water supply and wastewater treatment services for the northern portion of the catchment, but in the southern section of the catchment, south of Downton, Bournemouth Water provides water supply services while Wessex Water provides wastewater services.

Key issues

Sewage treatment

Within the Hampshire Avon catchment, we operate 37 water recycling centres (WRC, formerly known as sewage treatment works), over 230 sewage pumping stations (SPS) and 55 storm overflows (SO).

Nutrients

One of the main issues to affect the Hampshire Avon catchment is the impact of nutrients on its chalk streams and associated habitats. This is primarily from phosphorus, although nitrogen can also have an effect. Phosphorus causes eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands and is a particular problem for the streams and rivers in the catchment. Nutrients come from our own sewage assets but also from diffuse sources, such as agricultural and urban run-off.

Storm overflows

We operate 55 storm overflows in the catchment, many at water recycling centres. They exist because many sewers were laid at a time when drains carried both rainwater and sewage. Our overflows should only operate during periods of intense rainfall, where they act as relief valves to allow excess stormwater to be released to rivers or the sea to protect properties from flooding and prevent sewage backing up into streets and homes during heavy storm events. During storms, or during periods of high groundwater, any foul water released from a storm overflow is heavily diluted by large volumes of rainwater. Flows are further diluted by the watercourse as this will also be swollen by the same heavy rain.

Some of these overflows operate for extended periods of time due to groundwater infiltration into the sewerage system. Due to the underlying chalk geology of the catchment, in wet weather the ground water table can become very high, and this water can enter into and inundate our (public) and others' (private) sewers. We have produced a video explaining this phenomenon and what can be done (here). Information on how often these assets discharge, and for how long, can be found on our Drainage and Wastewater Management Plan Portal (Managing Drainage and Wastewater. Planning the future (wessexwater.co.uk).

To combat this infiltration, we have an Infiltration Reduction Programme (Infiltration reduction plans - Reducing the risk of groundwater. (wessexwater.co.uk) which sets out how we will monitor our network and renovate or seal affected sewers to prevent groundwater entering them.

We aim to eliminate all harm from overflows, starting with the ones that have the greatest impact. However, this is not a simple matter and will require several decades of sustained increased investment. It is estimated that to eliminate all overflows in England and Wales will cost in excess of £300 billion. Our programme starts with monitoring and reporting all overflow operations, identifying the ones that will potentially cause environmental or public health harm, addressing those and then progressively working through the others.

Our website contains further details on storm overflows (Storm overflows (wessexwater.co.uk)) and on our plans for tackling overflows which will be set out in our Drainage and Wastewater Management Plans.

Water supply and resources

Within the catchment, we operate 19 water treatment centres (with the majority of water sourced from groundwater), four stream supports (where we add water to rivers when flows are low) and more than 50 distribution sites (such as storage reservoirs or pumping stations).

River flows

The water we supply to our customers comes from the local environment and, approximately, 75% from boreholes and springs that tap into the chalk and Upper Greensand aquifers of Wiltshire and Dorset. Abstracting water from the aquifers that feed the chalk streams of the catchment has to be done without taking too much water, leaving too little for the streams and rivers to flow and support the wide range of species and habitats for which they are important.

For decades we have sought to balance the need to supply water to our customers without compromising healthy flows in our chalk streams, and we have taken steps to minimise the impact of our abstractions. The impact of all of Wessex Water's abstractions in the Hampshire Avon catchment was the subject of a major low flow study during Asset Management Plan (AMP) 4 (2005-2010). This involved extensive monitoring of river flows and river ecology, as well as numerical modelling of the interaction between groundwater abstractions, groundwater storage and river flows. Further investigations continue to understand more about how our abstractions can affect river flows (see below).

This resulted in the need to reduce our abstractions from several sites and so, over the last decade, we have invested more than £230 million to reduce the amount of water we take from the Hampshire Avon by 23.5 million litres per day, in order to preserve the unique ecology of these rivers. We are undertaking an extensive survey programme of aquatic plants and invertebrates to assess how the ecology has responded to these reductions in abstraction.

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Groundwater inundation video: https://www.youtube.com/watch?v=7b4uaY4H1Tk

Hampshire Avon catchment factsheet

Key investments completed up to 2020

Nutrients

Our long-term programme to reduce nutrients from our assets started in AMP3 (2000-2005) when, as a first stage, phosphorus removal to 2mg/l at many WRCs in the catchment was installed. AMP5 (2005-10) saw a further phosphorus removal to 1mg/l at many WRCs with more than 100 tonnes per year removed in the Hampshire Avon. Our investment in treatment processes for phosphorus removal at these WRCs amounts to £30 million, with additional annual operating costs for phosphorus removal at these sites of over £2.0million/year.

By the end of AMP6 (2020) we had installed phosphorus removal at the following treatment works:

River flows

We completed our integrated water supply grid, a £230m scheme delivering 23.5Ml/d abstraction reductions (c7% of water put into supply) and improved resilience for customers' water supplies. The scheme involved the construction of 200km new trunk mains, 24 refurbished or new pumping stations and 12 new storage reservoirs. This has allowed us to deliver the major reductions in abstractions required in the catchment by moving water from other areas of our region.

Future sustainability reductions in our abstractions will be informed by our AMP7 investigation into the revised Common Standards Monitoring Guidance for the River Avon SSSI.

WRC	Permitted Phosphorus Level (mg/l)	Approximate phosphorus removed (kg/yr)	WRC	Permitted Phosphorus Level (mg/l)	Approximate phosphorus removed (kg/yr)
All Cannings	1	430	Pewsey	1	2,900
Amesbury	1	3,300	Ratfyn	1	8,290
Barford St Martin	2	110	Ringwood	1	8,330
Downton	1	2,200	Salisbury	1	42,800
East Knoyle	1	370	Shrewton	1	870
Fordingbridge	1	5,000	Tisbury	1	1,600
Fovant	1	630	Upavon	1	750
Hurdcott	1	3,700	Warminster	1	10,000
Marden	2	260	Wishford	1	1,400
Netheravon	1	2,700			

Environmental investigations completed up to 2020

Environmental investigations

We have completed the following investigations within the catchment:

- Upper Avon Western Arm - established the impact of abstraction on river flows at normal rates of abstraction and theoretical full licence condition in this section of the river. It compared these values to guideline values to see if changes to flow and water quality altered the stream ecology (see below for further details).
- Warminster WRC Phosphorus Removal Trials - investigated phosphorus removal using iron dosing to see how much phosphorus removal is possible using existing technology.
- Heytesbury Brook Hydrology - evaluated the effect of our abstraction on the ability of the Brook to meet the standards set by the Water Framework Directive.
- Teffont Stream Investigation - worked to understand the current ecology of the stream and to consider the effect of groundwater abstraction both at its actual rates of abstraction and at theoretical full licence.
- Ecology of the Hampshire Avon - ongoing collection of long-term ecological datasets (to be reported at the end of AMP7) to help us understand changes in the river system resulting from reductions in the amount of water we abstract from sources in the Hampshire Avon.
- Water quality in the Hampshire Avon catchment - a programme of sampling and analysis to determine the influence of our operations on nutrients in the Hampshire Avon catchment.
- Blashford Lakes Phosphorus - reviewed the sources and means of reduction of phosphorus levels in the lakes.
- Blashford Lakes Habitat Management Plan - delivered a plan for the lakes which aims to manage and reduce existing phosphorus levels and established whether there were significant inputs of phosphorus from fishing bait and the bird population of the lakes.

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Hampshire Risk based catchment screening (RBCS) outputs
The RBCS stage screened each WRC catchment against 18 indicators. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5. Table 59 provides a summary of the RBCS outputs which are demonstrated in Figure 144.

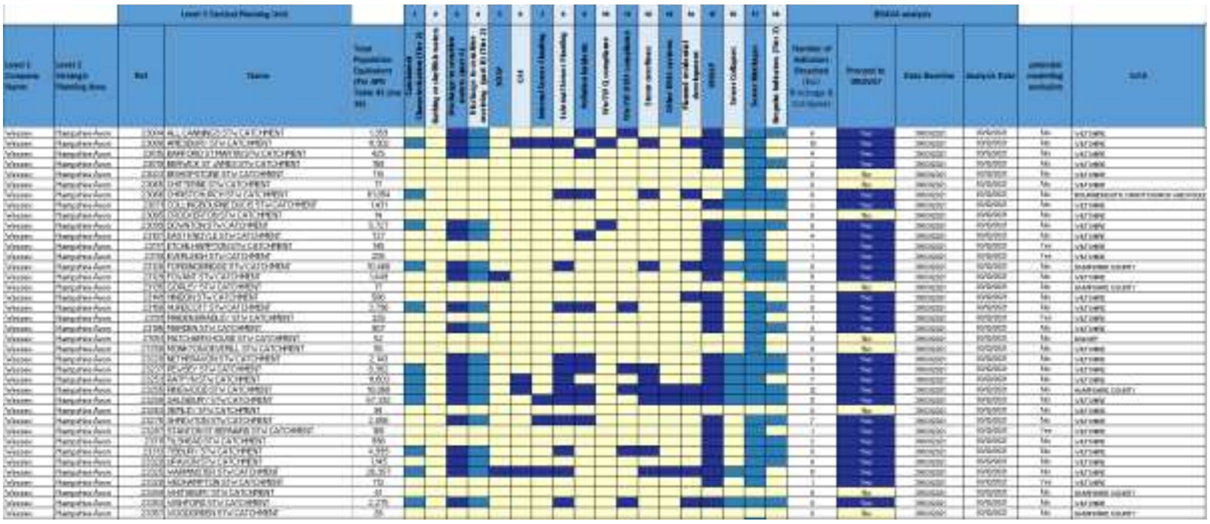
Of the 38 level 2 catchments in the Hampshire catchment, 29 had some risk in them and proceed to BRAVA stage. The 9 level 2 catchments that did not proceed were all small (<250pe) in size and in total only 433 pe.

Table 59: Hampshire RBCS output summary

Indicator	No. level 2 catchments with RBCS risk identified
Catchment Characterisation (Tier 2)	12
Bathing or shellfish waters	0
Discharge to sensitive waters (part A)	19
Discharge to sensitive receiving (part B) (Tier 2)	19
SOAF	2
CAF	4
Internal Sewer Flooding	4
External Sewer Flooding	13
Pollution Incidents	10
WwTW Q compliance	2
WwTW DWF compliance	6
Storm overflows	9
Other RMA systems	3
Planned residential development	8
WINEP	28
Sewer Collapses	13
Sewer Blockages	33
Groundwater (bespoke indicator)	18
Number of Indicators Breached*	157
Proceed to BRAVA?	29

*Excluding Blockage & Collapse

Figure 144: Example showing the evidence we performed this calculation at level 3



Hampshire BRAVA outputs

The BRAVA stage looks at the risk now and in the future for the common planning objectives. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5.

Table 60 provides a summary. The planning objectives at the top of the table are risk based. A score of 0 indicate not a significant risk (yellow), score of 1 some risk (light blue) and a score of 2 (dark blue) if there is or will be a significant risk.

The bottom four bespoke performance commitments are activity-based planning objectives. A score of 0 indicate no significant work risk (light green), score of 1 some activity (green) and a score of 2 (dark green) if there is significant planned. The future planning objective scores for the have been made 'n/a'. This is because performance in these areas depend on the levels of ambition in these areas. We await feedback from our draft consultation, to see if the core level of planning is preferred or whether we can go to the unconstrained targets.

Table 60: Summary BRAVA results for Hampshire Avon

Hampshire Avon	2025 score	2030 Score	2035 Score	2050 Score
Common - Internal Sewer Flooding Risk	0	0	0	0
Common- Pollution Risk	0	0	0	0
Common - Sewer Collapse Risk	0	0	0	1
Bespoke - Blockages Risk	1	1	1	1
Common - Risk of Sewer Flooding in a 1 in 50-year storm	0	0	0	1
Common - Storm Overflow performance	0	0	0	0
Common - Risk of WwTW Quality Compliance Failure	0	1	1	2
Bespoke - WwTW Flow Compliance Performance	0	0	0	0
Bespoke - Groundwater improved	1	n/a	n/a	n/a
Bespoke - Sustainable drainage	1	n/a	n/a	n/a
Bespoke - Waterbodies improved	2	n/a	n/a	n/a
Bespoke - Partnership working	2	n/a	n/a	n/a

Storm overflow improvements
Table 61 summarises coastal and inland storm overflow sites that may need improvement in 2025 to 2035.
Hampshire Avon has many chalk streams and it could be that overflows discharging to these will need improving. However, until we have assessed harm, these are not listed in the table of improvements below.

Table 61: Storm overflows that may need improvement by 2035 in the Hampshire Avon catchment

Reasons for potential improvement	Number of storm overflows
Bathing Waters	2
Shellfish Waters	0
RNAG	0
Chalk stream	44

Hampshire Avon feasible options

The screening of generic options through the ODA process identified various combinations of 'feasible options' to deliver required solutions. Different blends of these options may be applied across the Hampshire Avon catchment.

The feasible options selected for the Hampshire Avon catchment are as follows:
- **Customer management:** domestic and business customer education.
- **Surface water management:** source control, pathway measures and separating flows.
- **Combined foul and sewer systems:** intelligent network operation, increased capacity of networks, wastewater transfers, groundwater infiltration reduction and attenuation.
- **Wastewater treatment:** treatment at overflows, increasing capacity (through both grey and green solutions), rationalisation and catchment management.
- **Indirect measures:** influencing policy, investigating, and monitoring.

Given the high level, strategic assessment of options selected through the DWMP process, specific detail of option combinations will not be confirmed until detailed design is undertaken (outside the scope of the DWMP). Best value considerations were considered throughout the ODA screening process to derive feasible options that formed the unconstrained DWMP. The final DWMP has considered consultation feedback for partnership working, and we have quadrupled investment in the final plan.

Hampshire Avon partnership working

Partnership priority locations within the Level 2 Hampshire Avon Catchment have been identified by stakeholders. It is expected that approximately 6 partnership projects in this area could be developed as candidates for inclusion within the PR24 Business Plan.

Partnership funding or contributions from other stakeholders will be required for partnership projects to progress. It should be highlighted that projects identified in the DWMP are not guaranteed funding through the PR24 business plan. Where funding is secured, the partnership projects have the potential to deliver a range of outcomes dependent on the project maturity. The project lead for partnership projects will be assessed on a case-by-case basis.

If funding is secured through the PR24 business plan. The potential partnership projects identified are likely to deliver a range of outcomes dependent on the project maturity. Work could include:

- further development and improvement in our understanding of risk, impact, and interconnections of different drainage infrastructure (where appropriate).
- investigate resilience improvements to drainage and wastewater infrastructure to align with other strategic capital schemes and adaptive pathways.
- Progress design and delivery of collaborative schemes.

Annex D. Level 2 assessment – Dorset

This annex provides level 2 detail for the Dorset catchments.

It starts by providing an introduction to the catchments by summarising the investment already made and planned for completion by 2025 through our catchment fact sheets for Poole Harbour (Figure 145), Stour (Figure 146) and West Dorset Rivers and Streams (Figure 147). It also outlines the level of investment identified within the core plans for the Dorset Catchments.

Later sections in this annex include:

- level 2 detail of the DWMP stages, such as the RBCS and BRAVA results
- an indication of the level of enhancement investment that is required
- an indication of storm overflows improvements
- example of adaptive pathways for flooding
- the latest partnership working schemes.

Dorset introduction
The population of the Dorset catchment is 879,799 pe (domestic and commercial flow equivalent). We anticipate this will increase to 999,204 pe by 2050.

There are 249 storm overflows in the Dorset catchment. These will need investment as will the 76+ WRCs. The core plan proposes almost £1.5bn is invested in the Dorset catchment by 2050 to enhance the drainage and wastewater. That is £55m per year on average.

The Dorset Area of Outstanding Natural Beauty AONB received funding from DEFRA to complete a Test and trails project, which focused on the Brit Valley and Marshwood Vale, Cerne and Sydling Valleys and South Purbeck https://www.dorsetaonb.org.uk/resource/defra-tests-and-trials-project-2/

Also see the Dorset catchment website[56] and the:

- Stour catchment (available at https://www.wessexwater.co.uk/environment/catchment-partnerships/stour-catchment-partnership/stour-additional-information, look under “Relevant Documents”)
- Poole Harbour (attached, available from https://www.wessexwater.co.uk/environment/catchment-partnerships/poole-harbour-catchment-partnership/meetings-and-documents, (look under “Key documents”)

Dorset factsheets
See overleaf.

Figure 145: Poole Harbour catchment factsheet detailing investment made and planned for completion by 2025

Poole Harbour Catchment - the facts

Sewage treatment

Within the catchment, we operate 21 WRCs (water recycling centres, formerly known as sewage treatment works), 172 sewage pumping stations and 88 storm overflows (SO).

Nutrients

One of the main issues affecting the Poole Harbour catchment is the impact of nutrients (nitrogen and phosphorus).

Nitrogen

Nitrogen is of particular concern as it affects algal growth and the protected habitats and species of Poole Harbour.

- The total input of nitrogen (N) to Poole Harbour measured from our WRCs in 2009 was around 13% of the total (with the remainder coming from diffuse urban and rural sources), comprising 1.8% from Poole WRC and 11.1% from other WRCs, with the main share from Dorchester WRC.
- Poole WRC was fitted with nitrogen removal in 2008 at a cost of £12 million. This removes 927 tonnes of nitrogen per year.

Phosphorus

Phosphorus causes eutrophication in rivers. By the end of AMP6 (2020) we will have installed phosphorus removal at:

- Maiden Newton WRC (£0.8 million, removing estimated 0.96 tonnes phosphorus per annum from March 2020)
- Wool WRC (£1.5 million, removing estimated four tonnes phosphorus per annum from 2006)
- Dorchester STW (£0.77 million, removing estimated 12.9 tonnes per annum from 2002, with tightening from 2010 to remove an additional 4.3 tonnes per annum).

Poole Harbour catchment offsetting 2015-2020

Nitrogen removal is expensive and chemically/energy intensive. We are delivering a catchment nitrogen offsetting scheme as a more sustainable alternative, working with farmers and landowners to deliver 40 tonnes/year nitrogen reduction to offset some of the nitrogen load discharged from Dorchester WRC.

This is delivered through our EnTrade nutrient trading platform. Following a pilot auction in 2016, further auctions have been held in 2017, 2018 and 2019. EnTrade has saved an estimated 275 tonnes of nitrogen from entering Poole Harbour by funding 65 farmers who have received £500,000 funding to change land management practices.

From 2020-2025 we will increase our target to reduce 100 tonnes per year of nitrogen within the catchment through offsetting or treatment, comprising:

- Continuing the 40 tonnes per year offsetting the discharge from Dorchester WRC.
- An additional 51 tonnes per year as a voluntary target across the wider catchment.
- An additional 9 tonnes per year which will be achieved from the new nitrogen removal plant at Wareham WRC.

Water supply

Within the catchment, we operate 13 Water treatment works, three river flow supports (where we discharge water to support flows in rivers) and 65 distribution sites.

Nitrate

Rising nitrate levels in groundwater are also of concern for public water supplies. We rely on groundwater for public water supply in Dorset and drinking water regulations place a limit on the level of nitrate in water. We have had to take action to reduce nitrate to avoid breaching regulations. The sources in the table are being monitored for nitrate and many have been identified as safeguard zones which have measures to reverse rising nitrate trends - including our catchment management approach to work with landowners to reduce nitrate entering the sources.

Drinking water sources	Current nitrogen status
Winterbourne Abbas	Out of supply
Belhuish	Rising
Briantspuddle	Stable
Alton Pancras	Falling
Milbourne St Andrew	Stable, but seasonal peaks exceed limits
Hooke	Stable with reduced seasonal peaks
Forston	Stable
Dewlish	Rising over the past 4 years
Eagle Lodge	Stable
Maiden Newton	Low but with large spikes
Cattistock	Low, but rising
Litton Cheney	Rising - source protection zone inside catchment but actual source is outside
Langdon	No longer used due to too high nitrate

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Poole Harbour Catchment - the facts

Investments completed to 2020

Five investigations completed 2010-2020

- Hydrology of the Devils Brook - evaluating the impact of our abstractions on the watercourse.
- Bere Stream - evaluating the impacts of our abstractions and discharges on the stream.
- River Frome Nutrients - understanding the influence of WRC discharges on nutrient levels in river.
- Poole Harbour Nutrients - understanding nitrogen levels entering Poole Harbour.
- Poole Harbour Shellfish - monitoring outputs from WRCs at Studland and Corfe Castle, and rivers for bacterial levels.

Poole Harbour catchment initiative

- We initiated and developed the pilot partnership in 2012.
- We continue to host the catchment partnership, now in conjunction with Dorset Wildlife Trust.
- We provide £75,000 annual funding, including funding, and hosting roles of the catchment co-ordinator and catchment partnership technician.

Environmental Investment

- Poole Harbour catchment biodiversity project (1,800 hectares of catchment mapped for biodiversity opportunities).
- Dorset biodiversity strategy (£58,000 funding through our biodiversity partners programme 2006-2010).
- Dorset Wild Rivers project with Dorset Wildlife Trust and FWAG SW (£200,000 funding through our Biodiversity Partners Programme 2010-2020).
- Dorset extended riverfly monitoring (£2,500 funding through our Biodiversity Partners Programme 2015-2020).
- Holt Heath (£2,500 funding through our Biodiversity Partners Programme 2015-2020).
- Devils Brook multi benefit project (£5,000 funding through our Biodiversity Partners Programme 2015-2020).
- Streamclean team - tackling sewerage misconnections around Poole.

Future Investment 2020-2025

New phosphorus removal at WRCs

- Cerne Abbas WRC (removing 0.3 tonnes per annum by 2021).
- Corfe Castle WRC (0.48 tonnes per annum by 2021).
- Piddlehinton WRC (0.13 tonnes per annum removed by 2025).
- Dorchester WRC (tighten existing permit to remove 18.54 tonnes by 2025).

Nitrogen removal at WRCs and catchment offsetting

Target for removal of 100 tonnes of nitrogen/year through:

- new nitrogen removal process for Wareham WRC (to achieve 15mg/l total nitrogen), removing c. nine tonnes of nitrogen/year by 2021
- continuing nitrogen offsetting from Dorchester WRC - 40 tonnes per annum reduction to 2025
- additional nitrogen offsetting in line with our performance commitment - 51 tonnes/year to 2025.

Installation of ultraviolet treatment (UV) to reduce bacteria to improve shellfish waters

- Corfe Castle WRC (by 2021).

Environmental Investigations:

- Dewlish boreholes - implement abstraction licence change to reduce abstraction in the Devils Brook.
- Dorchester WRC seasonal permitting - investigate an innovative seasonal phosphorus permitting approach at Dorchester WRC.
- Dorset Frome SSSI water quality - assess the contribution our WRCs, SOs, water resources and catchment management have on water quality of the River Frome SSSI.
- Poole Harbour catchment WRCs - to understand the nitrogen and phosphorus contributions from WRCs.
- Poole Harbour shellfish waters - to assess our discharges and their impact on shellfish waters and climate change impacts.
- Poole WRC options appraisal - to assess improvements for discharge quality or outfall re-location.
- Holes Bay - investigation of nitrogen and phosphorus loads from our discharges to Holes Bay, Poole.

Biodiversity

- Briantspuddle and Litton Cheney DrWPA - biodiversity opportunity investigation and catchment nitrate reduction measures.
- Poole Harbour catchment biodiversity project - 72 hectares of habitat to be improved to enhance biodiversity and reduce nutrients to rivers.
- Five years funding for the Dorset Wild Rivers project with Dorset Wildlife Trust, FWAG SW & Dorset AONB (£100,000 total funding from our Partners Programme 2020-2025).

FIND OUT MORE

You can access more information about our work in the Poole Harbour catchment on our website – **wessexwater.co.uk/environment**

- Interactive Investigations map.
- Sample results and flow data from our WRCs.
- Our Business Plan for AMP7 (2020-2025).
- Find out about our drainage and waste water management plans including details of our SOs.
- Read more about the Poole Harbour catchment initiative and our catchment management work.

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Figure 146: Stour catchment factsheet detailing investment made and planned for completion by 2025

Stour catchment factsheet

Wessex Water provides water supply and sewage treatment services for the northern portion of the catchment. However, in the southern section of the catchment (south-east of Sturminster Marshall), Bournemouth Water provides water supply services and we provide sewerage services.

Key issues

Sewage treatment

Within the Stour catchment, we operate 51 water recycling centres (WRC, formerly known as sewage treatment works), more than 275 sewage pumping stations (SPS) and over 110 storm overflows (SO).

Nutrients

One of the main issues to affect the Stour catchment is the impact of nutrients on its rivers, catchments and chalk streams. This is primarily from phosphorus, although nitrogen can also have an effect. Phosphorus causes eutrophication (where the nutrients bring about excessive growth of plant life) in rivers and wetlands, and is a particular problem for the streams and rivers in the catchment. Nutrients come from our own sewage assets and from diffuse sources, such as agricultural and urban run-off.

Storm overflows

We operate more than 110 storm overflows in the catchment, many at water recycling centres. They exist because many sewers were laid at a time when drains carried both rainwater and sewage. Our overflows should only operate during periods of intense rainfall, where they act as relief valves to allow excess stormwater to be released to rivers or the sea, to protect properties from flooding and prevent sewage backing up into streets and homes during heavy storm events.

During storms, or during periods of high groundwater, any foul water released from a storm overflow is heavily diluted by large volumes of rainwater. Flows are further diluted by the watercourse as this will also be swollen by the same heavy rain.

Some of these overflows operate for extended periods of time due to groundwater getting into the sewerage system. Because of the underlying geology of the catchment, in wet weather the groundwater table can become very high, and this water can enter and overwhelm both public, and private, sewers. Our video explaining this phenomenon and what can be done can be accessed here.

To combat the risk of groundwater getting into sewers, our infiltration reduction programme monitors our network and renovates or seals affected sewers to prevent groundwater entering.

We aim to eliminate harm from overflows, starting with the ones that have most impact. This is not a simple matter and will require several decades of sustained increased investment - it's estimated that it will cost in excess of £300 billion to eliminate all overflows in England and Wales.

Our programme starts with monitoring and reporting all overflow operations, identifying the ones that will potentially cause environmental or public health harm, addressing those and then progressively working through the others.

Visit our website - www.wessexwater.co.uk/environment/drainage-and-wastewater-management-plan - for further details on:

- storm overflows and our plans for tackling them
- information on how often these assets discharge and for how long
- our infiltration reduction programme.

Water supply and resources

Within the catchment, we operate four water treatment centres (the majority supplying groundwater), one stream support (where we add water to rivers when flows are low) and more than 65 distribution sites (such as storage reservoirs or pumping stations).

Nitrate

Rising nitrate levels in groundwater are of concern for public water supplies. Drinking water regulations place a limit on the level of nitrate in water and we have had to take action to reduce nitrate to avoid breaching regulations, particularly at our major sources in Sturminster Marshall and Shapwick. These are routinely affected by peaks of high nitrate in raw water. We have been working with local farmers to reduce nitrate losses from agricultural land to the aquifer. We must now redouble these efforts to deliver nature based solutions with farmers to avoid the need to build expensive and less sustainable additional treatment processes to remove nitrates.

River flows

The water we supply to our customers comes from the local environment, approximately 75% from boreholes and springs that tap into the chalk and Upper Greensand aquifers of Wiltshire and Dorset. Taking water from the aquifers that feed the chalk streams of the catchment must be done without taking too much, which can leave too little for the streams and rivers to flow and support the wide range of species and habitats for which they are important.

For decades we have sought to balance the need to supply water to our customers without compromising healthy flows in our chalk streams and have taken steps to minimise the impact of our abstractions. In the Stour catchment there have been areas of concern, such as the Shreen and Ashfield Water at Mere and the River Tarrant. We have investigated the impact our abstraction is having on these watercourses and are taking steps to reduce the amount of water being removed.

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Stour catchment factsheet

Key investments completed up to 2020

Nutrients

By the end of AMP6 2020 (asset management plan) we had installed phosphorus removal at the following treatment works:

WRC	Permitted phosphorus level (mg/l)	Approximate phosphorus removed (kg/yr)	Approximate cost (£m)
Bourton	1	590	2.6
Buckland Newton	4	40	1.9
Cranborne	2	340	1.6
Gillingham	1	4,000	1.0*
Stourton Caundle	1.5	160	1.5
Sturminster Newton	2	1,400	0.3*

*Apportioned cost. as delivered as part of larger schemes providing growth capacity.

River flows

Abstractions within two areas in the Stour catchment have been identified as causing concern.

- The Shreen and Ashfield Water at Mere
- The River Tarrant (Stubhampton)

The effect of abstraction at our source in Mere on the Shreen and Ashfield Water was investigated between 2005 and 2008. That study concluded that the effects were minor and the changes in flow of the headwater streams were due to climatic variation. However, in the dry summer of 2011 the Shreen in the centre of Mere dried up and residents expressed their concerns through the Mere Rivers Group and asked what could be done to improve the flows.

In 2013, when groundwater levels fell below a threshold, we used an abstraction incentive mechanism (AIM) to reduce the quantity we take. This works by reducing the export of water from the Mere source to a maximum of 100 million litres per annum (Ml/a) while groundwater levels are below a specified threshold. If we exceed the 100 Ml/a target we must pay a cost per Ml for the excess. Since this work began, we've reduced the volume of water abstracted for export from the local catchment by around 60%.

Our Stubhampton groundwater source is in the upper reach of the River Tarrant Valley and draws water from the underlying chalk aquifer. The Tarrant is a winterbourne stream and the whole river can dry during extended dry weather – periods of no flow which were the subject of residents' concerns for several years.

Between 2015 and 2020 we undertook an investigation into the impact of our abstractions on the River Tarrant which showed that our groundwater abstractions from neighbouring catchments do not affect flows along the river; therefore, any river flow change is due to the abstraction at Stubhampton.

Hydrological modelling suggests that on average, between 1970 and 2016, the use of Stubhampton caused 14 days a year of extra drying along the winterbourne reach, but that the modelled scale of hydrological impact will not adversely affect the ecology of the River Tarrant. So, we are using an AIM approach at Stubhampton during the AMP7 period (2020-2025) to manage abstraction during low flow periods.

In addition to the specific actions noted above, we completed our integrated water supply grid, a £230m scheme delivering 23.5Ml/d abstraction reductions (c7% of water put into supply) and improved resilience for customers' water supplies.

The scheme involved the construction of 200km new trunk mains, 24 refurbished or new pumping stations and 12 new storage reservoirs. This has allowed us to deliver the major reductions in abstractions required in the Hampshire Avon catchment by moving water from other areas of our region.

Stream support at Mere

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Stour catchment factsheet

Environmental investment up to 2020

Environmental investigations

- Abstraction incentive mechanism Mere - we trialled a new approach evaluating how financial incentives can work to reduce abstraction in environmentally sensitive areas, such as Mere. This led to the use of AIM (see above).
- Water quality in the Dorset Stour catchment – investigation into the influence of Wessex Water operations on nutrients in the Dorset Stour catchment.
- Hydrology of the middle River Stour – this investigation collected new information to help us understand the effects of our abstraction on the Water Framework Directive status of the River Tarrant, Pimperne Brook and North Winterbourne. This led to the use of AIM at Stubhampton (see above).
- Water quality in the Moors River – this assessed the effect of Wessex Water assets between Verwood and Hurn and Uddens Water on the condition of the Moors River SSSI.

Biodiversity Partners Programme

We have provided support and funding of more than £330,000 to projects working on the Stour, or more widely within its catchment since 1998, including:

- The Dorset Biodiversity Strategy/Biodiversity Project (Dorset Wildlife Trust, 1998-2010)
- Dorset Wild Rivers Project (Dorset Wildlife Trust, 2010 onwards)
- Stour Catchment Stepping Stones project (Dorset Wildlife Trust, 2017)
- Holt Heath Project (Wessex Chalk Stream and Rivers Trust with Dorset Wild Rivers, 2018).

Stour catchment initiative

- We initiated and developed the pilot partnership in 2014, in conjunction with Dorset Wildlife Trust, who continue to co-host the partnership with us.
- We provide more than £75,000 annual funding, including funding and hosting the roles of the catchment partnership co-ordinator and catchment partnership support officer.

Planned investment 2020-2025

In addition to ongoing expenditure on our waste and water supply treatment and network assets, our business plan sets out the following key expenditure.

Nutrients

Figures below are in addition to phosphorus already removed at our WRCs by 2020, which will continue to be removed.

WRC	Permitted phosphorus level (mg/l)	Approximate phosphorus removed (kg/yr)	Approximate cost (£m)
Cranborne	1	Additional 110	0.2
Hazelbury Bryan	1.5	500	0.8
Holdenhurst	1	100,000	13.5
Iwerne Minster	1	630	0.9
Kinson	1	19,300	3.9
Marnhull (reed beds)	1	640	2.1
Marnhull Common Lane	1	2,100	2.8
Mere	1	1,300	1.4
Palmersford	1	34,000	4.6
Shaftesbury	1	5,300	1.2
Sturminster Newton	1	Additional 460	0.2
Tarrant Crawford	1	11,000	2.8
Templecombe	1	750	1.4
Wimborne	1	10,200	2.3
Wincanton	1	3,280	1.7

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Stour catchment factsheet

Planned investment 2020-2025

Catchment permitting

We will also be using a new approach to reducing nutrients in this catchment which has proved successful in the Bristol Avon one. Traditionally, we would install new treatment processes at each WRC to remove phosphorus. This is not sustainable as they are expensive to construct and consume large amounts of energy and chemicals to operate.

Instead, in AMP7 we will be managing nutrients at a catchment scale with a single permit covering all WRCs across the catchment, spreading the required phosphorus reduction across several sites. Individual WRCs are optimised with tighter permits at sites that either contribute the most phosphorus or are best able to reduce existing contributions.

This reduces the overall phosphorus entering the catchment without having to build additional treatment processes at a larger number of WRCs and delivers the greatest length of river improved by phosphorus reductions at sites throughout the catchment. The development of our catchment permitting approach will continue into AMP8 (2025-30) and result in the removal of an additional 10,000kg per year from 2027.

Catchment nutrient balancing

In parts of the Stour catchment, we will work with farmers to reduce phosphorus losses to water from agricultural land to balance the need to reduce phosphorus discharges from our WRCs. This is a more sustainable and nature-based approach which combines nutrient reduction with other benefits, such as improvements for biodiversity and flooding. This is expected to reduce phosphorus by approximately 2,500kg a year by 2025.

Storm overflow improvements

In addition to the above, we will also be carrying out the following major projects:

- storm storage improvements at Holdenhurst WRC
- flow capacity and storm storage improvements at Bourton WRC
- flow capacity improvements at Shillingstone WRC.

River flows

We will continue our abstraction incentive mechanism (AIM) scheme at Mere to reduce abstractions from this source. And we plan to trial stream support on the Ashfield water and, if successful, this may be extended to the Shreen. We will continue to meet annually with the Mere Rivers Group to discuss the AIM performance and liaise with them regularly to communicate changes to abstraction at the source.

We have introduced our new AIM commitment to reduce abstraction from our Stubhampton source from 2020. The ambitious target we are setting for the AIM at this source is to reduce abstraction when groundwater levels are below a certain threshold (below 79m AOD Ml/d at a specific monitoring point) to 1.09 million litres/day.

This is significantly lower than our recent abstraction from the source and we estimate this will result in abstraction being reduced for around 70% of the time, and an average reduction in abstraction of 192 Ml per annum.

Environmental investigations

- Drought monitoring Stour – monitoring of macroinvertebrate and fish populations, water quality and hydrology to establish environmental baseline conditions against which the effects of any future drought could be measured.
- Moors River and Uddens – investigation of CSO impact to determine whether we need to improve the performance of three storm overflows in the Moors River catchment.
- Crane CSMG – investigation to determine whether we need to improve the performance of our waste water assets on the River Crane to meet water quality targets that protect Sites of Special Scientific Interest.
- Stubhampton AIM – flow and ecological monitoring to quantify the environmental benefit of abstraction reductions at Stubhampton through AIM.
- Yarde Lane stream support – changes to our abstraction licence to enable a more environmentally beneficial flow regime to be used.
- Bournemouth Boscombe Pier bathing water ambition investigation – identifying the improvements required to our assets to achieve Excellent status at Bournemouth Boscombe Pier bathing water.
- Sixpenny Handley WRC groundwater nitrogen investigation – water quality monitoring and modelling to determine the effect of this WRC on nitrate concentrations in groundwater in the context of catchment influences and to determine whether treatment improvements are required.

Biodiversity and partnership funding

Wessex Water Foundation's Partners Programme is providing a further five years' funding for the Dorset Wild Rivers project with Dorset Wildlife Trust, FWAG SW & Dorset AONB – £100,000 total funding from our Partners Programme 2020-2025.

We will continue to support the Stour catchment initiative – £75,000 per year.

In addition, the following projects will be undertaken across the Wessex Water region but are likely to include sites within the catchment:

- maximising opportunities for birds at our water recycling centres
- priority habitat restoration and recreation.

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Figure 147: West Dorset coastal streams catchment factsheet detailing investment made and planned for completion by 2025

West Dorset Coastal Streams catchment factsheet

We provide water supply and wastewater treatment services for many of the coastal streams and rivers on the south and west of Dorset which flow into the sea. This includes the Swan; Wey; Bride; Asker, Brit, Simene and Char. The area to the west of Charmouth is served by South West Water.

Key issues

Sewage treatment

Within the West Dorset catchment, we operate 16 water recycling centres (WRC, formerly known as sewage treatment works), nearly 100 sewage pumping stations (SPS) and over 70 storm overflows (SO).

Nutrients

One of the main issues to affect the West Dorset catchment is the impact of nutrients on its rivers, catchments and sensitive environmental areas (such as The Fleet). This is primarily from phosphorus, although nitrogen can also have an effect. Phosphorus causes eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands and is a particular problem for the streams and rivers in the catchment. Nutrients come from our own sewage assets but also from diffuse sources, such as agricultural and urban run-off.

Storm overflows

We operate over 70 storm overflows in the catchment, many at Water Recycling Centres. In an ideal world we wouldn't have storm overflows at all - they are a legacy from the past. They have always been part of the sewerage network in the UK because the majority of sewers carry both rainwater and foul sewage and they prevent properties from flooding following intense rainfall. We are now getting more intense rainfall due to climate change, which can affect when overflows operate. Under storm conditions, any foul water released from a storm overflow is diluted by large volumes of rainwater. Flows are further diluted by the watercourse as this will also be swollen by the same heavy rain. They are designed in such a way as to avoid adverse environmental impact on the receiving waters.

Although overflows are permitted by the Environment Agency, we agree that they have no place in the 21st century, but it will take time and significant investment to progressively eliminate them.

We are committed to completely eliminating the discharge of untreated sewage, starting with storm overflows that discharge most frequently and those that have any environmental impact. Our Storm Overflows Improvement Plan sets out how we will begin this journey.

Information on how often these assets discharge, and for how long, can be found on our Drainage and Wastewater Management Plan Portal (Managing Drainage and Wastewater, Planning the future (wessexwater.co.uk)).

Our website contains further details on Storm Overflows (Storm overflows (wessexwater.co.uk)) and on our plans for tackling overflows which will be set out in our Drainage and Wastewater Management Plans.

Water supply and resources

Within the catchment, we operate 5 water treatment centres (the majority from groundwater), and more than 60 distribution sites (such as storage reservoirs or pumping stations).

Water Supply Nitrates

Rising nitrate levels in groundwater are also of concern for public water supplies. We rely on groundwater for public water supply in Dorset and drinking water regulations place a limit on the level of nitrate in water. We have had to take action to reduce nitrate to avoid breaching regulations. The sources in the table are being monitored for nitrate and many have been identified as safeguard zones which have measures to reverse rising nitrate trends - including our catchment management approach to work with landowners to reduce nitrate entering the sources. Across these three sources, in 2021 Wessex Water supported farmers to implement various nitrate leaching reduction measures including: 313ha of cover winter cover crops, 4ha of zero input arable reversion, 49ha of lower leaching crops, fertiliser calibrations as well as capital grants.

Drinking water sources	Current nitrate status
Friar Waddon	Elevated and rising
Litton Cheney	Elevated but stable
Sutton Poyntz	Elevated and rising

River Flows

In 2015 we were asked to investigate the impact of our abstraction from the springs at Sutton Poyntz on the river Jordan downstream of the source to assess possible impact on the ecology, river water quality and flow. As a result of this investigation, the upper section of the river was restored in 2021 to a more natural form to create a wet woodland and allowing for a greater diversity of habitats, while providing a measure of attenuation for higher flow events.

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West Dorset Coastal Streams catchment factsheet

Key investments completed up to 2020

Nutrients

By the end of AMP (Asset Management Plan) 6 (2020) we have installed phosphorus removal at the following treatment works:

WRC	Permitted Phosphorus Level (mg/l)	Approximate phosphorus removed (kg/yr)	Approximate Cost (£m)
Abbotsbury	0.81	570	1.2

Environmental investigations completed up to 2020

Environmental investigations

- Water quality in the South and West Wessex catchment - Investigation into the influence of Wessex Water operations on nutrients in the West Dorset catchments
- The Fleet Shellfish Water Investigation – this assessed the extent to which Wessex Water assets discharging into the Fleet contributed to the bacterial loading within the waterbody to assess the risk posed to shellfish water quality
- River Wey Investigation – to determine the impact of water abstractions and storm overflows upon the River Wey against the Water Framework Directive standards
- Radipole Lake Investigation – evaluated the contribution of storm overflows to nutrient loads within the lake
- Ecology of the River Jordan - Investigation to improve understanding of the hydrological impact of abstraction at Sutton Poyntz and how this affects the ecology of the River Jordan

Biodiversity Partners Programme

We have provided support and funding of more than £170,000 to projects working in West Dorset, or more widely within its catchments since 1998, including:

- The Dorset Biodiversity Strategy/Biodiversity Project (Dorset Wildlife Trust, 1998-2010)
- Dorset Wild Rivers Project (Dorset Wildlife Trust, 2010 onwards)
- Springs and seepages for biodiversity (Buglife, 2010-2015)

Planned investment 2020-2025

In addition to ongoing expenditure on our waste and water supply treatment and network assets, our business plan sets out the following key expenditure:

Nutrients

(The below is in addition to phosphorus already removed at our WRCs by 2020, which will continue to be removed.)

WRC	Permitted Phosphorus Level (mg/l)	Approximate phosphorus removed (kg/yr)	Approximate Cost (£m)
Puncknowle	2.5	500	0.8

Other investment

In addition to the above, we will also be carrying out the following major projects:

- Major maintenance works at Swanage WRC, Chideock WRC
- Major maintenance works at West Bexington Sewage Pumping Station (SPS), Weymouth Radipole SPS, Weymouth Knightsdale/Newstead Road SPS, Chickerell Road Storm Overflow
- Enhancement to Weymouth WRC to improve operation and an investigation into saline (salt water) intrusion into the sewer network

Environmental Investigations

- River Jordan Restoration – we are undertaking habitat improvements to a section of the river to implement recommendations from the previous investigation into the Ecology of the River Jordan
- Litton Cheney Catchment Biodiversity investigation - biodiversity opportunity investigation and catchment nitrate reduction measures

Biodiversity and partnership funding

Wessex Water Foundation's Partners Programme is providing a further five years funding for the Dorset Wild Rivers project with Dorset Wildlife Trust, FWAG SW & Dorset AONB (£100,000 total funding from our Partners Programme 2020-2025).

In addition, the following projects will be undertaken across the Wessex Water region but are likely to include sites within the catchment:

- Maximising opportunities for birds at our water recycling centres.

Dorset Risk based catchment screening (RBCS) outputs

The RBCS stage screened each WRC catchment against 18 indicators. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5. Table 62 provides a summary of the outputs, while Figure 148 provides an example of the outputs.

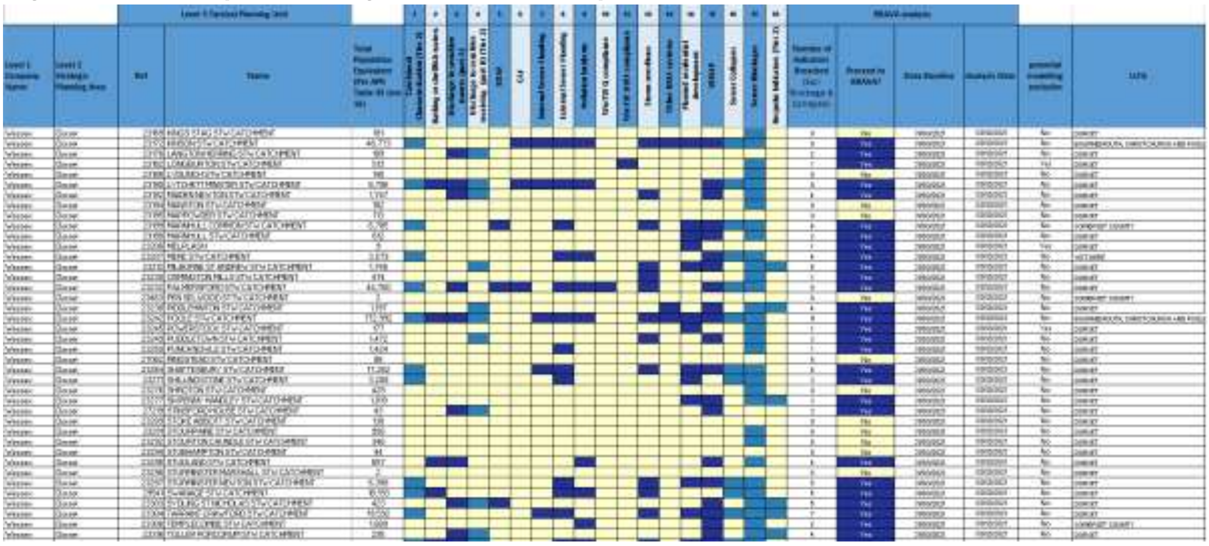
Of the 88 level 2 catchments in the Dorset catchment, 55 had some risk in them and proceed to BRAVA stage. The 33 level 2 catchments that did not proceed were all small (<1000pe) in size and in total 5,763 pe.

Table 62: Dorset RBCS output summary

Indicator	No. level 2 catchments with RBCS risk identified
Catchment Characterisation (Tier 2)	25
Bathing or shellfish waters	12
Discharge to sensitive waters (part A)	18
Discharge to sensitive receiving (part B) (Tier 2)	22
SOAF	9
CAF	9
Internal Sewer Flooding	10
External Sewer Flooding	27
Pollution Incidents	21
WwTW Q compliance	2
WwTW DWF compliance	2
Storm overflows	23
Other RMA systems	6
Planned residential development	27
WINEP	38
Sewer Collapses	25
Sewer Blockages	50
Groundwater (bespoke indicator)	10
Number of Indicators Breached*	261
Proceed to BRAVA?	55

*Excluding Blockage & Collapse

Figure 148: Example showing the evidence we performed this calculation at level 3



BRAVA outputs

The BRAVA stage looks at the risk now and in the future for the common planning objectives. The results are too complex to show in this report but are available on the DWMP portal as explained in section 11.7.5.

Table 63 provides a summary of the BRAVA outputs for Dorset catchments. The planning objectives at the top of the table are risk based. A score of 0 indicate not a significant risk (yellow), score of 1 some risk (light blue) and a score of 2 (dark blue) if there is or will be a significant risk.

The bottom four bespoke performance commitments are activity-based planning objectives. A score of 0 indicate no significant work risk (light green), score of 1 some activity (green) and a score of 2 (dark green) if there is significant planned. The future planning objective scores for the have been made ‘n/a’. This is because performance in these areas depend on the levels of ambition in these areas. We await feedback from our draft consultation, to see if the core level of planning is preferred or whether we can go to the unconstrained targets.

Table 63: Summary BRAVA results for Dorset

Dorset	2025 score	2030 Score	2035 Score	2050 Score
Common - Internal Sewer Flooding Risk	0	0	0	0
Common- Pollution Risk	0	0	0	0
Common - Sewer Collapse Risk	0	0	0	0
Bespoke - Blockages Risk	0	0	0	0
Common - Risk of Sewer Flooding in a 1 in 50-year storm	1	1	1	1
Common - Storm Overflow performance	0	0	0	0
Common - Risk of WwTW Quality Compliance Failure	0	1	1	1
Bespoke - WwTW Flow Compliance Performance	0	0	0	0
Bespoke - Groundwater improved	1	n/a	n/a	n/a
Bespoke - Sustainable drainage	0	n/a	n/a	n/a
Bespoke - Waterbodies improved	2	n/a	n/a	n/a
Bespoke - Partnership working	2	n/a	n/a	n/a

Storm overflow improvements

Table 64 summarises coastal and inland storm overflow sites that may need improvement in 2025 to 2035.

Table 64: Storm overflows in Dorset that may need improvement by 2035

Reasons for potential improvement	Number of storm overflows
Bathing Waters	45
Shellfish Waters	37
RNAG	0
Chalk stream	109

Dorset catchment feasible options

The screening of generic options through the ODA process identified various combinations of 'feasible options' to deliver required solutions. Different blends of these options may be applied across the Dorset catchments.

The feasible options selected for the Dorset catchments are as follows:

- **Customer management:** domestic and business customer education.
- **Surface water management:** source control, pathway measures and separating flows.
- **Combined foul and sewer systems:** intelligent network operation, increased capacity of networks, wastewater transfers, groundwater infiltration reduction and attenuation.
- **Wastewater treatment:** treatment at overflows, increasing capacity (through both grey and green solutions), rationalisation, effluent re-use, and catchment management.
- **Indirect measures:** influencing policy, investigating, and monitoring.

Given the high level, strategic assessment of options selected through the DWMP process, specific detail of option combinations will not be confirmed until detailed design is undertaken (outside the scope of the DWMP).

Best value considerations were considered throughout the ODA screening process to derive feasible options that formed the unconstrained DWMP. This was then subject to optimisation through the programme appraisal to inform different DWMP scenarios for the Draft Plan that will be consulted on to help inform the final DWMP.

Dorset catchment adaptive pathways for the unconstrained plan

Weymouth was assigned as a 'complex' catchment for the ODA stage of the framework. This resulted in the generation of 3 different adaptive pathways to address flooding and storm overflow operation for the unconstrained plan.

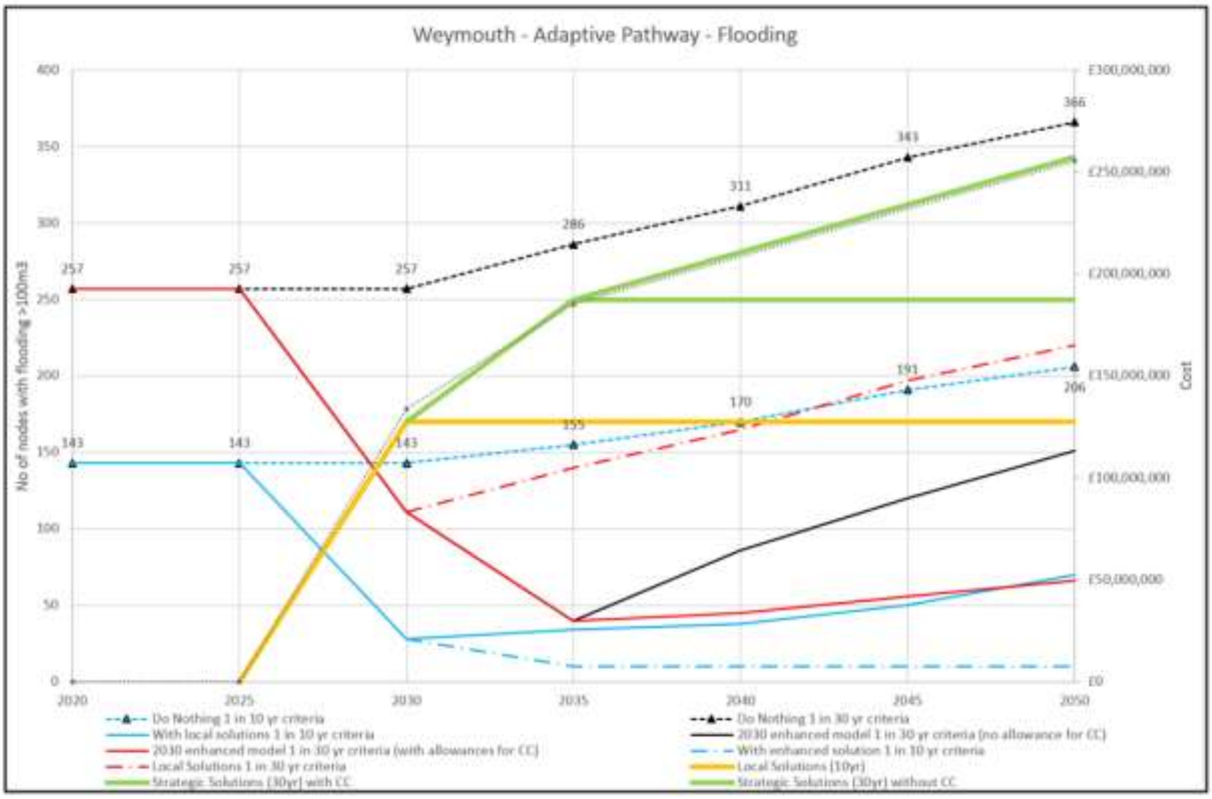
Figure 149 presents the adaptive pathway for flooding in Weymouth. In both the flooding and storm overflow adaptive pathways, local solutions in the short term have the potential to increase the resilience of drainage and wastewater infrastructure for a 1 in 10 and 1 in 30-year storm. The decision point in the adaptive plan for Weymouth is reached in 2030. If the expectation from customers is that no serious flooding will occur during a 1 in 30-year storm by 2050, strategic solutions will be required to prevent smaller localised solutions becoming redundant. Additional factors to consider as part of the adaptive plan will be the scale and timing of climate change, growth, and urban creep, however the dominant influence will be climate change.

Similar adaptive planning scenarios have been identified for storm overflows frequency of operation and discharge volume.

It is recognised that given uncertainties with the evidence, further understanding is initially required to provide a sound evidence base. This will assist with informed decisions regarding further development of strategic measures which promote best value, lowest cost solutions.

There is also the opportunity to align the adaptive planning for the DWMP with other strategic plans being developed and promoted by the EA and Dorset Council.

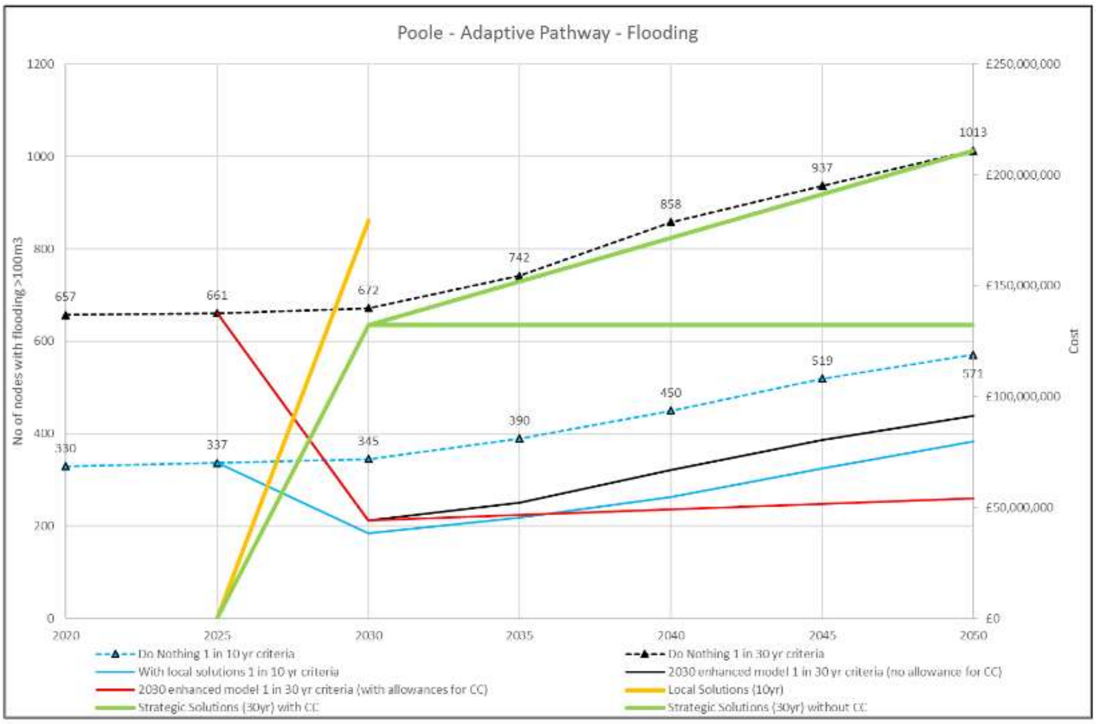
Figure 149: Weymouth unconstrained adaptive pathway for flooding



Poole adaptive pathway for an unconstrained option

The unconstrained adaptive pathway developed for Poole WRC (Figure 150) identifies that local solutions will have an impact to address current flooding and storm overflow operation. The adaptive plan has recognised that right at the beginning of the investment period a decision is needed about whether to follow a localised strategy rather than a strategic holistic approach. Ultimately, the holistic strategy is less expensive and delivers a higher level of protection.

Figure 150: Poole adaptive pathway for an unconstrained option



Dorset partnership working

Partnership priority locations within the Level 2 Dorset catchments have been identified by stakeholders. It is expected that approximately 16 partnership projects in this area could be developed as candidates for inclusion within the PR24 Business Plan.

Partnership funding or contributions from other stakeholders will be required for partnership projects to progress. It should be highlighted that projects identified in the DWMP are not guaranteed funding through the PR24 business plan. Where funding is secured, the partnership projects have the potential to deliver a range of outcomes dependent on the project maturity. The project lead for partnership projects will be assessed on a case-by-case basis.

Work could include:
- further development and improvement in our understanding of risk, impact and interconnections of different drainage infrastructure (where appropriate).
- investigate resilience improvements to drainage and wastewater infrastructure to align with other strategic capital schemes and adaptive pathways.
- Progress design of collaborative schemes.
- Progress delivery of collaborative schemes.

Annex E. Planning objective details

This Annex contains further detail than was provided in section 5 of the plan (planning objectives and levels of service).

WaterUK website (here) contains an explanation of each common planning objective. These were agreed by Water UK to be used in this first cycle of DWMPs. This section provides detail of Wessex Water's bespoke planning objectives.

Table 65 below details the planning objective thresholds that Wessex Water have used in this first cycle DWMP. It is expected that some of these thresholds will see a tightening in future cycles. For example the storm overflow thresholds were based on the Storm Overflow Assessment Framework discharge frequencies. Defra's storm overflow reduction policy (expected in September 2022) is likely to tighten these thresholds to 10 spills a year.

Table 65: Cycle 1 Planning objective score threshold (Level 2) summary

Planning objectives	Score = 0	Score = 1	Score = 2
Risk of WRC quality compliance failure (% of all WRCs)	<90%	90% to 95%	>=95%
Risk of WRC dry weather flow compliance failure (% of all WRCs)	<90%	90% to 95%	>=95%
Waterbodies improved	<20%	20% to 30%	>=30%
Storm overflow performance	<=20 spills per year	>20 to <40	>=40
Risk of sewer flooding in a 1 in 50-year storm	<8.37% (Yr5)	8.37% (Yr5) to 12.93% (Yr1)	>12.93% (Yr1)
Internal sewer flooding risk (number per 10,000 connected properties)	<=1.68 (UQ Yr1)	>1.68 to 4.09 (enhanced underperformance)	>4.09
Blockage risk (number per 1,000km)	<=380.60 (Yr 1 performance)	>380.60 to 1141.80 (Yr1 performance *3)	>1141.80
Pollution risk (number per 10,000km)	<=24.51 (UQ Yr1)	>24.51 to 35 (EPA)	>35
Sustainable drainage (SuDS) and separation (m^2) at Level 2	negative (more surface water is connected than removed) or zero	Positive, but <25000	>25000
Partnership working (Schemes per Level 2 area, average over 3 years)	0	>0 to <2	>=2
Sewer collapses (number per 1,000km)	<=6.33 (PC level Yr1)	>6.33 to 18.99 (PC level Yr1 *3)	>18.99
Groundwater inundation score	0	>0 to 0.04	>=0.04

Annex F. Accommodating growth and new development

Accommodating growth and new development summary

Economic conditions over the last decade and the depletion of housebuilding resources has seen a significant reduction in the number of homes needed to meet demand. More recently output has been growing 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 housebuilding is predicted to slow though 2023 reflecting the steady rise of interest rates and mortgage availability. The recent policy decision to withdraw housing targets from the planning system to protect the green belt, will also influence supply and housing delivery over the short term.

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.

Climate change continues to influence wider extremes upon rainfall and weather patterns and future directives upon climate change may introduce variances in the strategic planning process to meet this challenge.

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 wastewater recycling with process capacity
- Service quality in Developer Services markets

These ongoing activities have established process to evaluate the impact of growth and new development upon the capacity and performance of sewerage assets. Regulation of the industry has led a path toward a greater focus upon investment planning at the 5-year Price Review. Longer term strategic planning is perhaps less visible to external stakeholders but has remained in the background as a fundamental part of capacity planning.

A DWMP seeks to provide a formal platform and structure to develop strategies and investment plans which integrate with wider catchment and environmental objectives. One of the key elements in assessing the impact of new development and the future performance of existing wastewater assets involves preparing a demand forecast.

The DWMP operates over three levels, companywide, strategic planning areas and individual water recycling centre catchment areas known as tactical planning units (TPU), to assess the performance and risks to the sewerage and wastewater systems considering future pressures including development, climate change, urban creep and per capita consumption. The Planning Liaison Team prepare, and update demand projections for Level 3 TPUs. These projections assist with completing assessments for sewerage assets, and then aggregated into Level 2 Strategic Planning areas and the level 1 company wide area.

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 l/ph/d are factored into company plans over the longer term. and has reduced influence where verified network models are used for catchment appraisal. The influence of surface water discharges upon network capacity, rise with storm events and climate change over the longer term.

The DWMP requires consideration over periods of 5, 10, and 25 years to align short term investment priorities with long term strategy. Assessment of network and treatment capacity and performance uses common development data established from Local Authority Plans. Demand projections for network and treatment purposes are prepared separately and use common development data adjusted for catchment boundaries. These assets are assessed against relevant design conditions and performance criteria.

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 - 15yr period with further information available to inform location through a Site Allocations document and a 5-year supply of development land.

Beyond a Local Plan period a long term 25yr projection can draw upon data published by the Office of National Statistics. Household and population projections are available from government websites:

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

National population projections - Office for National Statistics[44]

This information provides some guidance upon the level of future growth over both 10 and 25 years. Further information and some limited analyses of current Local Plans are considered in the next section on strategic planning.

Strategic Planning – Local Plans & ONS Projections

Forward looking capacity management operates at a strategic level, consulting with published Local Plans adopted by each Local Planning Authority (LPA) following a successful examination in public by the Planning Inspectorate. Waste and Mineral plans are also included. Local Plans generally cover a 15-year period with a rolling 5-year supply of development land for continuity. Each Local Authority estimates prescribed housing requirements and employment areas with allocations to deliver new homes and employment.

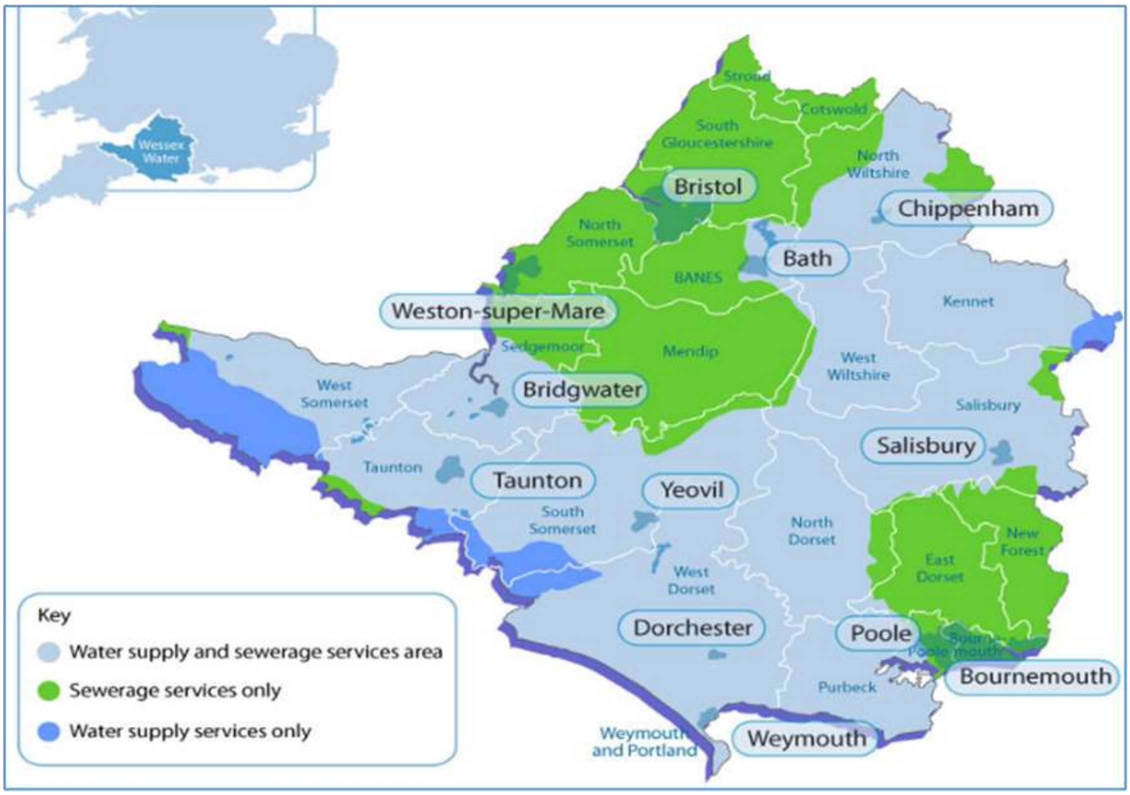
Wessex Water serves areas previously referred as Avon, Somerset, Wiltshire and Dorset. Currently there are 8 Unitary Authorities with minor areas and partial boundary coverage in a further 4 areas. Table 66 indicates the authority and Local Plan status.

Table 66: Local Authority Areas – Local Plan Status

Local Authority	Local Plan Adoption	Plan Period	Housing Allocations
Bath and North East Somerset (BANES) UA	2014	2006 - 2029	12,960
Bristol City UA	2011	2006 - 2026	30,600
North Somerset UA	2015	2006 - 2026	20,985
South Gloucestershire UA	2013	2006 - 2027	28,355
Dorset UA[1] North Dorset DC West Dorset DC East Dorset DC Purbeck DC	 2016 2015 2014 2012	 2011 – 2031 2011 – 2031 2013 – 2028 2006 – 2027	 7,110 10,230 5,603 2,520
Bournemouth, Christchurch and Poole (BCP) UA[2] Bournemouth Christchurch Poole	 2012 2014 2010	 2006 – 2026 2013 – 2028 2006 – 2026	 14,600 2,800 10,000
Wiltshire UA	2015	2006 – 2026	42,000
Mendip DC	2014	2006 – 2029	9,635
Sedgemoor DC	2011	2006 – 2027	10,605
South Somerset DC	2015	2006 – 2026	15,950
Taunton Deane DC[3]	2012	2011 - 2028	17,000
West Somerset DC[3] – Part 50%	2016	2011 - 2028	1,450
Cotswold DC – Part 10% Tetbury	2018	2011 - 2031	840
Stroud DC – Part 10% Berkeley & Sharpness	2015	2006 - 2031	1,140
New Forest DC – Part 20% Fordingbridge & Ringwood	2020	2016 - 2036	2,084

Notes
1 & 2 - existing Local Plans will remain until the Local Plan Review by the new authority is complete
3 – Taunton & West Somerset report joint plans from 2019

Figure 151: Council planning authority areas in Wessex



There are significant differences in geographic areas between water supply and wastewater boundaries. Principally, Bristol and Bournemouth areas although served for wastewater remain outside the Wessex Water supply area. Wessex has approximately 1.3 million water customers and 2.8 million waste customers. Demand projections for supply and wastewater are based upon the best available information using Local Plan data with ONS projections.

All planning authorities have adopted plans within the Wessex Water region, and most are undertaking Local Plan Reviews to carry forward a 15-year planning horizon to 2036. Beyond this point it becomes appropriate to apply proportionate growth to demand projections using long term averages.

Local Planning Authorities promote national and local planning policies to meet the demand for housing and employment within each area. Sustainable development is prioritised to make allocations for development land. Planning policy ensures that larger allocations are directed at Towns and Cities with limited growth permitted through a hierarchy of service villages and restricted opportunities for dwellings in rural countryside. Wessex Water engages with spatial planners through the plan making process, and we advise upon capacity requirements and constraints where necessary.

We can advise upon some delay to Local Plan updates where there has been a pause in the process owing to the pandemic period. There are further transitional arrangements where newly appointed Unitary Authorities of Bournemouth, Christchurch and Poole (BCP) and Dorset Council prepare for a Local Plan Review. Somerset Council also replaces the previous five lower tier authorities within the County from April 2023.

The West of England Combined Authority prepared a Joint Spatial Plan for the greater Bristol Housing Market Area, however this has now been withdrawn following a rejection at examination. Existing Local Plans will now progress to a Local Plan Review by individual authorities to a revised programme over the next 12 months.

Land Agents and Developers promote sites through the Local Plan and generally seek planning consents once allocations are made. The onward journey through the statutory planning process follows with planning submissions and consents providing greater detail upon proposals. Mapping new sites onto GIS based software, allows catchment-based growth to be quantified by site location with annual build rates and phasing arrangements.

Regional Planning – Current Progress

On a regional level we have a good understanding of Local Plan Proposals and delivery within the Wessex Water area. Reviewing data from 2010 onwards provides a useful indicator of the progress achieved against housing targets and delivery capacity.

Figure 152 below plots the proposed level of development with actual completion of new dwellings over the period. Net new dwellings and actual completions are taken from Annual Monitoring Reports published by each Council and reflect the statistical returns made to DCLG for national housebuilding. These figures cover the commencing period of Local Plans under the Localism Act 2011, (superseding the Regional Spatial Strategy) and progress through to 2022.

The predicted housing trajectory over the 5-year period from 2020 is based upon annual average requirements from Local Plans. These will be updated once information becomes available. There is some dislocation in presenting these figures at a regional level and the relevant growth allocated in Level 3 catchment areas, however predictions do reflect alignment with Local Plan proposals.

This information is not wholly accurate as boundary alignments provide a small level of distortion across served areas for wastewater. There will also be a small number of homes with private wastewater systems in rural areas. Completions over the period are falling below those predicted, however delivery of new homes has been rising. We note that larger multi-phase developments are slower to progress through to planning consents and agreements.

Figure 152: Local Plan Progress

Dissecting the data into 5-year stages reveals the change in household growth over the period for Housing completions thus:
2011-2015 = 47,773 (actual) +3.86%
2016-2020 = 61,396 (actual) +4.78%
2021-2025 = 75,561 (predicted) +5.61%

Delivery capacity although rising has fallen behind planned Housing Targets. There is a cumulative shortfall of approximately 15,425 new homes over the 5 yr period from 2015. Variable market and economic conditions over the period have significant influence. Future assumptions will remain with meeting target levels of growth and adaptive plans to provide capacity. However, there is a low probability that delivery capacity will leap forward in the short term.

We believe that market conditions will remain suppressed in the short term and unlikely to accelerate and recover this shortfall over the next 5 years. It is more likely that Council's will roll forward targets with incremental increases in capacity consolidating over time.

Long Term Forecasting

The DWMP features planning periods of 5, 10 and 25 years to integrate and align short term wastewater investment programmes with longer term strategic objectives. Moreover, this process should support community based environmental and flood risk planning frameworks for wider catchment planning and collaborative partnerships. These planning periods will operate across three levels (detailed in Table 67).

Table 67: DWMP planning hierarchy

Level	
Level 1	Company level DWMP - Strategy and investment plans informed by Level 2 & Level 3 planning frameworks.
Level 2	Strategic planning areas (SPA) or partnership catchments – Aggregation of Level 3 tactical planning units (TPU)
Level 3	WRC catchment & network, referred to in the DWMP framework as tactical planning units (TPU)

Level 1 - Property & Population growth

The ONS prepares regional growth projections for population and households, most recently covering a period from 2018. :

- Household Projections indicate a national 16.2% rise over a 25-year period and a 7.1% increase over 10 years, with the highest rate in the southwest region at 9%.
- Population projections indicate a national 10.3% rise over 25 yr period and a 4.5% increase over 10 years.

Long term demand projections use a hybrid of Local Plan information over the shorter 5- and 10-year period and introduce a trend-based projection over the longer 25-year term.

One of the main drivers for household growth is explained as a greater proportion of the ageing population in residence with single occupancy. Reducing occupancy has been acknowledged and is accommodated in projections. Some uncertainty remains in this assumption beyond a general value across the region. Table 68 below indicates ONS projections over longer term periods. The 25 year projection at 2050 is based upon extrapolating the 2018 – 2043 data period.

Table 62: ONS 10- and 25-year projections 2025 onwards

Local Authority	ONS 10Yr % Household growth	ONS 10Yr % Population growth	ONS 25Yr[1] % Population growth
Bath and North East Somerset (BANES) UA	7.6	6.6	16.2
Bristol City UA	6.5	5.8	14.8
North Somerset UA	7.7	5.9	15.7
South Gloucestershire UA	9.8	9.3	25.1
Dorset UA North Dorset DC West Dorset DC East Dorset DC Purbeck DC	 4.9 8.7 5.2 7.2	 0.9 4.8 3.6 3.8	 3.0 12.9 6.2 10.7
Bournemouth, Christchurch and Poole (BCP) UA Bournemouth Christchurch Poole	 3.3 6.7 4.6	 0.9 2.7 1.3	 1.8 7.5 4.2
Wiltshire UA	6.4	3.3	10.8
Mendip DC	8.3	5.2	14.2
Sedgemoor DC	7.7	4.8	12.9
South Somerset DC	5.7	2.6	7.1
Taunton Deane DC	11.4	7.7	21.4
West Somerset DC – Part 50%	9.4	6.0	14.9
Cotswold DC – Part 10% Tetbury	12.1	9.6	26.8
Stroud DC – Part 10% Berkeley & Sharpness	8.0	5.4	14.3
New Forest DC – Part 20% Fordingbridge & Ringwood	4.2	1.5	4.0 TBC

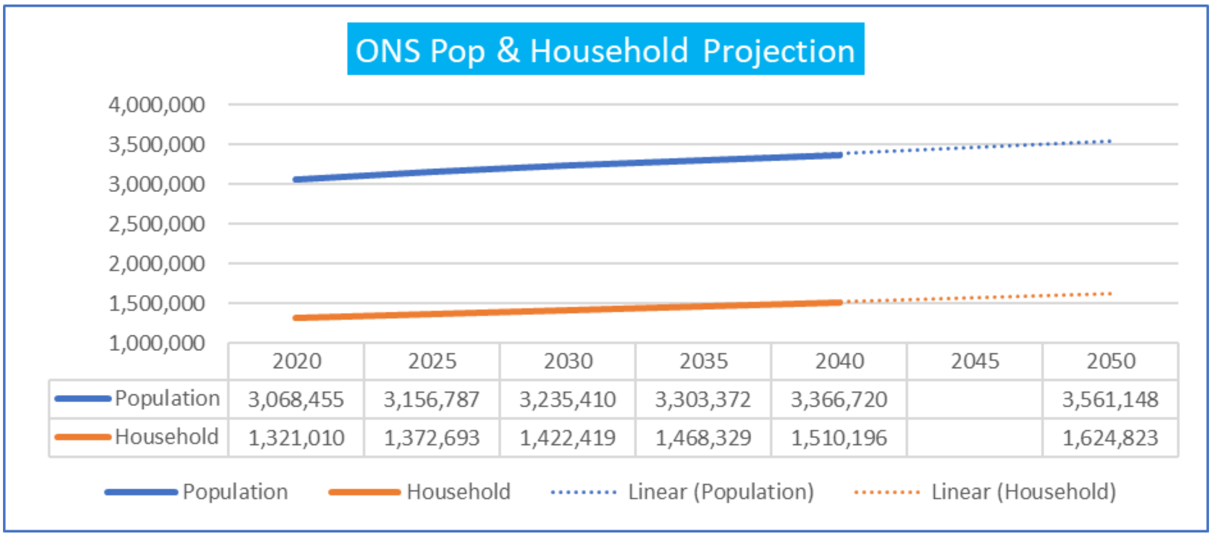
Note: 1. Population figures expressed as % over 25 yr period. TBC.

Table 68: ONS 10- and 25-year projections

Household Projections(2018 base)							5Yr growth %	10Yr growth %	25yr growth %	Ave growth pa %
Area name	2020	2025	2030	2035	2040	2050	2025-2030	2025-2035	2018-2043	2025-2050
New Forest (Part @20%)	15,979	16,351	16,719	17,040	17,313	18,045	2.2%	4.2%	10.36%	0.41%
Bath and North East Somerset	79,362	82,554	85,856	88,862	91,504	98,571	4.0%	7.6%	19.40%	0.78%
Bournemouth	86,540	87,408	88,988	90,288	91,177	92,902	1.8%	3.3%	6.29%	0.25%
Bristol, City of	195,658	202,001	208,360	215,085	221,548	235,949	3.1%	6.5%	16.81%	0.67%
North Somerset	95,968	100,211	104,227	107,906	111,432	121,035	4.0%	7.7%	20.78%	0.83%
Poole	65,696	67,209	68,753	70,205	71,419	74,404	2.3%	4.5%	10.71%	0.43%
South Gloucestershire	119,024	125,669	131,887	137,947	144,013	159,824	4.9%	9.8%	27.18%	1.09%
Wiltshire	214,401	222,704	230,216	237,036	243,254	263,015	3.4%	6.4%	18.10%	0.72%
Christchurch	22,605	23,371	24,196	24,933	25,582	27,178	3.5%	6.7%	16.29%	0.65%
East Dorset	39,263	40,451	41,595	42,551	43,374	45,672	2.8%	5.2%	12.91%	0.52%
North Dorset	30,785	31,695	32,550	33,235	33,831	35,584	2.7%	4.9%	12.27%	0.49%
Purbeck	21,139	22,116	22,994	23,718	24,337	26,305	4.0%	7.2%	18.94%	0.76%
West Dorset	47,991	50,648	53,072	55,076	56,774	62,378	4.8%	8.7%	23.16%	0.93%
Weymouth and Portland	30,111	31,242	32,350	33,312	34,087	36,349	3.5%	6.6%	16.35%	0.65%
Cotswold (Part @10%)	4,037	4,345	4,629	4,870	5,079	5,782	6.5%	12.1%	33.09%	1.32%
Stroud (Part @ 10%)	5,148	5,386	5,613	5,820	6,008	6,522	4.2%	8.0%	21.09%	0.84%
Mendip	50,453	53,033	55,361	57,415	59,299	64,856	4.4%	8.3%	22.29%	0.89%
Sedgemoor	53,803	56,318	58,573	60,662	62,594	68,012	4.0%	7.7%	20.76%	0.83%
South Somerset	74,216	76,722	79,055	81,118	82,933	87,980	3.0%	5.7%	14.67%	0.59%
Taunton Deane	52,553	56,137	59,458	62,525	65,224	73,269	5.9%	11.4%	30.52%	1.22%
West Somerset (Part @ 50%)	16,279	17,122	17,968	18,725	19,414	21,189	4.9%	9.4%	23.75%	0.95%
	1,321,010	1,372,693	1,422,419	1,468,329	1,510,196	1,624,823				
	23,846	51,683	49,727	45,910	41,867	**303812**	Net New Dwellings over 25 Yr			
	11,923	10,337	9,945	9,182	8,373	**12152**	Ave Annual NND over 25 Yr 2025-2050			

Population projections (2018 base)							5 Yr growth %	10Yr growth%	25 Yr growth%	Ave Growth pa %
AREA	2020	2025	2030	2035	2040	2050	2025-2030	2025-2035	2018-2043	2025-2050
New Forest (Part @ 20%)	36100	36,422	36,690	36,952	37,238	37908	0.7%	1.5%	4.1%	0.16%
Bath and North East Somerset	195691	203,103	210,848	216,459	220,500	235790	3.8%	6.6%	16.1%	0.64%
Bournemouth	194882	195,666	197,320	197,423	196,969	198629	0.8%	0.9%	1.5%	0.06%
Bristol, City of	471344	484,965	499,153	513,235	525,817	557501	2.9%	5.8%	15.0%	0.60%
North Somerset	217015	224,446	231,273	237,585	244,055	260345	3.0%	5.9%	16.0%	0.64%
Poole	152359	154,161	155,304	156,241	157,199	160739	0.7%	1.3%	4.3%	0.17%
South Gloucestershire	289478	305,222	319,854	333,491	346,664	382570	4.8%	9.3%	25.3%	1.01%
Wiltshire	509964	522,406	531,520	539,471	547,864	580058	1.7%	3.3%	11.0%	0.44%
Christchurch	50475	51,435	52,215	52,841	53,414	55304	1.5%	2.7%	7.5%	0.30%
East Dorset	90662	92,348	93,491	94,273	94,997	98094	1.2%	2.1%	6.2%	0.25%
North Dorset	70931	71,477	71,835	72,137	72,602	73617	0.5%	0.9%	3.0%	0.12%
Purbeck	47867	49,400	50,495	51,277	51,924	54789	2.2%	3.8%	10.9%	0.44%
West Dorset	104094	107,677	110,556	112,796	114,845	121557	2.7%	4.8%	12.9%	0.52%
Weymouth and Portland	66348	67,389	68,319	69,110	69,757	71743	1.4%	2.6%	6.5%	0.26%
Cotswold (Part @10%)	9198	9,821	10,348	10,764	11,102	12456	5.4%	9.6%	26.8%	1.07%
Stroud (Part @10%)	12069	12,474	12,824	13,142	13,450	14292	2.8%	5.4%	14.6%	0.58%
Mendip	116606	120,866	124,321	127,145	129,807	138190	2.9%	5.2%	14.3%	0.57%
Sedgemoor	124482	128,332	131,558	134,451	137,327	145285	2.5%	4.8%	13.2%	0.53%
South Somerset	169316	172,504	174,898	176,913	178,910	185079	1.4%	2.6%	7.3%	0.29%
Taunton Deane	121889	128,378	133,702	138,278	142,455	156151	4.1%	7.7%	21.6%	0.87%
West Somerset (Part @ 50%)	17685	18,295	18,888	19,388	19,827	21050	3.2%	6.0%	15.1%	0.60%
	3,068,455	3,156,787	3,235,410	3,303,372	3,366,720	3,561,148	Sub total			
		88,332	78,623	67,962	63,348	**404,361**	Pop growth over 25 Yr			
		17,666	15,725	13,592	12,670	**16,174**	Ann Ave growth over 25 Yr 2025-2050			

Figure 62: ONS Population and Household Projections



Comparisons with average growth at 15.8% over a 25 yr period with average growth at 6.7% over 10 yrs. Demonstrate if WW demand and Household/population projections align with Local Plans

Whilst regional planning indicates strategic information upon the predicted levels of growth over the 25 period, the demand projections and assessments made for Level 3 TPU's remain the most meaningful. These will aggregate to the higher Level 2 Strategic Planning Areas.

Published Local Plans are the principal source of information to predict changes in demand from properties and population over the plan period. Local Plans cover a 15-year period to meet estimated housing demand with site allocations and a rolling 5 yr supply of development land. For a 25-year demand forecast we can project long term average growth rates beyond the Local Plan period. Demand projections from a baseline through the specified 5, 10 and 25-year final scenario has been used to complete BRAVA assessments against planning objectives. These arrangements are not dissimilar from current practice used by Wessex Water for infrastructure planning and delivery.

Further supporting information is available from developer enquiries, pre-development requests and the statutory planning process upon the scale, timing, and phasing of new development. We engage with planning authorities and participate in Local Plans and Site Allocations. Case studies are included below where we have taken measures to agree and secure capacity through developer led schemes and funding arrangements. Demand projections are therefore heavily weighted on the best available information from Local Plans to cover the plan period.

Proposed reforms to the planning system to meet national targets for 300,000 new homes annually have failed to materialise and the current economic conditions remain a drag upon housing delivery.

Level 2 - Strategic Planning Areas

Strategic Planning Areas in the Wessex DWMP are formed through catchment partnership or catchment management areas across the region as the most appropriate alignment with participants, as shown in Figure 16.

Demand projections are built through the tactical planning units at Level 3 and brought forward to the strategic planning areas. Strategic planning has always been part of the investment programme with a focus in preparing for the Price Review periods.

DWMP guidance (reproduced below) illustrates a range of Strategic planning frameworks that now exist for a range of water and environmental management purposes. Consultation and collaboration through the DWMP will provide benefits in recognising and sharing adverse and harmful risks, (community risk events) and evolving and integrating strategic measures in partnership where possible. Particular reference is illustrated through the relevant plans listed below which demonstrate strong links to RBMPs, FRMPs, Local plans.

Table 69: Strategic planning frameworks (Table 7.1 in DWMP framework)

Name	Jurisdiction	Led by	Length (years)	
			Round	Plan
Water resources management plans (WRMP)	England and Wales	Companies	5	25
Regional water resource plans (RWRP)	England	Companies	5	25
River basin management plan (RBMP)	England and Wales	Environment Agency / NRW	6	6-12
Flood risk management plan (FRMP)	England and Wales	Environment Agency / NRW	6	6-12
Drainage and wastewater management plan (DWMP)	England and Wales	Companies	5	25
Strategic regional water resources gated process	England	RAPID	N/A	N/A
Shoreline management plans (SMP)	England and Wales	Local councils	N/A	100
National environment plan (NEP)	Wales	NRW	5	5
Water industry national environment plan (WINEP)	England	Environment Agency	5	5

Level 3 - Infrastructure Planning

Published Local Plans are available across the Wessex Water Region and remain a common source of data to inform the scale, scope and location of growth and new development over a 15-year planning horizon. Further information is available from Spatial Planners to demonstrate a rolling 5-year supply of development land with allocations.

Growth uncertainty is a subjective assessment made in preparing demand projections and we use the following criteria below:

- High: speculative development with limited development allocations, or exceeds local plan forecasts of development, or Developer Services team are highly uncertain of forecast.
- Medium: development allocations known but do not match the local plan forecast
- Low: Formal allocations matched or supports the local plan forecast

There is some flexibility for adjustment depending on the probability of each development and how that affects the overall certainty and the influence upon future projections. For example, where data only exists up to 2025 there would be some additional uncertainty for the long term.
Moving from long-term 25-year strategic planning into short term 5- and 10-year planning cycles for the capital programme. We will be delivering both Network and Treatment schemes and all will be considered with a demand forecast reflecting growth and new development in the catchment. Design standards make provision for a relevant planning horizon to ensure resilience against future demand and variance in climate change and weather patterns.

Network Capacity
Where growth and new development is a primary driver of investment to correct supply side deficiencies and maintain performance standards, a strategy can be fundamentally simple to provide or replace eroded capacity. Further consideration will be needed to determine the appropriate level of headroom capacity required. This can entail greater complexity when there are downstream constraints, exceedance thresholds and compliance issues. When preparing a project brief with a degree of uncertainty over future events and circumstances, adaptive strategies can accommodate options to phase essential works, introduce mitigation or defer selected measures.

Pre-development enquiries generally lead the way into appraisal for most development sites, using hydraulic models to evaluate the impact of new connections. Where capacity and performance fall below accepted levels, high level options and strategies will be developed to service new sites. Schemes will be promoted and prioritised into the capital programme over a 5yr period with release into design and construction to match the rate of development. Network Reinforcement schemes are proportionally funded through the new developer charging arrangements and infrastructure charges reflect the level of investment required through the periodic review.

Conceptual schemes at Level 3 will require further scrutiny under strategic planning frameworks at Level 2 where catchment constraints or objectives may be compromised. Existing arrangements are in place with Risk Management Authorities to share and consult upon planned works. Collaborative opportunities to pursue wider catchment objectives can be considered through partnership arrangements.

All BRAVA assessments have been provided with estimated demand projections for each Water Recycling Centre and network catchments. We can be a little more precise over the short term with information from LPA site allocations and 5-year land supply for growth and new development provided by local authority spatial planners.

Annex G. Regulators' expectations

The governments' Guiding Principles[6] document set out expectations of the DWMP. The tables below references how we have addressed the requirements throughout the DWMP.

This annex states extracts from the guiding principles and the tables show how we have responded.

Principle 1: Comprehensive, evidenced based and transparent

We expect companies to publish comprehensive, evidence based and transparent DWMPs for the 2024 price review.

Plans should use the guidance from the framework for the production of Drainage and Wastewater Management Plans, developed by Water UK in collaboration with Defra, the Welsh Government, the Water Services Regulation Authority (Ofwat), Environment Agency, Natural Resources Wales (NRW), Consumer Council for Water (CCWater), Association of Directors of Environment, Economy, Planning and Transport (ADEPT) and Blueprint for Water.

English companies' plans should address the priorities and expectations as set out in guidance from the UK government, such as:

- Defra's strategic policy statement to Ofwat
- Surface Water Management Action Plan 2018
- the national Flood and Coastal Erosion Risk Management (FCERM) Strategy for England
- the Defra flood and coastal erosion risk management statement
- regulators, such as the Environment Agency and Natural England Water Industry Strategic Environmental Requirements or the National Infrastructure Commission's Assessment

Welsh companies' plans should address the priorities and expectations as set out in these documents published by the Welsh Government and NRW:

- Strategic Priorities and Objectives Statement to Ofwat issued under section 2B of the Water Industry Act 1991
- National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in Wales
- Water Strategy for Wales

Principle 1: Comprehensive, evidenced based and transparent

Guiding Principles	Reference within DWMP
Complete the stages as set out on page 14 to 15 of Water UK's Framework for the production of Drainage and Wastewater Management Plans . The framework should be applied to secure consistency (in technical application and reporting) while maintaining some flexibility to facilitate innovation and external engagement with stakeholders.	This refers to the framework section entitled 'Planning for robust and resilient drainage and wastewater services . Our DWMP delivers that requirement. throughout, but especially sections 5 to 11.
Build on existing sewerage planning approaches undertaken by the industry. In the case of English companies this should reinforce the principles of the 2013 Drainage Strategy Framework (a joint Environment Agency and Ofwat document).	Our DWMP builds on the principles of the Drainage Strategy Framework. For example, we have 'live' data published on our website[83]. . This plan includes c200 drainage strategies (available on our DWMP portal[82]).The principles of the 2013 Drainage Strategy Framework have been followed. See throughout and Section 12 and Appendix A (Drainage and wastewater strategies).
Demonstrate links with other companies, plans and programmes which could complement the DWMP such as the national flood and coastal erosion risk management strategy, river basin management plans (RBMPs), flood risk management plans (FRMPs) , the Water Industry National Environment Programme (WINEP) the NEP in Wales and local plans produced by local authorities (for example, local flood risk management strategies, local development plans) in the interest of refining the DWMP framework and developing common ways of working and efficiencies and sharing best practice.	Section 2.3 'alignment with other plans' and section 6 'stakeholder engagement' demonstrate the links. There are many other references to this expectations throughout the plan..
Provide a clear and consistent planning approach, with enough agility and adaptability to respond to long-term drivers for drainage and wastewater services.	For our final DWMP we have created a new section 11: Adaptive planning. This allow flexibility to deviate away from the best value plan (section 10).

Demonstrate links to companies' business planning for the Price Review which will address base costs for asset maintenance, health, and resilience. It may also highlight where a change in a previous approach is considered necessary to address performance.	Base costs need a step change and we have applied adaptive paths to achieve this. This is addressed across the fDWMP, in particular Sections 2.2.4, 5.1.2, 10.8, and 11.3.
Consider, describe, and quantify any pressures in the catchment that will affect the achievement of outcomes such as population change, consumer priorities, urban creep, new development, climate change, water consumption and compliance with environmental legislation. The identification and quantification of these pressures will develop over successive cycles of DWMPs. For this first cycle of plans, we at least expect the focus to be on growth, climate change and urban creep reflecting the maturity of long-term forecasts for these parameters.	We have referred to these pressures throughout this plan. The baseline risk and vulnerability stage, is most relevant but see all section 7. Our best value plan is summarised in Section 10.6.
Show how the long-term plans facilitate economic growth, resilient communities and how they protect and enhance the environment, providing greater environmental resilience and long-term sustainability	Detailed throughout this plan. Climate change and growth adaptive path is in section 11.2.
Facilitate innovation (instigated by identifying future challenges that will need new approaches to address them) and the development of affordable, sustainable investment plans. Like WRMPs, cycle 1 of DWMPs must be based on current technologies. The adaptive pathways approach should be used to indicate how those plans may change with technology advances and other sources of uncertainty.	See section 11.7.2: New technology adaptive plan. We also mention innovation throughout our the DWMP. Ofwat's common reference scenarios for the long term planning scenarios will also be reported in the PR24 business plan submission.

Plans should be formed using robust evidence, whether this be bespoke survey, modelling or, for example, event duration monitoring (EDM) of storm overflows.	We have used all the data (e.g. EDM) we have to inform this plan. We have undertaken lots of surveys, modelling and monitoring to inform this plan. This DWMP has established a suite of computer models of our sewerage system. We have used those detailed hydraulic models to establish baseline and future performance, taking into account growth, creep, reduction in domestic flows and climate change. Referred to throughout the DWMP, e.g. 3.3 and sections 7 to 10.
Plans should focus on company assets including foul, combined and surface water sewers, ancillaries and sewage treatment works facilities. However, they can highlight through the contributions from, and cocreation with, other RMAs, where interventions across a multi owner asset base deliver multiple benefits in a cost-efficient manner.	Partnership working is described in section 6 Stakeholder and customer engagement. Our draft plan allocated £5m investment in AMP8 but this has increased following further engagement to £20m. See section10.7 Best value partnership working.
Plans should be used to inform discussions to shape companies' business plans, as well as influencing others' plans and through links to communications strategies, customer and product manufacturer and retailer behaviours, where these might impact on drainage and wastewater management performance.	The DWMP is informing our PR24 business plan. See section 10.1 and Figure 111: Alignment of needs and service measures.
Look for opportunities to enhance the local environment, economy, and wellbeing, for example by working with local authorities and other partners to deliver new and retrofitted sustainable drainage schemes in preference to traditional infrastructure, where appropriate and taking account of local environmental objectives.	Throughout the plan we are promoting nature based solutions and separation opportunities. See sections 6to 8 and section 10.

Transparent: Transparent plans will help assure the governments, regulators and interested stakeholders of their robustness and that they are fit for purpose. Elements we would expect to see to illustrate transparency, as set out in the DWMP framework, are:

Guiding Principles	Reference within DWMP
The assessment of long-term drainage and wastewater capacity and the drivers, risks and scenarios being planned for being clearly set out, including impacts on water quality	This is the purpose of the DWMP. Section 7 of the report shows how we have applied the DWMP framework to assess the long term drivers, risks and considered alternative scenarios in sections 10 and 11.
A structured and assured approach to identifying and developing options and presenting a robust investment plan	Referred to throughout, but main sections are 8 and 10.
Consistent presentation of data such that national understanding of risk is enabled.	Our DWMP portal contains all the information required (and a lot more))in a format following the WaterUK national picture, developed as part of the DWMP framework. See section 12
Informed debate about acceptability of different levels of risk	In our draft plan, we introduced scenarios to show these different investment requirements depending on risk. We have listened to the feedback and our final plan is similar to the draft core plan, with extra investment for nutrient neutrality and storm overflows. See section 10. Our approach to flooding risk is shown in Figure 77: Resilience standards for drainage infrastructure.

Provide greater confidence to customers, regulators and stakeholders in risk mitigation strategies identified, and resultant plans	By publishing the DWMP on our website gives customers, regulators and stakeholders greater confidence in our long term plans.
Provide the basis for effective engagement with customers and stakeholders on levels of service, environmental performance and resilience, now and for the future, and on the choices and costs to customers in providing that service	Our customer research has established this as details in Section 6 and Appendix B: DWMP customer research.
Where Ofwat does not have assurance that companies are planning and investing appropriately as part of their strategy to achieve long-term operational resilience, Ofwat will challenge companies to make sure that the needs of current and future customers will be met efficiently.	The plan is aiming for long term operational resilience due to future pressures. It does not generally include base or operational costs, as the DWMP is more focussed on the enhancement of water quality and resilience. Our business plan covers base maintenance.

Guiding Principle 2: Resilient:

Defra's enabling resilience in the water sector report says that companies, other RMAs and drainage asset owners must work with each other and with government and regulators to lead the way in taking action to ensure that they can meet the pressures and needs of a growing population and economy, while at the same time valuing the environment and meeting the challenges of climate change.

The resilience map in the report also set out plans for English companies to help secure the long-term resilience of the water sector and enhance the resilience of the sewerage network

Guiding Principles	DWMP – the plan Reference
Identifying and assessing risks DWMPs should clearly quantify and present (including visually through mapping) current and future risks: - from sewerage assets to the environment - possible flood risk to sewerage assets from climate change, urban creep and population growth	Our DWMP portal shows the WaterUK style mapping of how storm overflow and flooding risks can increase in the future due to climate change urban creep and growth – if we do nothing. Reported throughout the DWMP, especially See Section.7 and 12.
We expect to see risks presented in a consistent way across plans to permit a national understanding of risk for Welsh companies concerning risks within Wales and English companies concerning risks within England.	RBCS, BRAVA and Common planning objectives were agreed by WaterUK and DWMP steering group. See section 5.
We would also propose that companies consider UK Climate Risk's Independent Assessment (CCRA3), and how the DWMP can help ensure drainage and wastewater systems remain resilient and able to cope with the changing climate.	We have considered climate change. See section7.4.

Time frames and future trends	
Where feasible, and to support prioritisation of investment decisions, 5 and 10-year intervals should be assessed in addition to the minimum 25-year period.	We have considered the baseline, 5, 10 and 25 year horizons. Described in section 7.
We recognise there will be limits to what can be achieved in the first cycle of plans, but it is expected that as a minimum all companies will carry out baseline and minimum 25-year assessments, with 5-year and 10-year assessments carried out if the level of change warrants it in specific catchments.	We have considered the baseline, 5, 10 and 25 year horizons. Described in section 7.
Impacts of existing maintenance and investment schedules, as well as changing customer and stakeholder behaviours should also be qualitatively assessed, where quantifying is not possible.	Base maintenance has a huge impact. For example in Section 10.1.4we have estimated how many flooding and pollutions incidents could result in no base 2.2.4 maintenance.
In planning for a minimum 25-year timeframe, we expect companies to consider all current and future trends. While challenges such as population growth are undoubtedly key drivers, it's important not to overlook other trends that could have a significant impact on planning.	The plan covers this. We have considered the 25 year timeframe and growth trends. See Annex F.
A changing climate is perhaps the biggest of these other trends or factors. However, companies should not only factor in climate change in relation to increasing intensity of rainfall, but also carry out research, working with stakeholders where appropriate, so that in the second and future cycles of DWMPs it is possible to consider issues such as:	This was agreed by Water UK not to be Cycle 1, but the research is needed for cycle 2. Noted for cycle 2.
• how increased temperatures might affect the operation of treatment works	
• the potential for dry summers reducing river base flows, with occasional intense rainfall, resulting in increased risks of environmental impact	
Companies should also consider the impact of changing customer behaviour when preparing their plans, such as whether encouraging customers to use less water might affect flows.	We have modelled the reduction in water usage to align with the WRMP. This has a negligible effect

	compared to rainfall runoff. See Appendix B and section 7.4.
Equally, more sustainable drainage in new developments could have a similar impact. Thus, the flow regimes could alter differently in different locations.	Sustainable drainage in new developments has been assumed. Especially with the move to enact schedule 3 of FWMA. See section 7.4 and Annex F.

Guiding Principle Potential hazards and threats to sewerage assets

Guiding Principles	DWMP Reference
We expect companies, as with other RMAs, to assess the resilience of their sewerage systems and infrastructure against the full range of potential hazards and threats and to include risks associated with blockages resulting from sewer misuse and sewer condition or risks such as infiltration and take proportionate steps to improve operational resilience where required.	We have done this in developing the DWMP and it is reported throughout the plan.
This should also include flooding of water and wastewater infrastructure, burst water mains or other infrastructure failures, and reduce the contribution to urban diffuse pollution from misconnections.	Flooding of wastewater infrastructure (section 10.4 and Appendix D) and burst rising mains (section 10.8) are covered and elsewhere in the plan. Flooding of water infrastructure and water mains is not included in the DWMP framework, so is not in our DWMP.
For English companies, relevant measures set out in the National Flood and Coastal Erosion Risk Management Strategy, should be supported.	We support these. See section 2.3.5 and Appendix D.
We expect companies to make links to their existing flood resilience planning to assess the extent to which their sewage treatment plants are appropriately resilient against extreme flood events (as described in the National Flood Resilience Review) and include provision for additional resilience where required.	Resilience is covered in Appendix D.
We expect companies to consider green infrastructure, nature-based and low-carbon solutions to mitigating risk, such as sustainable drainage systems, where possible, as well as taking opportunities to reduce the pumping of wastewater around the drainage system.	We agree this is better than grey solutions. We have used sustainable solutions where best value. Sections 6 to 11.

Prioritising resilience upgrades to assets	
Companies should prioritise resilience upgrades based on risk, achieving necessary improvements to high-risk sites first. Ofwat's annual reporting guidance gives some consideration to what is allowable under enhancement expenditure for resilience versus a base cost activity.	We have included resilience in Section 10.10. More detail of resilience is in Appendix D.
Plans should identify where companies can make greater use of technology available such as, real time control to optimise storage capacity within networks and give advance warning of potentially damaging spill events.	Real-time control is not new technology and is already used on where we have larger sewer to make it worthwhile. Optimisation of our network is discussed in Sections 3.3, 8.3.6 and section 10
In this way early preventative action can be taken, thereby making systems more resilient to the pressures on them and providing enhanced environmental protection.	See above. We are looking to apply this approach to the newly constructed North Bristol sewer, as described in section 3.3
Companies should also consider environmental enhancement or improved flood risk performance could be delivered through changing existing asset maintenance activities. This information should be taken account of in business planning for the Price Review.	Business as usual in our best plan, section 10, especially Section 10.5.

Guiding Principle 3: Environment

Guiding Principles	Reference within DWMP
The UK government's 25 Year Environment Plan for England and the Welsh Government's water strategy for Wales 2015 committed to clean and plentiful water and reducing the risks of harm from environmental hazards.	The DWMP plan includes 25YEP improvements, as we have included them on the WINEP for delivery by 2030. The DWMP is enhancing performance to reduce harm.

	See section 2.3.2.
Ambitions are for the water environment to be cleaner and healthier and managed in a way that is more resilient to floods and drought to support people, biodiversity, and the economy.	The WINEP contains schemes to move towards the ambition. See section 10.
In England, the 25 Year Plan charts how we plan to improve our environment, and DWMPs are clearly signposted as a way in which we will do this. It is therefore important that DWMPs clearly assess impacts on the environment and how these can be reduced or improved over the 25-year period.	The DWMP plan is aimed to improvement environment as well as serving our customers. See our environmental report Appendix C. Also see the plan, especially sections2.2.2, 2.3, 9 and 10.
English companies' DWMPs should also take account of the current joint Environment Agency and Natural England document water industry strategic environment requirements and future updates.	The DWMP plan includes the ambition of the WISER as stated in Section 2.3.
The inclusion of the drainage and wastewater management planning process in the Environment Act, making the process statutory [footnote 4] for cycle 2 in both England and Wales, underlines the importance that both the governments are placing on DWMPs as a current and future tool for drainage and wastewater management policy.	Noted.
Protecting and enhancing the environment Actions arising from DWMPs should make a significant contribution to securing a healthier water environment, whilst protecting public health and wildlife by reducing pollution incidents, and the management of the water industry's contribution to reducing urban diffuse pollution.	Noted.
For example, operational practices affecting water quality must be addressed, and we expect that DWMPs should make a positive contribution to this. Companies can also use data and engagement on the minimum 25-year planning horizon to consider the pressures from future housing development such as the effect on nutrients in wastewater.	Nutrient Neutrality obligations has changed since the draft DWMP in June 2022. The final DWMP includes £700m extra investment in dealing with this, and it included on the WINEP for delivery by 2030. See the full

	plan, especially sections 2.2.2, and 10. Annex F details development pressures.
English companies will be aware that in January 2021, the UK government announced that the Storm Overflows Taskforce for England made up of Defra, the Environment Agency, Ofwat, Consumer Council for Water, Blueprint for Water and Water UK had agreed to set a long-term goal to eliminate harm from storm overflows.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments Storm overflow discharge reduction plan (SODRP). See throughout the plan, especially section 10.3.
We expect English companies' DWMPs to set out how companies will achieve significant reductions in the frequency and volume of sewage discharges from storm overflows, so they operate infrequently and only in cases of unusually heavy rainfall as mentioned in the Environment Act 2021 and Defra's strategic policy statement to Ofwat ahead of price review 2024.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.
We expect overflows that do the most harm or impact on the most sensitive and highest amenity sites to be prioritised first.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.
Harm includes where it could occur to people (for example, in recreational waters) and the environment. Treatment of sewage discharges from storm overflows can also be considered.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.

The Storm Overflows Taskforce is considering a range of factors to achieve this goal, including the role of drainage issues in storm overflows, and possible actions to reduce or slow down surface water entering the sewerage system.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.
The UK government therefore anticipates issuing supplementary guidance for English companies by January 2022 on the ambition for storm overflows to accompany these guiding principles document.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.
This supplementary guidance should also be considered in time for the draft DWMPs on which companies will be consulting in summer 2022, and fully taken account of for their final plans in March 2023.	Storm overflows are discussed throughout our plan. Our DWMP aligns with the governments SODRP. See throughout the plan, especially section 10.3.
If English companies apply the guiding principles in this document now in advance of 2022, such as seeking to engage and collaborate with other organisations.	Agreed
They should have a good understanding of the pressures being placed on their networks by others, the challenges to resilience and the impacts of overflows on the environment, engaging also with the Environment Agency.	Agreed
This should place companies in a good position to respond to the government's ambition on storm overflows.	Agreed

Nature-based solutions	
In helping to protect and enhance the environment, we expect DWMPs to consider the use of nature-based solutions, where feasible, as part of their option development and assessment.	Throughout our DWMP where best value. See section 10.1.5 Our best value plan Nature based solutions
For example, multifunctional sustainable drainage systems present opportunities which may, in collaboration and partnership with stakeholders, have the potential to contribute to the creation of new habitats, as well as contribute to the industry's response to climate change mitigation and adaption.	Throughout our DWMP where best value. E.g. See sections 8.3.3, 10.1.5, 10.1.6.
We expect the actions arising from plans to prevent environmental deterioration, enable sustainable development and seek out opportunities for environmental enhancement where possible.	Our DWMP aims to improve the environment, so reported throughout our DWMP the plan. See section 10
Plans should address the challenges of protecting the environment, support economic growth, and deal with the pressures of new development, climate change and population growth, and the resulting pressures on infrastructure.	Throughout our DWMP.. See section 7.4 and Annex F.
Realising the DWMPs' full potential	
We recognise that our ambitions for the environmental benefits of DWMPs will only be fully realised if all RMAs and drainage asset owners play their part in participating in their cocreation and jointly funded.	Agreed
This will enable plans to take account of local environmental outcomes, where applicable, and potentially find solutions with multiple benefits. We expect to see collaboration and engagement from all parties.	Section 6.

Principle 4: Collaboration

Collaboration with other organisations and stakeholders is key to the development of comprehensive DWMPs. So, companies should do all they can to foster collaborative working.	Section 6.
The importance of collaboration	Section 6.

While the responsibility for development and publication of DWMPs sits with companies, they cannot develop plans which deliver their full potential without the input of other stakeholders within and around the companies' areas of operation.	
Plans need to be developed and created closely with other stakeholders, including those who have responsibility for other elements of drainage. Local authorities and the environmental regulators can be responsible for aspects of surface water drainage and management of flood risks, and other drainage assets which feed into a companies' networks.	Section 6.
The new FCERM strategy for England was adopted by UK government on 25 September 2020 and provides the framework for all RMAs to improve the nation's resilience to the risk of flooding and coastal change.	Section 6.
It sets out the long-term delivery objectives the nation should take over the next 10 to 30 years as well as shorter term, practical measures risk management authorities should take now, working with partners and communities.	Section 6.
A national flood and coastal erosion risk management strategy for England action plan was published on GOV.UK in May 2021 on how the Environment Agency and national stakeholders will take forward measures in the strategy.	Section 6. Appendix D.
The strategy emphasised the importance of working together on DWMPs and early engagement with beneficiaries to help unlock jointly funded opportunities.	Section 6.
A key action is: 'The Environment Agency will work with Water UK and Ofwat to assess the degree to which all relevant RMAs are actively contributing to the production of Drainage and Wastewater Management Plans by May 2022'.	Section 6.
Other stakeholders, like environmental non-governmental organisations (NGOs) could also have an interest, for example, in a habitat close to a company asset, and can share their knowledge about the requirements of the habitat and how any potential risks to it could be prevented or addressed.	Section 6.
A framework for collaboration Plans should:	
be collaborative, demonstrate that collaboration, and strive to realise the multiple benefits from achieving best value to the economy, society, and the environment over the long-term. This is so it aligns with the 25 Year Environment Plan in England (see page 96)	Section 6.
provide a clear and practical framework for engagement and consultation with key stakeholders	Section 6.

help articulate how the delivery of long-term plans will provide clear benefits for stakeholders, customers, and the environment	Section 6.
Our expectations for collaboration and its challenges We expect to see collaboration leading to the cocreation of and joint funded solutions which can both further the delivery of the DWMP while also, where possible, delivering integrated solutions, to resolve issues such as surface water flooding risks or improving natural habitat.	Section 6.
As with leadership, we expect all collaboration partners in the DWMP process to familiarise themselves with Water UK's DWMP companion document working together to improve drainage and environmental water quality.	Section 6.
This document explains the DWMP process and sets out how organisations with interests or responsibilities relating to drainage, flooding and protection of the environment can make improvements by working together to create DWMPs.	Section 6.

Principal 5: Leadership

We expect companies to lead on the development of the plans and engagement with others, building on the leadership they have already shown in the DWMP Steering Group, the DWMP Implementation Group, and the Task and Finish groups that support this work.	We lead the development of the plan and many meeting with stakeholders as described in section 6.
Companies should also have regard to their statutory duties on drainage and flood risk management.	Duties are in our DWMP and business plans.

We also expect company boards to:	
• ensure that plans are given sufficient resource for their development	Board has had many update regarding resources, and consultants have been used for a lot of the development of the options. See Appendix E.
• give a clear signal to their DWMP and regulation teams on the board's expectations for the plans	Regulatory teams have been involved in Boards expectations. See Appendix E.
• take an active interest in their plan's development, challenging what is being done and considering how the plans can improve company operations and accountability	Boards have delegated to PR24 groups with engaged and challenging members. See Appendix E.
• be exemplars for encouraging multi-sector engagement on the plans and promoting them within the company and beyond	CEO officer emailed all our MPs about storm overflows. See section 6 and Appendix E.
As effective drainage can make a significant contribution to managing surface water flood risk, we expect relevant RMAs to show appropriate leadership in meeting their flood risk management obligations by ensuring their organisations actively engage with the DWMP process.	Section 6.

Principle 6: Customers

<u>Engage your customers</u>	
We expect companies to carry out meaningful and effective engagement with their customers in developing their draft plans, and through this be able to demonstrate that their final plans are acceptable to customers overall.	See section 2.2.9 and Appendix B Customer research.
As with other complex planning processes such as WRMP and RBMP, the maturity and effectiveness of the consultation process are expected to develop over time as all parties become more familiar with the DWMP framework.	
• However, to try to maximise engagement and its effectiveness in this first cycle companies should consider how best to engage with customers to ensure that they include all groups of customers as far as possible. It would therefore be desirable to use a range of approaches to engagement, rather than only online.	See section 2.2.9 and Appendix B Customer research.
• If companies know that a large proportion of customers do not have online accounts and receive only paper bills. We recognise that this may be difficult for the first cycle of DWMPs given the ongoing impact of COVID-19.	
• Companies might also find it useful to consider, where appropriate, how engagement on DWMPs might fit with other engagement such as on WRMPs. Such engagement might provide customers with a greater understanding of the water cycle, and foster changes in customer behaviour, which might lead to a reduction in sewer blockages.	See section 2.2.9 and Appendix B Customer research.
• Explain clearly to your customers	
The plans should:	
provide customers with confidence that existing service levels to current and future customers are maintained in the face of increasing population, economic growth, climate change, tightening environmental standards and rising expectations of customers	Our DWMP gives visibility to these existing and future pressures. See the plan especially sections 7, 10 and 11
clearly show the required improvements where the service levels are not currently good enough (such as, they do not meet customers' reasonable expectations)	DWMP gives visibility to these existing and future pressures. See the plan especially sections 7, 10 and 11. We have applied adaptive

	pathways to increase investment in the future if needed. Section 11.
describe clearly where risks remain to long-term resilience for customers and make sure that they are acceptable to customers, as far as possible	Our geospatial portal shows which catchments have risk and how those risk will increase in the future if we stand still. See section 12 and Appendix A.
explain potential risks that can be created by customers such as the impact of the incorrect disposal of single-use items, such as wet wipes, nappies, and sanitary products	See sections 5.8 and 10.5.
Show value for money and wider benefits	See section 10.
We expect companies to select options with a view to delivering the best value for money over the long term, considering the wider costs and benefits to the economy, society and the environment.	See section 10.
We expect plans to offer best value and be affordable while demonstrating legitimacy by taking due account of customers' priorities and appetite for risk.	See section 10 for best value and Appendix B for affordability.
Plans should also expose any conflict between affordability and the above objectives and clearly set out how such conflicts will be managed, and risks mitigated.	See Appendix B. Bills will need to increase, which some customers will not be able to afford. We will put measures in place the mange this.
Regarding cost, partnership is key so that there is an integrated approach to managing drainage with fair apportionment of the burden of investment between water bill payers, taxpayers (local and central), highway users, riparian owners and any other relevant stakeholders.	See section 6 and 10.1.6.

Conclusion

These guiding principles are being issued after companies have completed the Risk-Based Catchment Screening, Baseline Risk and Vulnerability Assessment (BRAVA) and problem characterisation phases of their DWMP development for this first planning cycle.	Updated 26 August 2022.
Now into the Options Development and Appraisal (ODA) phase, 2021 to 2022 will therefore see the focus being squarely on developing possible options for mitigating what has been identified and prioritising action.	See section 8 Options development and appraisal.
We therefore consider that these guiding principles will help provide a timely reminder of the governments' and regulators' expectations for your draft and final plans for this first cycle.	Noted.
Our ambition for the management of our drainage and wastewater assets and networks must be high. As we are all aware, these critical assets face increasing challenges as we experience a changing climate and population growth. We must have comprehensive plans for addressing these challenges, including operational issues such as storm overflows.	See sections 8 to 11.
The water industry has shown important leadership in collaborating on the development of this planning process, and we all want that collaboration to continue and evolve. The governments and regulators welcome companies' early collaboration with them as plans develop. DWMPs must be a game-changer for managing drainage and sewerage, including wastewater, now and into the future.	Our DWMP shows that a step change in drainage and wastewater investment is required to achieve the governments' ambitious targets included in the Environment Act. Or Board assurance statement can be found in Appendix E.

Annex H. Statement of Response to draft DWMP consultation

The following document was written to collate all responses to our draft DWMP. This final Statement of Response has been included as an Annex to the main report, so it can contain hyperlinks to the relevant sections of the report.

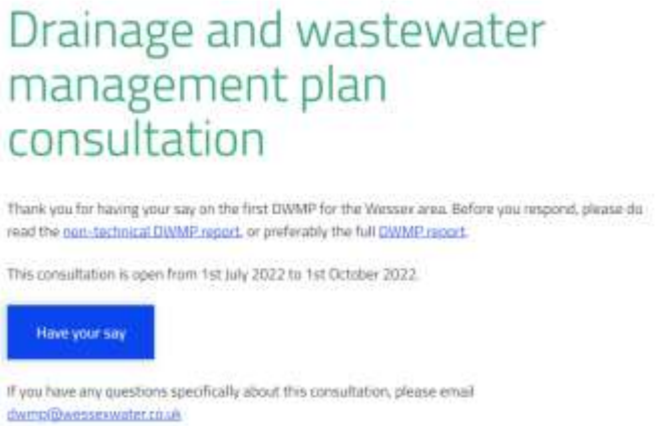
H1.0 Introduction

Thanks to everyone who responded to our draft Drainage and Wastewater Management plan (dDWMP). We value the feedback and we have tried to incorporate as much as possible in the final DWMP. Due to time restrictions, some will need to wait for cycle 2.

This report is the final Statement of Response (SoR), which has been produced. In this SoR we have collated all responses received during the consultation of our dDWMP, either from the on-line 'Have your say' (see Figure 153) or sent to our DWMP@wessexwater.co.uk address.

This final SoR contain cross-references where we have addressed feedback in the final DWMP report, or explains why we didn't address the feedback in Cycle 1 fDWMP.

Figure 153: Draft DWMP consultation 'have your say'



In this statement of response, the feedback comments obtained from all stakeholders during the consultation period has been grouped into broad themes, which are set out below:

- Stakeholder engagement
- Partnership working
- Investment scenarios / affordability
- Storm overflows & monitoring
- Nature based solutions / SuDS
- Base vs enhancement activities and asset management
- Environmental impact, climate change / ecological emergency
- Other

H1.1 DWMP background

Drainage and Wastewater Management Plans (DWMPs) are long term strategic plans which set out how resilient drainage and wastewater infrastructure will be delivered over the next 25 years. These are to be prepared by sewerage undertakers on a 5 year annual cycle. This is the first time we have produced a DWMP (cycle 1).

Wessex Water published our draft Drainage and Wastewater Management Plan (dDWMP) on 30th June 2022. The plan can be found at Drainage and wastewater management plan | Wessex Water.

The draft plan set out four key investment scenarios, outlining the associated risks, costs and impacts on customer bills to enable the delivery of an effective drainage network over the plan period to differing performance ambition and timescales:

- **Core scenario** – to continue our current levels of service investment and also improve storm overflow discharge frequencies to less than 10 discharges per year by 2050. A bill increase of £80 may be required.
- **Full scenario** – which is the same as the core scenario but also eliminates storm overflows by 2050 – at a very high cost and disruption. This is likely to increase bills by £330 per household per year.
- **Unconstrained scenario** – which is the same as the full scenario but includes more sustainable solutions and also reduces significant flooding. This is likely to increase bills by £450 per household per year.
- **Sound science scenario** – which is the same as the core scenario, but with the storm overflow investment deferred, so there is no bill impact in 2025-2030, but will increase by £100 after 2030.

The idea of these scenarios was to obtain feedback from our customers and stakeholders on their preference given the associated bill increases. We deliberately did not state out preference as we did not want to influence the feedback. The intention was that this would inform the level of ambition and timing of our preferred final DWMP and PR24.

H1.2 Consultation

The DWMP has implications for a range of partner organisations and stakeholders spanning flood risk, drainage, environmental protection and water quality across the Wessex Water region.

Following publication of the draft plan, customers, partners and stakeholders were invited to make comments on the plan, including an opportunity to rank the four key investment scenarios. We encouraged feedback via the on-line consultation ‘Have your say’ (shown in Figure 153) because the online responses were automatically compiled into an Excel spreadsheet. The consultation period ended on 1st October 2022. Some email responses were received after this date which we have included in this SoR.

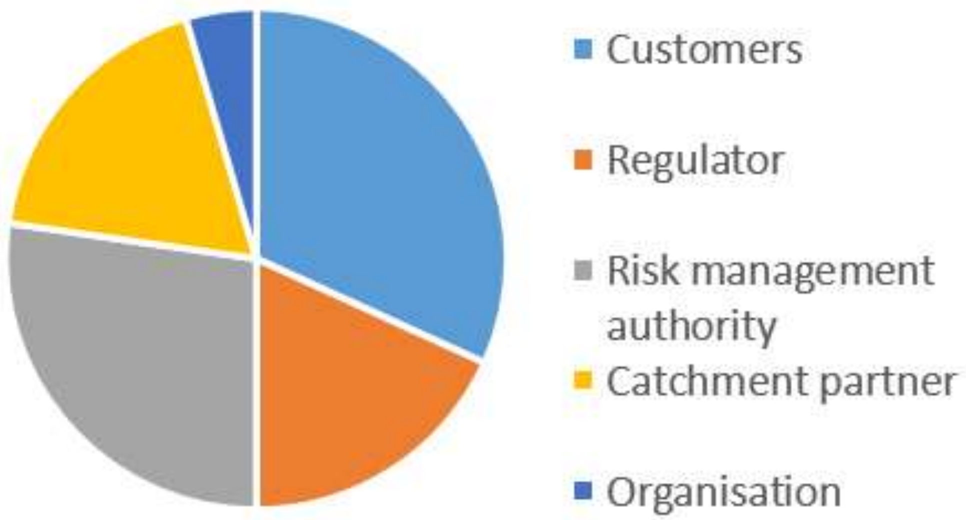
We had 22 responses, from a variety of stakeholders (also see Figure 2), including:

- Customers
- Ofwat
- Environment Agency
- Natural England
- Historic England
- Lead Local Flood Authorities - Hampshire, Dorset, BCP, Bristol City
- Highways (B&NES)
- River Frome Reconnected
- Wiltshire Fisheries Association
- Catchment Partnerships – Somerset, Bristol Avon, Dorset

In Section H2 we summarise all the feedback and our provide interim response.

In Section H3, we tabulate the detailed feedback, by stakeholder type. We have highlighted which theme the feedback relates to. Some of the feedback has been summarised (e.g. background detailed is not replicated), but we have tried to capture all feedback points made.

Figure 154: Who feedback was received from



H2.0 Summary of consultation feedback

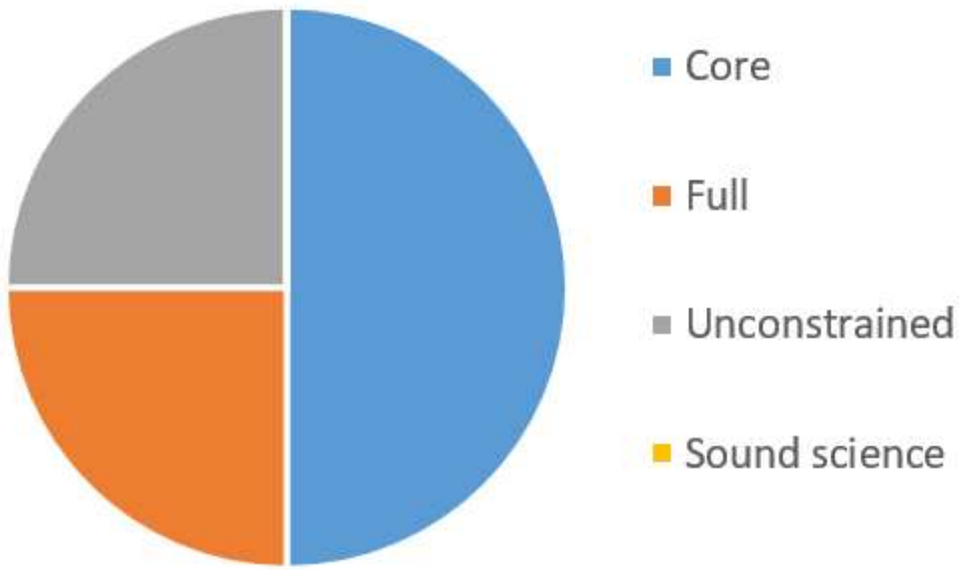
This section summarises the consultation feedback. Section H3 contains more tables (per organisation type) listing the detailed comments on how we can improve between now and the final or cycle 2 DWMP.

H2.1 Scenario preference

One of the main purpose of the consultation was to obtain feedback from our customers and stakeholder on the preferences of the proposed dDWMP scenarios. These scenarios were developed to do the minimum (core), defer investment (sound science), delivery more (full) and deliver more sustainably using nature based solutions (unconstrained). The bill impacts of each scenario are listed in section H1.1. This customer and stakeholder engagement was to obtain their preference on affordability compared to performance of storm overflows and flooding. It was undertaken during the energy crisis.

Figure 155 shows the first choice of the consultation on the preferred scenario. It suggests that the 'core' scenario is the preferred scenario. However, the sample rate is not considered representative of all our customers and stakeholders.

Figure 155: Preferred (first choice) scenario



H2.2 Positive consultation feedback

Our on-line consultation asked the question: What do you like most?
On-line responses (that we can share - one redacted) were:

- Managing the any increase in bills over an extended period and accepting that there will be some storm water escape but managing this within a framework
- It recognises the impact of climate change and certain vulnerabilities within the city. It also supports SuDS implementation and retrofitting SuDS. We are pleased to see partnership working projects and opportunities identified. The plans are well informed and it is helpful to see the data sources supporting this
- Openness to working with nature-based solutions to drainage & wastewater issues
- Plans to clean up sewage discharges
- work on surface water drains

Positive feedback was also received on the production of our first DWMP.

Ofwat commented:

- In addition to the six national planning objectives, Wessex Water has set itself an additional six bespoke planning objectives, all directly or indirectly related to environmental improvement. We are particularly pleased to see the inclusion of blockages (very often the cause of pollution incidents), waterbodies improved and groundwater infiltration reduction.
- For the environmental theme we welcome the clearly expressed link to the main drivers being Water Industry Strategic Environmental Requirements (WISER) and the Water Industry National Environment Programme (WINEP).
- The Plan appears to be fully integrated (and evidenced by the involvement of many Wessex Water teams) and there is a commitment to seeking partners for co-created solutions.
- Although a SEA was not required for DWMP cycle 1 Wessex Water, to its credit, produced an environmental report with the goal of meeting SEA requirements. In general, the report is well written and comprehensively presented, and acknowledging the limitations due to lack of specific details on options and that further modelling will be needed at this point in the DWMP process.

Somerset Catchment Partnership commented:

- We welcome the development of the Plan and the opportunity that this provides for collaboration to align with the objectives of the Wessex Area Catchment Partnerships through a transparent approach.
- We welcome the opportunity, through the DWMPs, to collaborate with Wessex Water on the Catchment Based Approach, with a key focus and ambition to deliver improvements via integration of nature-based and multi-benefit solutions.
- The Drainage and Wastewater Management Strategy Summary Reports help with strategic planning around where partnership opportunities could be within the catchment in the future.
- We welcome development of the DWMP Portal as a useful resource for stakeholders and communities to access more detailed information.

River Frome Connected commented:

- Welcome the development of the Plan with consideration and alignment with the Catchment Partnerships through a transparent approach.
- Welcomed the updates and excellent communication and support to the River Frome Reconnected partnership over the past 2 years
- Agree on the ambition to deliver improvements through Nature-Based Solutions taking Partnership approach. Especially SuDS and NFM.
- Useful to see the Drainage and Wastewater Management Strategy Summary Reports- helps with strategic planning and thinking about where the partnership opportunities could be within the catchment in the future
- DWMP Portal very useful resource to access more detailed information

Bristol City Council commented:

- It recognises the impact of climate change to Bristol and certain vulnerabilities within the city. It also supports SuDS implementation and retrofitting SuDS. We are pleased to see partnership working projects and opportunities identified. The plans are well informed and it is helpful to see the data sources supporting this.

South Gloucestershire Council commented:

- SGC LLFA fully support the DWMP for Wessex area and the 12 planning objectives that are put forward, which strongly align with our LFRMS.
- Element of the DWMP that align closely with our future ambitions and are 'most liked' are around the proposal to make use of nature-based solution over traditional grey infrastructure and the inclusion of the bespoke SuDS planning objective.
- We see the use of green solutions in flood risk and drainage schemes that provide multiple environmental benefits as being key to allowing our sector to meet our obligations in responding to the climate emergency.
- We also welcome the statement recommending that Schedule 3 of the FWMA (2010) be implemented to ensure the delivery of high standard SuDS with development.

Bristol Avon Catchment partnership commented:

- We welcome the development of the Plan, through a transparent approach, with consideration and alignment with the Catchment Partnerships.
- We have welcomed the updates and communication provided from the Flood Risk & Drainage Strategy Manager with the BACP over the past 2 years.
- The Partnership views the development of the DWMPs as a good opportunity to collaborate and work up catchment-based solutions/ nature-based solutions to align the DWMP Strategies with the Partnership Programmes, identified in the BACP Catchment Delivery Framework (on BACP website).
- We welcome the ambition to deliver improvements through Partnership Solutions and Nature-Based Solutions.
- Useful to see the Drainage and Wastewater Management Strategy Summary Reports- helps with strategic planning and thinking about where the partnership opportunities could be within the catchment in the future.

- DWMP Portal very useful resource to access more detailed information. We support the long-term investment approach that is being taken to significantly reduce the impact of the drainage and wastewater networks on the environment. We also support the recommendations, in particular the options for SuDS, catchment management, making space for water and contributions to and from partnership schemes, as we feel these options will deliver the required improvements and also provide more sustainable, multi-benefit outcomes in the long-term.

Dorset catchment partnership commented:

- We appreciate the ongoing engagement with Catchment Partnerships throughout the Plan's development, which has included identifying existing projects and future partnership opportunities for delivering DWMP outcomes in Dorset. Regular engagement between the DWMP team and Dorset Catchment Partnership has helped aligning the DWMP with the Dorset Catchment Strategy as both have developed in parallel.
- We welcome the DWMP portal as a useful resource for external partners, including but not only our LLFA and EA partners, to access more detailed information. Some of our partners have already used this facility to contribute to significant aspects of the Plan, and ensure its alignment with other local strategies such as the Shoreline Management Plans and Flooding and Coastal Erosion Risk Management Plans.
- We welcome the ambition to deliver improvements through partnership working and Nature-based-solutions, and look forward to working with Wessex Water partners in developing and delivering such schemes in Dorset's catchments for multiple environmental benefit.
- We support the significant programme proposed to reduce Storm Overflows within Dorset's catchments, and support the evidence-based nature of this plan which will prioritise those Overflows which cause most environmental harm.

H2.3 Other consultation feedback

Our on-line consultation asked the question: Are there any changes needed?

On-line responses (that we can share and publish) were:

- In Table 7 please identify the Local Flood Risk Management Strategy as potential for DWMP partnership working opportunities. It would be useful to see each scenario with associated SuDS costs
- The Lyde Green development area located in the northeast of Bristol is shown outside of the WW region. The reason for its exclusion is because a NAV has been appointed as the water and sewerage undertaker for the development. Other new developments in South Glos have also appointed a NAV as the water and sewerage undertaker. Due to the rise in number of NAV's being appointed to serve new developments across the Wessex area, SGC LLFA wonder if a section should be included in the DWMP that covers NAVs and how they function with the delivery of the DWMP objectives. It also raises the question as to whether the NAV's will need to produce their own DWMP or be expected to contribute towards objectives in the WW DWMP for the Wessex area.

- I would be willing to accept significantly higher water bills in order to facilitate maximal investment in water infrastructure, in order to better protect & enhance our environment
- The process must happen much sooner than planned
- More flexibility of approach in the use of sewerage infrastructure where spare capacity exists and magnitude of flood risk is an overriding concern.
- I would like to see the surface water drains extending further out to sea

Table 1 contains a summary of all the consultation feedback and includes comments on how Wessex Water proposes to address comments received during the consultation in the final plan, or if not why.

Section 3 contains the more detailed feedback received.

A summary of the main consultation feedback that Wessex Water will respond to includes:

- Propose a core plan with adaptive pathways to reflect different decision points and pathways.
- Demonstrate alignment with the storm overflow reduction plan to ensure regulatory compliance over the plan period
- Provide clarity on Wessex Water's approach to the delivery of Nature Based Solutions / SuDS.
- Include a recreational use section needed (e.g. bathing waters)
- Provide more reference to climate/ ecological emergency declarations of partner organisations
- Provide further detail on spend profiles (e.g. storm overflow over the next 25 years)
- Determine and set out next steps in terms of stakeholder and customer engagement

Table 70: Summary of consultation feedback

Theme	Ofwat feedback	Other customer and stakeholder feedback	Wessex Water response
ADAPTIVE PLANNING	Demonstrate how you will manage uncertainty across the wider DWMP using scenario testing and adaptive planning to show how the plan will adapt to changes in key factors	None	Our final DWMP will include more on scenario testing and adaptive planning.
ASSET MANAGEMENT	Clearly set out how asset management and optimisation (base expenditure activities) can address some of your risks….. before recommending enhancement schemes.	Environmental impact of existing assets, particularly those which do not have schemes or interventions planned needs to be clearer	Asset management and optimisation can provide some benefits, but are unlikely to give a step change in performance. Greater clarity will be provided in the final DWMP regarding using base expenditure to defer enhancement expenditure.
OPTIONS APPRAISAL	Provide evidence/ clarification • On how best value was calculated and provide a best value assessment of the final constrained list of options. • In respect of costs and benefits of solutions, particularly schemes that deliver multiple benefits. • On how multiple benefit solutions are being considered, how they compare to alternatives, and how this has evolved since the dDWMP. • Provide clarity on how your nature-based ambition will be realized (prioritise natural based solutions). • how the alignment of your DWMP decision-making tools with other areas of your business to assess risk and prioritise solutions.		The schemes included on the WINEP were subjected to the best value assessments, which will be explained more in the final DWMP. Multiple benefits of schemes will also be included (e.g. storm overflow separation could also reduce flood risk). Our preference is to use nature based solutions rather than grey solutions. We will include more examples (e.g. wetlands to treat groundwater overflow discharges) in our final DWMP where they are best value. Our PR24 business plan will align our needs across the business, but his will be after the fDWMP.
PARTNERSHIP WORKING	Provide further detail on the likelihood of your partnership schemes going ahead, including timelines for delivery and the split in funding contributions, and be clear on the rationale for not progressing such schemes, where applicable. Include details of the feedback provided from the dDWMP consultation, as well as any further stakeholder engagement undertaken between draft and final submissions.	Improvements needed in communication with Catchment Partnerships – more detailed 1-1 discussions. Identify Local Flood Risk Management Strategy potential for partnership working More staff / capacity to work on DWMPs / partnership working to ensure delivery Case studies – highlight link between DWMP and PR24 WINEP Resources concerns – regional plans to streamline engagement	Since the dDWMP we have continued our partnership working, and we will update and set out more clearly in the final report. There is uncertainty in third party funding and programmes. We have used existing meetings for efficient partnership working More detailed 1-2-1 meetings can be held on a case by case basis We will not be employing more staff in the short term, but our future structure has extra resource
STORM OVERFLOWS	Provide a more detailed and robust timeline (showing milestones and prioritisation) and evidence on the costs for storm overflow schemes in your final DWMP. Your final plan should be aligned with Defra's Storm Overflows Discharge Reduction Plan timelines and targets. Your plan does not • investigate or suggest any novel solutions to reduce harm, such as treating spills prior to discharging where it may be necessary or even considered better than reducing spill frequency. • Include potential improvements to current asset health, proactive maintenance or customer engagement as possible solutions to help meet storm overflow targets. You should include in your final plan, where feasible,	Risk screening Address legacy nutrient issue Targeted delivery of SuDS through partnership programmes Bathing water / recreation More detail needed on monitoring of storm overflows (more openness and access to data) Continuous water quality monitoring of all overflows and near-real time reporting is not detailed	Significant appraisal work on storm overflows has been undertaken since the dDWMP, which will be reported more in final DWMP. It will align with the SODRP but there is still uncertainty regarding 'no local adverse ecological harm'. More storm overflow data is now available on our website, which we will point to. Separation solutions and nature based solutions are our preferred solution when best value and are included in our plans. Our WINEP includes proposed wetlands to treat groundwater induced overflow discharges, so these will be mentioned in the fDWMP. We will highlight where our DWMP aims to reduce pollutions from our assets, by having multiple ways, such as proactive maintenance, asset health and customer engagement to reduce the risk of blockages.

	• different options for reducing harm to the environment, where it is found that nature-based or grey solutions do not provide best value as well as clarity on how asset maintenance and customer engagement can be utilised to improve network performance. You should also provide rationale for discounting any of these options.		We have discussed CWQM and near real time reporting in the fDWMP, which are new. There is still uncertainty about CWQM.
AFFORDABILITY	Costs should indicate the impact on affordability of bills. We note that you have provided the components of potential bill impacts for all four of the assessed scenarios for the next 25 years. However, it is unclear how these costs meet with customers' priorities and expectations. This should be addressed and included in the final DWMP submission. Improvements in asset maintenance should be considered within base expenditure and should be reflected in your final DWMP as such, unless there is compelling evidence to suggest that it should count as enhancement investment. The impacts, costs and benefits of proposed enhancement activities should be clearly explained in your final DWMP.		Customers priorities are currently being reviewed in our PR24 process. We may have some early feedback to include in our fDWMP. We are planning on expanding our affordability measures for customers who need help in PR24. As per the framework, our dDWMP was primarily enhancement investment, although base expenditure for flooding other causes, pollution reduction and collapses were reported in the dDWMP.
COST REFINEMENT	We asked companies to provide details of significant, material investment requirements, such as tackling storm overflows, in draft and final DWMPs and PR24 business plans. You should provide further refinement of when different schemes will come online to improve maturity of the cost profile in your final plan.		As mentioned above, we have a more detailed prioritisation and plan for storm overflows, which will be reported in the fDWMP. Our fDWMP will also include significant nutrient neutrality impacts which have been identified since the dDWMP.
STAKEHOLDER ENGAGEMENT	Provide further detail on how customer engagement has influenced your plan and include feedback from the dDWMP consultation. You should consider how more targeted engagement will allow greater stakeholder feedback in future DWMP planning cycles. You should consider the responses to your dDWMP consultation, and any additional engagement, and explain how these have influenced your final DWMP.	The Environment Agency expressed concern that stakeholder engagement had been patchy within Level 2 and 3 and were not clear on the role that stakeholders played in developing bespoke planning objectives. Stakeholders shared concerns about how accessible the portal, and the detail of the plan, is to non-technical audiences. It was suggested that further engagement would be needed with Local Planning Authorities and Strategic Planners.	The fDWMP will detail how customer and stakeholder engagement was undertaken and how Cycle 2 could improve on customer engagement. Engagement was tailored to feedback from stakeholders whose preference was to address through existing meetings where multi stakeholders attended, not dedicated events. Our stakeholder engagement is being expanded with the storm overflow team contacting local planning authorities and planners.
ASSURANCE	You should ensure that a full Board Assurance statement is provided as part of your final DWMP submission, and we would welcome confirmation of any additional assurance provided on your final plan. You should include the external audit results in the DWMP to enhance confidence in your DWMP process.		A full Board Assurance statement will be included in the fDWMP. We have appointed an external Auditor (Mott MacDonald) for independent assurance and will include their summary report as a fDWMP annex.
INVESTMENT SCENARIOS		We would like to have seen at least one of the scenarios operating with a hierarchy whereby the best environmental options (surface water separation, blue-green infrastructure) are considered first. Need evidence that blue/green is more expensive than grey infrastructure, particularly when social costs and benefits are considered.	We will make it clear in our fDWMP that nature based solutions / green solutions are our preferred solutions. UKWIR are undertaking a study on the wider benefits of blue/green solutions. The results of this will inform the cycle 2 DWMP.
NATURE BASED SOLUTIONS / SUDS		It could be made clearer that tried-and-tested solutions will be deployed in parallel with encouraging innovation, to help address climate and ecological objectives	Our adaptive pathway will include a combination of storage and nature based solutions. Noted.

		Need for pre- and post-development monitoring programmes for any options/interventions being delivered through more natural solutions.	
ENVIRONMENTAL IMPACT & CLIMATE CHANGE		Clearer recognition of Local Authority climate and ecological emergency declarations More detail on climate implication of Wessex Waters company proposals and emissions Sound science investment scenario delays actions on climate change Emphasis and prioritisation needed on protecting and enhancing designated habitats and waterbodies Stronger focus on aquatic biodiversity, including fish recovery and biodiversity, with greater consideration of Biodiversity targets and Local Nature Recovery Strategies.	We will mention these emergency declarations in the fDWMP. Carbon has been assessed for the WINEP schemes, so we will include more reference in the fDWMP. The sound science scenario was not preferred by stakeholders. We will not include it in the fDWMP. Protecting and enhancing the environment is included in the WINEP and SODRP processes. The fDWMP will explain more. The environmental appendix will be updated for the fDWMP. We also have a new Biodiversity performance commitment, which we will mention in the fDWMP. Cycle 2 could include more biodiversity drivers.
OTHER - INFILTRATION		Contamination of groundwater from sewers needs to be addressed in the plan, in addition to how groundwater can infiltrate sewers A list of the infiltration reduction plans and how to access them. Unclear what options would be developed to address groundwater infiltration risk.	We do not have evidence that exfiltration causes harm, but our proactive inspection risk model factors into account groundwater and source protection areas. Please see the new section 8.3.2. Our IRP for priority catchments are summarised on our website, and there is a downloadable report covering the Wessex area. Yes, has been made clearer in Section 8.3.2. The Hanging Langford case study (Figure 12) is an alternative Nature Based Solution alternative.
OTHER - NAVs		Function of NAVs in the delivery of DWMP objectives	We will mention NAVs in the fDWMP but Cycle 1 will not incorporate detail.

H3.0 Detailed tabulated feedback

This section contains tables of detailed feedback, grouped by the type of organisation.
We have highlighted which theme the feedback relates to. Some of the feedback has been summarised (e.g. background detailed is not replicated), but we have tried to capture all points made.

List of tables in this SoR:

Table 71: Ofwat feedback to draft DWMP

Reference	Theme	OFWAT Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR2.01	ADAPTIVE PLANNING	We consider that your plan demonstrates some understanding of the aims of adaptive planning but is lacking in detail. Adaptive planning has been attempted for five complex sites, using 2035 and 2050 timeframes, but you appear to have misunderstood some concepts including adaptive pathways, trigger points and decision points. Adaptive pathways should show how you plan to respond to a range of future scenarios in order to deliver stated outcomes, rather than setting out how different performance outcomes can be delivered in future years. In your dDWMP, the impact of uncertainty across the wider DWMP has not been considered. It is also unclear why some of the example complex sites consider a wide range of uncertainties, and some sites only take into account climate change. In your final DWMP you should demonstrate how you will manage uncertainty across the wider DWMP using scenario testing and adaptive planning to show how the plan will adapt to changes in key factors	*Noted.* *A new Section 11* Adaptive planning *provides updated adaptive pathways with trigger points and decision points more clearly identified.*	
SoR2.02	ASSET MANAGEMENT	Your dDWMP is focussed primarily on hydraulic capacity and enhancement and does not include or cover base capital maintenance expenditure, base operational expenditure and has no consideration of improving resilience through asset maintenance or optimisation. You should clearly set out how asset management and optimisation (base expenditure activities) can address some of your risks, such as, providing additional hydraulic capacity headroom in the system, as part of a hierarchy of options, before recommending enhancement schemes. You should ensure that you are able, and continue to be able, to meet all legal obligations, both now and in the future.	Noted. Section 10 details how our Best Value Plan has been derived. Section 10.1.4 details how base and enhancement is covered within the Final DWMP.	
SoR2.03	OPTIONS APPRAISAL	In determining options to manage current or future uncertainties, our pre-consultation feedback to companies recommended that evidence for their preferred best value solutions is presented alongside alternative options, such as least cost. This was to demonstrate the incremental benefits and associated costs that a range of solutions could deliver and to understand the basis for pursuing certain solutions while rejecting others. We are concerned at the lack of detail of how best value was assessed in your plan. Your dDWMP referenced that the costs of the plan options were compared against benefits such as carbon and natural capital, but no further details, such as how these benefits were valued are provided. The plan also stated that the ODA outputs were used to find the best value assessment at the feasibility /unconstrained option stage, rather than the constrained option stage. In your final DWMP you should provide evidence on how best value was calculated and provide a best value assessment of the final constrained list of options.	Noted. The screening process detailed in the framework that gave two preferred solutions, lowest cost and best value. This process is detailed in Section 8.2.1. Section 10 provides further details of Our Best Value Plan. Section 10.1.3 details Decision Support Tools. Section 10.1.5 details how Nature Based Solutions have been considered.	

SoR2.04	OPTIONS APPRAISAL	As DWMPs look holistically at a range of risks and mitigations at catchment levels, we expect you to provide more evidence in respect of costs and benefits of solutions, particularly schemes that deliver multiple benefits. We consider that there is insufficient convincing evidence in your dDWMP on why alternative options were discounted. It is not clear how solutions with multiple benefits are being included within your dDWMP to achieve best value. You should provide greater clarification in your final DWMP on how multiple benefit solutions are being considered, how they compare to alternatives, and how this has evolved since the dDWMP.	We agree and have done a lot of work in this area, especially the WINEP storm overflow and nutrient neutrality schemes, which are the vast majority of DWMP expenditure. More detail has been added about WINEP best value option selection in Section 10.1. Added more on our corporate EDA system measuring benefits and comparing options in section 10.1 and10.1.3. More on multiple benefits (e.g. select separation to allow for flooding benefits too) in Sections 1.4, 5.1 and 8.3.3.	
SoR2.05	OPTIONS APPRAISAL	In our pre-consultation feedback, we stated the importance of considering where nature-based or green solutions could address the risks identified. This is a key consideration in the DWMP Guiding Principles[9] and the Defra storm overflow discharge reduction plan.[10] We asked that companies clearly explain why green solutions would not be feasible. We are concerned to see a focus on grey solutions over nature-based alternatives. You claim that this is due to time constraints to meet storm overflow targets and that you consider sustainable drainage options are more expensive than grey storage solutions. We consider that there is insufficient convincing evidence in your dDWMP to explain why alternative options, such as nature-based solutions, were discounted. Nature-based solutions should be considered in favour of carbon-intensive, grey solutions, where feasible, and you should clearly explain why green solutions are overlooked. In your final plan you should also provide clarity on how your nature-based ambition will be realised.	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. As part of this process options were rejected if they were shown to either not be effective in meeting the desired targets or if they scored poorly against the DWMP screen process criteria (mentioned above). Throughout the screening assessment, reasons for options being discounted were documented. Nature based solutions were prioritised by the process where they were unable to meet the targets, they were supplemented by hybrid solutions (combining nature based and tradition solutions) or as a last resort, traditional solutions were put forward. Section 8 outlines the Options development and Assessment screening process. Section 10 provides further details of Our Best Value Plan. 10.1.3 Decision Support Tools 10.1.5 Nature Based Solutions Section 10.3 details Decision Support Tools Section 10.5 provides further details about where nature-based solutions have been considered instead of grey solutions.	
SoR2.06	OPTIONS APPRAISAL	We consider that your approach to decision-making was well developed with the use of corporate decision-making tools to prioritise investment needs. You note how you have aligned your DWMP decision making and analytical tools with the rest of the business, which shows a level of maturity and understanding which will help deliver best value, multi benefit solutions. In your final DWMP you should provide evidence of how the alignment of your DWMP decision-making tools with other areas of your business to assess risk and prioritise solutions.	Noted. Section 10 provides further details of how our corporate business plan prioritisation tool has been used to inform Our Best Value Plan. Section 10.1.3 details Decision Support Tools	

SoR2.07	PARTNERSHIP WORKING	The DWMP technical guidance[11] and the DWMP Guiding Principles[12] state that companies cannot develop plans which deliver their full potential without the input of other stakeholders. Some risks and solutions identified in the DWMP planning process, such as surface water removal or separation, rely heavily on joint working with local authorities and other risk management authorities (RMAs). We are encouraged by your approach of engagement and collaboration with RMAs and other stakeholders, and that you have identified potential opportunities for collaborative partnership schemes. In your final DWMP you should provide further detail on the likelihood of your partnership schemes going ahead, including timelines for delivery and the split in funding contributions, and be clear on the rationale for not progressing such schemes, where applicable. You should also include details of the feedback provided from the dDWMP consultation, as well as any further stakeholder engagement undertaken between draft and final submissions.	Noted Table 31 identifies 17 flood alleviation partnership schemes that have been identified with medium to high confidence of partnership opportunities of progressing. Details of investment, timelines for delivery, and potential split in funding contributions are provided in Appendix F in the DWMP data table. Detail of timelines for delivery are still uncertain, but there is high confidence that the work will be delivered during the AMP 8 funding period. Governance arrangements will be put in place for the DWMP Programme and partnership projects with significant funding. Appendix H details feedback provided from the dDWMP consultation and responses. Section 8 Options development appraisal 8.3.5 Partnership working Section 6.2.7, 6.2.8 and 10.1.6 identify engagement undertaken between the draft and the final plans.	
SoR2.08	STORM OVERFLOWS	We expect companies in England to make rapid progress in addressing storm overflow spills and meet the targets in Defra's storm overflow discharge reduction plan. Companies must ensure that they are complying with their obligations under section 94 of the Water Industry Act 1991 as supplemented by the Urban Waste Water (England and Wales) Regulations 1994. With regards to Defra’s storm overflow discharge reduction plan. We acknowledge that you have attempted to provide a separate cost estimation to evaluate the impact of different the storm overflows targets in your region, including "sound science" scenarios which break down investment requirements across AMPs. However, we expect to see a more detailed and robust timeline (showing milestones and prioritisation) and evidence on the costs for these storm overflow schemes in your final DWMP.	Section 10.3 has been updated to detail how we plan to meet Defra’s storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Table 34 presents details of the Storm overflow improvements in ‘core’ scenario to meet SODRP and breakdown of investment requirements across AMPS	
SoR2.09	STORM OVERFLOWS	We are concerned that the storm overflow draft reduction plan targets have not been addressed fully in your dDWMP. Your plan considers the set 10-spill target; however, it also states that the ecological harm target of 2035 is not achievable in the "core" scenario. We note that based on the Defra targets you have alternatively set out a ‘sound science’ plan that initially monitors storm overflows to understand if they have adverse ecological impact. However, like the "core" scenario, it is assumed that this scenario will not meet the deadlines of the Storm Overflows Discharge Reduction Plan for no ecological harm by 2035. Your final plan should be aligned with Defra’s Storm Overflows Discharge Reduction Plan timelines and targets.	noted - our core scenario aligns with Defra’s Storm Overflow Discharge Reduction Plan timelines and targets. Section 10.3 has been updated to detail how we plan to meet Defra’s storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Table 34 presents details of the Storm overflow improvements in ‘core’ scenario to meet SODRP and breakdown of investment requirements across AMPS.	
SoR2.10	STORM OVERFLOWS	Your plan does not investigate or suggest any novel solutions to reduce harm, such as treating spills prior to discharging where it may be necessary or even considered better than reducing spill frequency. You have not included potential improvements to current asset health, proactive maintenance or customer engagement as possible solutions to help meet storm overflow targets.	See Section 10 Our Best Value Plan 10.1.3 Decision Support Tools 10.1.5 Nature Based Solutions 10.1.3 outlines EDA tool and SMF and the incorporation of multiple capitals approach to decision-making (including natural capital).	

		You should include in your final plan, where feasible, different options for reducing harm to the environment, where it is found that nature-based or grey solutions do not provide best value as well as clarity on how asset maintenance and customer engagement can be utilised to improve network performance. You should also provide rationale for discounting any of these options.		
SoR2.11	STORM OVERFLOWS	The DWMP Guiding Principles and the Defra's storm overflow discharge reduction plan state that companies are expected to consider green infrastructure, nature-based and low-carbon solutions to mitigating risks, where possible. We expect to see sufficient and convincing evidence as to why you have discounted green options. In your plan, we are concerned to see a focus on grey solutions rather than prioritising nature-based options, particularly as there is insufficient evidence provided on the additional benefit green solutions can bring. You should provide clarity on this in your final DWMP, along with the rationale as to why green options have been discounted.	Section 10.1 details our approach to developing a best value plan and how we will look to prioritise nature-based solutions and green infrastructure where possible. Section 10.3 has been updated to detail how we plan to meet Defra's storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Also section 6.5.9 Outputs from customer research: Customers willing for bills to increase to improve the environment and reduce sewer flooding.	
SoR2.12	AFFORDABILIT Y	In line with the DWMP Guiding Principles, and the UK Government's strategic policy statement for Ofwat,13 we expect your plan to be affordable and take account of customers' priorities. Costs should indicate the impact on affordability of bills. We note that you have provided the components of potential bill impacts for all four of the assessed scenarios for the next 25 years. However, it is unclear how these costs meet with customers' priorities and expectations. This should be addressed and included in the final DWMP submission.	The Final DWMP plan presents the preferred plan which aligns with findings from updated customer engagement completed as to inform both the DWMP and PR24 process. Section 6.9 presents the findings from the latest customer research.	
SoR2.13	AFFORDABILIT Y	We expected by this stage in the planning process that companies would have set out information on affordability and bill impacts so that we have a clearer understanding of how future risks would be addressed through base expenditure allowances and what would require enhancement funding. It was clear from your dDWMP that the plan assumes that funding will come from enhancement rather than base. We note that your dDWMP states that a step change in proactive sewer rehabilitation is required to match the deterioration rates but does not consider this to be a base activity. Improvements in asset maintenance should be considered within base expenditure and should be reflected in your final DWMP as such, unless there is compelling evidence to suggest that it should count as enhancement investment. The impacts, costs and benefits of proposed enhancement activities should be clearly explained in your final DWMP.	Noted. Section 6.5.9 Outputs from customer research, including Customers willing for bills to increase to improve the environment and reduce sewer flooding. Section 10 presents details of Our Best Value Plan. Section 10.1.4 details what does Base Buy.	
SoR2.14	COST REFINEMENT	We asked companies to provide details of significant, material investment requirements, such as tackling storm overflows, in draft and final DWMPs and PR24 business plans. In your dDWMP, you have presented costs broken down by AMP and objective, although we note the plans often suggest a flat rate of spend over multiple AMPs. You should provide further refinement of when different schemes will come online to improve maturity of the cost profile in your final plan.	See: Figure 116 shows the locations of our proposed investment in storm overflows in AMP 8 (which are published on our DWMP portal website) Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6.9 Customer Engagement Undertaken in the 2022/2023 Year	
SoR2.15	COST BENEFIT	We are concerned that while costs, benefits and carbon usage were used to determine best value, it was highlighted that very few nature-based solutions came out as best value. Further examination of the cost benefit of nature-based solutions should be included in the final DWMP.	Section 10.1 details our approach to developing a best value plan and how we will look to prioritise nature-based solutions and green infrastructure where possible. However, Section 10.3.2 recognises that nature-based solutions for storm overflow improvements only deliver low monetised natural capital and carbon benefits, as a	

			consequence nature-based solutions in isolation are not typically the preferred solution. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement.	
SoR2.16	STAKEHOLDER ENGAGEMENT	We acknowledge that your plan explores engagement and collaboration opportunities with other risk management authorities (RMAs) that have responsibilities for drainage or surface water management. We are encouraged by the highlighted partnership opportunities for collaboration and co-delivery that have been considered as part of your dDWMP option to address some risks and solutions identified in the DWMP planning process, such as surface water removal or separation. We are encouraged to see the addition of the DWMP Customer Research document included within the Draft DWMP consultation response September 2022 submission. In your final DWMP you should provide further detail on how this customer engagement has influenced your plan and should include feedback from the dDWMP consultation.	The final plan presents the core plan which has been chosen to reflect regulator, stakeholder and customer views. Adaptive plans have also been included within this final plan to identify thresholds and trigger points to adapt our plan to meet changing situations or modify our approach to meet our preferred plan. The customer engagement section has been updated with Section 6.9 presenting findings from the latest customer research which was undertaken to inform both the DWMP and PR24 process. Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6.9 Customer Engagement Undertaken in the 2022/2023 Year	
SoR2.17	STAKEHOLDER ENGAGEMENT	In our pre-consultation feedback, we recommended that companies considered following up with stakeholders to ensure they understood the information being presented to them, and that companies continued to engage effectively with stakeholders throughout the remainder of the planning process. We are encouraged as to how stakeholder engagement has shaped elements of your plan with clear evidence and examples of collaboration included. However, we also note that due to some resource limitations and capacity issues it was difficult to engage with stakeholders in parts of the planning. You should consider how more targeted engagement will allow greater stakeholder feedback in future DWMP planning cycles. You should consider the responses to your dDWMP consultation, and any additional engagement, and explain how these have influenced your final DWMP.	Section 6.2.3 provides further detail about the sharing of information. Our approach to the cycle 1 has been to focus on targeted engagement focused on priority areas with a view to developing future partnership projects. Further detail about planned future engagement between the final DWMP and start of PR24 is provided in Section 6.2.7 and 6.2.8. Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6. Stakeholder and customer engagement 6.9 Customer Engagement Undertaken in the 2022/2023 Year Appendix F, G	
SoR2.18	ASSURANCE	As set out in a joint letter to companies,14 we requested an assurance statement from companies' Boards that the dDWMPs published for consultation followed the DWMP Guiding Principles,15 and the DWMP technical framework (which amongst other things says that companies must take account of legal requirements) met all defined planning objectives, linked to partnership opportunities that will be put forward in PR24, addressed the storm overflow reduction plan, and gave best value options based on robust evidence. We note that you have provided a Board assurance statement in the main DWMP document, stating that the guiding principles of the DWMP framework were met and includes a best value plan based on robust evidence. You should ensure that a full Board Assurance statement is also provided as part of your final DWMP submission, and we would welcome confirmation of any additional assurance provided on your final plan.	Section 2.4 refers to the Board Assurance Statement Annex I – details the Assurance Report completed by an external auditor Appendix E is the Board assurance statement.	
SoR2.19	ASSURANCE	We acknowledge that external assurance reviews were undertaken to ensure that the DWMP met the requirements of the regulatory guidelines. However, it is noted	Section 2.4 refers to the Board Assurance Statement Annex I – details the Assurance Report completed by an external auditor	

		that no results or conclusions from the external audit were included in the draft DWMP. You should include the results in the DWMP to enhance confidence in your DWMP process.	Appendix E is the Board assurance statement.	

Table 71: Ofwat feedback to draft DWMP

Reference	Theme	OFWAT Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR2.01	ADAPTIVE PLANNING	We consider that your plan demonstrates some understanding of the aims of adaptive planning but is lacking in detail. Adaptive planning has been attempted for five complex sites, using 2035 and 2050 timeframes, but you appear to have misunderstood some concepts including adaptive pathways, trigger points and decision points. Adaptive pathways should show how you plan to respond to a range of future scenarios in order to deliver stated outcomes, rather than setting out how different performance outcomes can be delivered in future years. In your dDWMP, the impact of uncertainty across the wider DWMP has not been considered. It is also unclear why some of the example complex sites consider a wide range of uncertainties, and some sites only take into account climate change. In your final DWMP you should demonstrate how you will manage uncertainty across the wider DWMP using scenario testing and adaptive planning to show how the plan will adapt to changes in key factors	*Noted.* *A new Section 11* Adaptive planning *provides updated adaptive pathways with trigger points and decision points more clearly identified.*	
SoR2.02	ASSET MANAGEMENT	Your dDWMP is focussed primarily on hydraulic capacity and enhancement and does not include or cover base capital maintenance expenditure, base operational expenditure and has no consideration of improving resilience through asset maintenance or optimisation. You should clearly set out how asset management and optimisation (base expenditure activities) can address some of your risks, such as, providing additional hydraulic capacity headroom in the system, as part of a hierarchy of options, before recommending enhancement schemes. You should ensure that you are able, and continue to be able, to meet all legal obligations, both now and in the future.	Noted. Section 10 details how our Best Value Plan has been derived. Section 10.1.4 details how base and enhancement is covered within the Final DWMP.	
SoR2.03	OPTIONS APPRAISAL	In determining options to manage current or future uncertainties, our pre-consultation feedback to companies recommended that evidence for their preferred best value solutions is presented alongside alternative options, such as least cost. This was to demonstrate the incremental benefits and associated costs that a range of solutions could deliver and to understand the basis for pursuing certain solutions while rejecting others. We are concerned at the lack of detail of how best value was assessed in your plan. Your dDWMP referenced that the costs of the plan options were compared against benefits such as carbon and natural capital, but no further details, such as how these benefits were valued are provided. The plan also stated that the ODA outputs were used to find the best value assessment at the feasibility /unconstrained option stage, rather than the constrained option stage. In your final DWMP you should provide evidence on how best value was calculated and provide a best value assessment of the final constrained list of options.	Noted. The screening process detailed in the framework that gave two preferred solutions, lowest cost and best value. This process is detailed in Section 8.2.1. Section 10 provides further details of Our Best Value Plan. Section 10.1.3 details Decision Support Tools. Section 10.1.5 details how Nature Based Solutions have been considered.	
SoR2.04	OPTIONS APPRAISAL	As DWMPs look holistically at a range of risks and mitigations at catchment levels, we expect you to provide more evidence in respect of costs and benefits of solutions, particularly schemes that deliver multiple benefits. We consider that	We agree and have done a lot of work in this area, especially the WINEP storm overflow and nutrient neutrality schemes, which are the vast majority of DWMP	

		there is insufficient convincing evidence in your dDWMP on why alternative options were discounted. It is not clear how solutions with multiple benefits are being included within your dDWMP to achieve best value. You should provide greater clarification in your final DWMP on how multiple benefit solutions are being considered, how they compare to alternatives, and how this has evolved since the dDWMP.	expenditure. More detail has been added about WINEP best value option selection in Section 10.1. Added more on our corporate EDA system measuring benefits and comparing options in section 10.1 and10.1.3. More on multiple benefits (e.g. select separation to allow for flooding benefits too) in Sections 1.4, 5.1 and 8.3.3.	
SoR2.05	OPTIONS APPRAISAL	In our pre-consultation feedback, we stated the importance of considering where nature-based or green solutions could address the risks identified. This is a key consideration in the DWMP Guiding Principles[9] and the Defra storm overflow discharge reduction plan.[10] We asked that companies clearly explain why green solutions would not be feasible. We are concerned to see a focus on grey solutions over nature-based alternatives. You claim that this is due to time constraints to meet storm overflow targets and that you consider sustainable drainage options are more expensive than grey storage solutions. We consider that there is insufficient convincing evidence in your dDWMP to explain why alternative options, such as nature-based solutions, were discounted. Nature-based solutions should be considered in favour of carbon-intensive, grey solutions, where feasible, and you should clearly explain why green solutions are overlooked. In your final plan you should also provide clarity on how your nature-based ambition will be realised.	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. As part of this process options were rejected if they were shown to either not be effective in meeting the desired targets or if they scored poorly against the DWMP screen process criteria (mentioned above). Throughout the screening assessment, reasons for options being discounted were documented. Nature based solutions were prioritised by the process where they were unable to meet the targets, they were supplemented by hybrid solutions (combining nature based and tradition solutions) or as a last resort, traditional solutions were put forward. Section 8 outlines the Options development and Assessment screening process. Section 10 provides further details of Our Best Value Plan. 10.1.3 Decision Support Tools 10.1.5 Nature Based Solutions Section 10.3 details Decision Support Tools Section 10.5 provides further details about where nature-based solutions have been considered instead of grey solutions.	
SoR2.06	OPTIONS APPRAISAL	We consider that your approach to decision-making was well developed with the use of corporate decision-making tools to prioritise investment needs. You note how you have aligned your DWMP decision making and analytical tools with the rest of the business, which shows a level of maturity and understanding which will help deliver best value, multi benefit solutions. In your final DWMP you should provide evidence of how the alignment of your DWMP decision-making tools with other areas of your business to assess risk and prioritise solutions.	Noted. Section 10 provides further details of how our corporate business plan prioritisation tool has been used to inform Our Best Value Plan. Section 10.1.3 details Decision Support Tools	
SoR2.07	PARTNERSHIP WORKING	The DWMP technical guidance[11] and the DWMP Guiding Principles[12] state that companies cannot develop plans which deliver their full potential without the input	Noted	

		of other stakeholders. Some risks and solutions identified in the DWMP planning process, such as surface water removal or separation, rely heavily on joint working with local authorities and other risk management authorities (RMAs). We are encouraged by your approach of engagement and collaboration with RMAs and other stakeholders, and that you have identified potential opportunities for collaborative partnership schemes. In your final DWMP you should provide further detail on the likelihood of your partnership schemes going ahead, including timelines for delivery and the split in funding contributions, and be clear on the rationale for not progressing such schemes, where applicable. You should also include details of the feedback provided from the dDWMP consultation, as well as any further stakeholder engagement undertaken between draft and final submissions.	Table 31 identifies 17 flood alleviation partnership schemes that have been identified with medium to high confidence of partnership opportunities of progressing. Details of investment, timelines for delivery, and potential split in funding contributions are provided in Appendix F in the DWMP data table. Detail of timelines for delivery are still uncertain, but there is high confidence that the work will be delivered during the AMP 8 funding period. Governance arrangements will be put in place for the DWMP Programme and partnership projects with significant funding. Appendix H details feedback provided from the dDWMP consultation and responses. Section 8 Options development appraisal 8.3.5 Partnership working Section 6.2.7, 6.2.8 and 10.1.6 identify engagement undertaken between the draft and the final plans.	
SoR2.08	STORM OVERFLOWS	We expect companies in England to make rapid progress in addressing storm overflow spills and meet the targets in Defra's storm overflow discharge reduction plan. Companies must ensure that they are complying with their obligations under section 94 of the Water Industry Act 1991 as supplemented by the Urban Waste Water (England and Wales) Regulations 1994. With regards to Defra’s storm overflow discharge reduction plan. We acknowledge that you have attempted to provide a separate cost estimation to evaluate the impact of different the storm overflows targets in your region, including "sound science" scenarios which break down investment requirements across AMPs. However, we expect to see a more detailed and robust timeline (showing milestones and prioritisation) and evidence on the costs for these storm overflow schemes in your final DWMP.	Section 10.3 has been updated to detail how we plan to meet Defra’s storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Table 34 presents details of the Storm overflow improvements in ‘core’ scenario to meet SODRP and breakdown of investment requirements across AMPS	
SoR2.09	STORM OVERFLOWS	We are concerned that the storm overflow draft reduction plan targets have not been addressed fully in your dDWMP. Your plan considers the set 10-spill target; however, it also states that the ecological harm target of 2035 is not achievable in the "core" scenario. We note that based on the Defra targets you have alternatively set out a ‘sound science’ plan that initially monitors storm overflows to understand if they have adverse ecological impact. However, like the "core" scenario, it is assumed that this scenario will not meet the deadlines of the Storm Overflows Discharge Reduction Plan for no ecological harm by 2035. Your final plan should be aligned with Defra’s Storm Overflows Discharge Reduction Plan timelines and targets.	noted - our core scenario aligns with Defra’s Storm Overflow Discharge Reduction Plan timelines and targets. Section 10.3 has been updated to detail how we plan to meet Defra’s storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Table 34 presents details of the Storm overflow improvements in ‘core’ scenario to meet SODRP and breakdown of investment requirements across AMPS.	
SoR2.10	STORM OVERFLOWS	Your plan does not investigate or suggest any novel solutions to reduce harm, such as treating spills prior to discharging where it may be necessary or even considered better than reducing spill frequency. You have not included potential improvements to current asset health, proactive maintenance or customer engagement as possible solutions to help meet storm overflow targets. You should include in your final plan, where feasible, different options for reducing harm to the environment, where it is found that nature-based or grey solutions do not provide best value as well as clarity on how asset maintenance and customer	See Section 10 Our Best Value Plan 10.1.3 Decision Support Tools 10.1.5 Nature Based Solutions 10.1.3 outlines EDA tool and SMF and the incorporation of multiple capitals approach to decision-making (including natural capital).	

		engagement can be utilised to improve network performance. You should also provide rationale for discounting any of these options.		
SoR2.11	STORM OVERFLOWS	The DWMP Guiding Principles and the Defra's storm overflow discharge reduction plan state that companies are expected to consider green infrastructure, nature-based and low-carbon solutions to mitigating risks, where possible. We expect to see sufficient and convincing evidence as to why you have discounted green options. In your plan, we are concerned to see a focus on grey solutions rather than prioritising nature-based options, particularly as there is insufficient evidence provided on the additional benefit green solutions can bring. You should provide clarity on this in your final DWMP, along with the rationale as to why green options have been discounted.	Section 10.1 details our approach to developing a best value plan and how we will look to prioritise nature-based solutions and green infrastructure where possible. Section 10.3 has been updated to detail how we plan to meet Defra's storm overflow reduction plan. As part of our core plan. Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement. Also section 6.5.9 Outputs from customer research: Customers willing for bills to increase to improve the environment and reduce sewer flooding.	
SoR2.12	AFFORDABILIT Y	In line with the DWMP Guiding Principles, and the UK Government's strategic policy statement for Ofwat,13 we expect your plan to be affordable and take account of customers' priorities. Costs should indicate the impact on affordability of bills. We note that you have provided the components of potential bill impacts for all four of the assessed scenarios for the next 25 years. However, it is unclear how these costs meet with customers' priorities and expectations. This should be addressed and included in the final DWMP submission.	The Final DWMP plan presents the preferred plan which aligns with findings from updated customer engagement completed as to inform both the DWMP and PR24 process. Section 6.9 presents the findings from the latest customer research.	
SoR2.13	AFFORDABILIT Y	We expected by this stage in the planning process that companies would have set out information on affordability and bill impacts so that we have a clearer understanding of how future risks would be addressed through base expenditure allowances and what would require enhancement funding. It was clear from your dDWMP that the plan assumes that funding will come from enhancement rather than base. We note that your dDWMP states that a step change in proactive sewer rehabilitation is required to match the deterioration rates but does not consider this to be a base activity. Improvements in asset maintenance should be considered within base expenditure and should be reflected in your final DWMP as such, unless there is compelling evidence to suggest that it should count as enhancement investment. The impacts, costs and benefits of proposed enhancement activities should be clearly explained in your final DWMP.	Noted. Section 6.5.9 Outputs from customer research, including Customers willing for bills to increase to improve the environment and reduce sewer flooding. Section 10 presents details of Our Best Value Plan. Section 10.1.4 details what does Base Buy.	
SoR2.14	COST REFINEMENT	We asked companies to provide details of significant, material investment requirements, such as tackling storm overflows, in draft and final DWMPs and PR24 business plans. In your dDWMP, you have presented costs broken down by AMP and objective, although we note the plans often suggest a flat rate of spend over multiple AMPs. You should provide further refinement of when different schemes will come online to improve maturity of the cost profile in your final plan.	See: Figure 116 shows the locations of our proposed investment in storm overflows in AMP 8 (which are published on our DWMP portal website) Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6.9 Customer Engagement Undertaken in the 2022/2023 Year	
SoR2.15	COST BENEFIT	We are concerned that while costs, benefits and carbon usage were used to determine best value, it was highlighted that very few nature-based solutions came out as best value. Further examination of the cost benefit of nature-based solutions should be included in the final DWMP.	Section 10.1 details our approach to developing a best value plan and how we will look to prioritise nature-based solutions and green infrastructure where possible. However, Section 10.3.2 recognises that nature-based solutions for storm overflow improvements only deliver low monetised natural capital and carbon benefits, as a consequence nature-based solutions in isolation are not typically the preferred solution.	

			Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement.	
SoR2.16	STAKEHOLDER ENGAGEMENT	We acknowledge that your plan explores engagement and collaboration opportunities with other risk management authorities (RMAs) that have responsibilities for drainage or surface water management. We are encouraged by the highlighted partnership opportunities for collaboration and co-delivery that have been considered as part of your dDWMP option to address some risks and solutions identified in the DWMP planning process, such as surface water removal or separation. We are encouraged to see the addition of the DWMP Customer Research document included within the Draft DWMP consultation response September 2022 submission. In your final DWMP you should provide further detail on how this customer engagement has influenced your plan and should include feedback from the dDWMP consultation.	The final plan presents the core plan which has been chosen to reflect regulator, stakeholder and customer views. Adaptive plans have also been included within this final plan to identify thresholds and trigger points to adapt our plan to meet changing situations or modify our approach to meet our preferred plan. The customer engagement section has been updated with Section 6.9 presenting findings from the latest customer research which was undertaken to inform both the DWMP and PR24 process. Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6.9 Customer Engagement Undertaken in the 2022/2023 Year	
SoR2.17	STAKEHOLDER ENGAGEMENT	In our pre-consultation feedback, we recommended that companies considered following up with stakeholders to ensure they understood the information being presented to them, and that companies continued to engage effectively with stakeholders throughout the remainder of the planning process. We are encouraged as to how stakeholder engagement has shaped elements of your plan with clear evidence and examples of collaboration included. However, we also note that due to some resource limitations and capacity issues it was difficult to engage with stakeholders in parts of the planning. You should consider how more targeted engagement will allow greater stakeholder feedback in future DWMP planning cycles. You should consider the responses to your dDWMP consultation, and any additional engagement, and explain how these have influenced your final DWMP.	Section 6.2.3 provides further detail about the sharing of information. Our approach to the cycle 1 has been to focus on targeted engagement focused on priority areas with a view to developing future partnership projects. Further detail about planned future engagement between the final DWMP and start of PR24 is provided in Section 6.2.7 and 6.2.8. Section 1 - Executive Summary 1.5 Changes made in response to the consultation. 6. Stakeholder and customer engagement 6.9 Customer Engagement Undertaken in the 2022/2023 Year Appendix F, G	
SoR2.18	ASSURANCE	As set out in a joint letter to companies,14 we requested an assurance statement from companies' Boards that the dDWMPs published for consultation followed the DWMP Guiding Principles,15 and the DWMP technical framework (which amongst other things says that companies must take account of legal requirements) met all defined planning objectives, linked to partnership opportunities that will be put forward in PR24, addressed the storm overflow reduction plan, and gave best value options based on robust evidence. We note that you have provided a Board assurance statement in the main DWMP document, stating that the guiding principles of the DWMP framework were met and includes a best value plan based on robust evidence. You should ensure that a full Board Assurance statement is also provided as part of your final DWMP submission, and we would welcome confirmation of any additional assurance provided on your final plan.	Section 2.4 refers to the Board Assurance Statement Annex I – details the Assurance Report completed by an external auditor Appendix E is the Board assurance statement.	
SoR2.19	ASSURANCE	We acknowledge that external assurance reviews were undertaken to ensure that the DWMP met the requirements of the regulatory guidelines. However, it is noted that no results or conclusions from the external audit were included in the draft DWMP. You should include the results in the DWMP to enhance confidence in your DWMP process.	Section 2.4 refers to the Board Assurance Statement Annex I – details the Assurance Report completed by an external auditor Appendix E is the Board assurance statement.	

Table 72: Environment Agency feedback on the draft DWMP

Reference	Theme	EA Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR3.01	STAKEHOLDER ENGAGEMENT	Unclear on role of stakeholders in developing bespoke planning objectives	Bespoke planning objectives were developed by stakeholders who attended the first two annual DWMP workshops. Further details of the types of engagement and discussions with stakeholders about DWMP (and planning objectives and different sections of the framework are provided in Section 6.2.5).	
SoR3.02	STAKEHOLDER ENGAGEMENT	We do recognise that the company has explored partnership working opportunities with some stakeholders, but in conclusion the Environment Agency does not feel that it was given sufficient opportunities to engage collaboratively with the development of Wessex Water's draft DWMP. Absent were multi-stakeholder gatherings with the company taking an 'engage, deliberate, decide' Approach Patchy stakeholder engagement - few multi stakeholder events particularly at Level 2 and 3 of the plan.	Engagement was tailored to feedback from stakeholders whose preference was to not have regular dedicated DWMP meetings but to discuss as agenda items at established multi-stakeholder meetings that are convened with risk management authorities including LLFAs, highways, Environment Agency. - Throughout the development of the WINEP process, very regular meetings have been held with the Environment Agency and Natural England to agree sites to put forward. - Annual DWMP multi-stakeholder update / briefing sessions have been held - which the Environment Agency attended. - Attendance and updates have been provided to the L2 catchment partnership meetings. - The results from various workshops hosted by the Catchment Partnerships have hosted (which the EA attend) have been used influence DWMP priorities and recognise potential opportunities for collaboration when detailed design progresses. Meetings have been held to discuss the EA-led catchment Strategies and Heart of Wessex project to discuss how that can align with DWMP projects when they progress to the detailed design phase.	
SoR3.03	INVESTMENT SCENARIOS	Of the four investment scenarios presented Wessex Water does not name its preferred scenario. We note a very wide range of investment costs (£6.66bn to £25.75bn). We presume, further to a specific consultation question seeking scenario preferences, that Wessex Water will name its preferred scenario in the final plan.	Noted. The Final DWMP presents a core plan, with adaptive pathways demonstrating decision and trigger points to modify approach to respond to changing situations to meet the ambition of our Strategic Direction Statement. See Section 2.2 - Changes made in response to consultation	
SoR3.04	INVESTMENT SCENARIOS	It clearly states in the text that the costs included in the DWMP are considered to be enhancement investments, with no inclusion of base capital maintenance or operational expenditure. Our understanding of DWMPs is that all water company drainage and wastewater management investment/expenditure should be included, with the specific funding routes secondary to the need for a comprehensive evidence base and a fully integrated plan.	Noted. Section 10 presents details of Our Best Value Plan. Section 10.1.4 details what does Base Buy. Also 2.2 - changes made in response to consultation 10.5 - flooding (other causes) and pollution	
SoR3.05	INVESTMENT SCENARIOS	Across all four scenarios Wessex Water's emphasis is on the provision of 'grey' solutions with blue/green solutions where appropriate. We would like to have seen at least one of the scenarios operating with a hierarchy whereby the best environmental options (surface water separation, blue-green infrastructure) are considered first. And we challenge the premise that blue/green is more expensive than grey infrastructure, particularly when social costs and benefits are considered. Overall, there is a lack of transparency regarding how/where investment will be targeted over the 25-year period. In terms of options development and overall programme appraisal, it seems despite considerable reference to nature-based solutions, including a bespoke planning objective to encourage sustainable drainage, the preferred 'core' plan and cheaper 'full plan' seem to default to 'grey' infrastructure.	Section 10 presents details of Our Best Value Plan. We are committed to delivering NBS where possible as part of hybrid solutions to increase the resilience of our drainage and waste-water infrastructure. Given the magnitude of investment required to meet regulatory demands, the WINEP framework has had a significant influence on the DWMP Cycle 1 programme. Section 10.1.5 Nature based solutions	
SoR3.06	STORM OVERFLOWS	Wessex Water has not assessed the full range of scenarios detailed in Defra's Storm Overflow Discharge Reduction Plan (SODRP). Whilst the company refers to planning for the 10-spill target, Wessex Water states that the ecological harm target is unachievable	Section 10.3 has been updated to detail how we plan to meet Defra's storm overflow reduction plan, as part of our core plan.	

		and there is little reference to achieving the bathing waters spill standards. Other companies are planning to achieve all these targets, we expect Wessex Water to align with the industry. We expect to see how the plan will address all the storm overflow discharge reduction plan targets in accordance with the milestones, by the final publication in March 2023.	Section 11 details adaptive pathways including decision and trigger points to modify our approach which would enable us to deliver our preferred plan to meet the ambition of our Strategic Direction Statement.	
SoR3.07	STORM OVERFLOWS	The 'sound science scenario' delays making significant improvements until after 2030 (2020-25/AMP8 for data gathering). The main difference across the scenarios is the level of ambition on storm overflows and timing of water recycling centre (WRC) and storm overflow investment. With accelerating climate change, urban creep and population growth we do not have the luxury of a five-year delay. High priority overflows need to be addressed in AMP8.	noted - we are not including the sound science scenario in our final DWMP, as it did not get any customer or stakeholder support.	
SoR3.08	INFILTRATION	Although the plan addresses groundwater infiltration reduction, it does not address the movement of water in the other direction, i.e. contamination of groundwater from leaking sewers. We would like to see this issue addressed in the final plan. For example, a leaking sewer contaminating groundwater that is used to supply drinking water, and damaging the environment, would be lower priority [than the WINEP] according to the company's thinking	Section 8.3.2 has been included to respond to this consultation feedback.	
SoR3.09	CLIMATE CHANGE	In the Technical summary it states, 'climate change may have already occurred'. Climate change is happening and is accelerating. That is the context for your DWMP.	noted - amend	
SoR3.10	CLIMATE CHANGE	Furthermore, Wessex Water's DWMP should detail the climate change implications of company proposals and emissions, especially if prioritising 'grey' solutions.	noted - best value assessment will take this into account. Our DWMP data tables shows that our requirements to improve water quality will have a negative caron impact. Carbon offsetting will be required.	
SoR3.11	STAKEHOLDER ENGAGEMENT	Environmental report: Clarification of whether EA did or did not provide comments on the scoping report and if they did, how have they been addressed. The draft DWMP suggests there have been comments provided but none are listed in the scoping report consultation response in Appendix B.	Comment noted. The EA did not provide comments on the Scoping Report. Appendix B of the Environmental Report is correct. The respondents are clarified in Section 4.2 of the SEA Post Adoption Statement (PAS).	
SoR3.12	REPORT IMPROVEMENTS	Environmental report: Figures showing the boundaries of the Level 1 and Level 2 management catchments need to be provided in the introductory chapter (currently there is only a very small non-labelled figure).	Comment noted. Figures have been provided within the introductory section (Section 1) of the PAS that meets the requirements of this request.	
SoR3.13	REPORT IMPROVEMENTS	Environmental report: A table summarising Key Policy Objectives Identified in Other Plans and Programmes relevant to the Assessment of the DWMP is needed in Chapter 3 as this summary is currently missing so it is not clear how the review of other plans and programmes have informed the assessment.	Comment noted. Section 2 of the Environmental Report presents an overview of the more than 200 international/European, national, regional/sub-regional and local level plans and programmes have been reviewed. Appendix C of the Environmental Report contains a record of these plans and programmes, outlining how they have been considered within the assessment. Text within the Environmental Report (Section 2.1 and 4.3) also outline how the plans and programmes have influenced the assessment. A further summary of the plans and programmes within the main report is noted as being complementary to the approach already taken but is not a requirement in the SEA regulations.	A further summary of the plans and programmes within the main report is complementary to the approach already taken but is not a requirement in the SEA regulations. For the next DWMP, the accompany SEA Environmental Report, consideration should be given to including a table summarising the key policy objectives identified

				in other plans and programmes.
SoR3.14	INFILTRATION	Environmental report: The methodology for the assessment of infiltration reduction plans (L3) needs to be provided in Section 4 (and referred to in the relevant part of the NTS) as this is currently missing. A list of the infiltration reduction plans should also be provided in the main text for clarity and the URL link to where they can be accessed (this appears in footnote 100).	Comment noted. Section 4.4 of the Environmental Report presents the approach to the assessment. This has been consistently applied to the elements included in the draft DWMP. There are no specific amendments made to the assessment of the Infiltration Plans. For the purposes of clarity, a list of the Infiltration Reduction Plans has been provided within Section 2.2.18 of the PAS document and a reference to the source of these plans is provided at the end of this response5.	
SoR3.15	REPORT IMPROVEMENTS	Environmental report: A careful proof reading is needed to ensure that the correct Appendix is being referred to in the main text.	Comment noted.	
SoR3.16	SEA	Environmental report: The report acknowledges there are limitations to the SEA due to lack of specific details on options and that further modelling will be needed at this point in the DWMP process. How and when this will be done should be set out in the proposed monitoring for the plan and there should be clear commitment to take on board the suggestions for future actions which are set out in para 5.6.14 of the report.	Comment noted. Wessex Water, as stated within the PAS document, is committed to monitoring the effects of the final DWMP. As part of this, Wessex Water will monitor whether the effects predicted within the Environmental Report are accurate and update future cycles ('Cycle 2') of the DWMP as needed to ensure environmental effects are identified and addressed.	
SoR3.17	CLIMATE CHANGE	The challenges posed by climate change well documented in the Plan and its impacts have been considered in the modelling work but we are left feeling it is the proverbial can being kicked down the road. We know that climate change is resulting in storms of greater intensity increasing the frequency of surface water flooding, sewer flooding and storm overflow events. Climate change is also predicted to increase the probability of wet winters, problematic for Wessex Water because the company experiences seasonal groundwater infiltration problems. And yet the company's sound science investment scenario proposes another five years of data gathering in AMP8 (2025-30) before serious action is taken to address these challenges. Although not explicitly stated we get the sense that this is the company's preferred scenario. We do not have the luxury of waiting for another five years before remedial action is taken.	Further to feedback from the draft consultation a preferred final scenario has been put forward within the Final DWMP to reflect regulatory requirements, stakeholder and customer feedback. The sound science scenario did not receive support from the consultation so is not presented within the preferred scenario documented in the final DWMP. The adaptive pathways presented in the plan reflect the opportunity to modify future investment scenarios.	
SoR3.18	NUTRIENT NEUTRALITY	With regards to nutrient neutrality, we welcome the reference to mitigating phosphorous in a Somerset WRC and importance in Hampshire due to the high number of environmentally protected sites and chalk rivers, but we would have expected more reference to nutrient neutrality across your plan due to the extensive coverage of 'nutrient advice areas' in your area.	At the time of producing the dDWMP, nutrient neutrality expectations on water companies were still in their infancy. Based on the draft of the Levelling-up and Regeneration Bill (LURB) currently going through Parliament, we are planning to upgrade WRCs ≥2,000 population equivalent to achieve 'technically achievable limits' for phosphorus and/or nitrogen in these nutrient advice areas. See section 10.2.	
SoR3.19	INFILTRATION	The inclusion of a groundwater infiltration risk bespoke planning objective acknowledges and assesses local risks; however, it was unclear what options would be developed to address the issue.	A step change in the level of investment in sewer lining has been proposed to reduce groundwater ingress into the network. Where there are storm overflows that operate due to groundwater ingress, treatment wetlands will be proposed if regulatory position accepts this as a viable solution.	
SoR3.20	NATURE BASED SOLUTIONS	it seems despite considerable reference to nature-based solutions, including a bespoke planning objective to encourage sustainable drainage, the preferred 'core' plan and cheaper 'full plan' seem to default to 'grey' infrastructure. The DWMP could have better integrated nature-based solutions via the considerable ongoing partnerships referenced in the DWMP. Wessex Water could have used	Our current best value tools suggests that grey solutions are typically the best value solution. It is likely that many AMP8 (2025 – 2030) storm overflow improvements will be grey solutions. We have identified about 10% green solutions. WaterUK are undertaking a research project on this topic.	

5 Wessex Water (2021) Groundwater Infiltration Reduction Plan Summary. Available online: https://www.wessexwater.co.uk/environment/drainage-and-wastewater-management-plan/infiltration-reduction-plans (Accessed 30/03/2023)

		the evidence gathered through their RBCS and BRAVA to inform a prioritised set of programmes that could link with NBS programmes. There is reference to 'exploring' NBS for overflow and WRC treatment, but again there is no detail on upscaling this in the programme apart from some NBS within the 'unconstrainted scenario', which would cost £18bn (£6bn more than purely grey).	We will review these options during outline and detailed design, to deliver the best value solution. NBS will be considered as a priority where best value– however solutions will have to meet regulatory requirements Partnership opportunities could bring in additional funding could help promote sustainable – Section 8.4.1	
SoR3.21	MONITORING IMPLEMENTATION	With regards to monitoring, Wessex Water have a programme to ensure 100% EDM coverage by December 2023, along with reference to innovative asset monitoring, although continuous water quality monitoring of all overflows and near-real time reporting is not detailed.	Please see section 10.1.7 Continuous water quality monitoring (CWQM).	
SoR3.22		We support standardisation of approaches [planning objective thresholds] moving from Cycle 1 to Cycle 2, with perhaps more of the industry wide bespoke planning objectives becoming national planning objectives. . . This is an area where we would welcome further dialogue with Wessex Water.	Noted – this will be discussed as part of the cycle 1 to cycle 2 industry-wide group	

Table 73: Natural England's feedback on the draft DWMP

Reference	Theme	Natural England	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR4.01	ENVIRONMENTAL IMPACT	The government has set out the priorities and expectations for drainage and wastewater management plans. One of the six key guiding principles was to "Consider the impact of drainage systems on immediate and wider environmental outcomes including habitats and in developing options for mitigation to include consideration of environmental net gain and enhancement". Further to this, Governments' 16 March 2022 policy paper Nutrient pollution: reducing the impacts on protected sites makes clear the importance of DWMPs in addressing pollution on protected sites subject to nutrient-neutrality requirements. In our view the draft DWMP does not adequately satisfy these two requirements. Natural England advises that these needs are given much greater attention within the Wessex Water DWMP and that relevant commentary is not simply restricted to a high-level summary of the Strategic Environmental Assessment. There should be a clear overview of the impact of Wessex Water's drainage system on the environment, particularly protected sites and priority 25 Year Environmental Plan objectives. Where it has not been possible to undertake a full assessment, at this stage, an action plan to achieve this should be clearly articulated and links to WINEP made.	Comment noted. Section 5.1 of the DWMP sets out the six planning objectives that were agreed to be investigated by all sewerage undertakers. These include pollution risk and water recycling centre compliance. Wessex Water has worked with key stakeholders in the selection of six additional bespoke planning objectives, which has included waterbodies (river water quality) improvements. These objectives have then been reflected in the development and refinement of the DWMP, which has followed the application of the DWMP framework. Pollution was identified as a key environmental issue within Table 3.15 of the Environmental Report, with information presented in Section 3 (notably 3.2 and 3.4, which summarises the WINEP). Consistent with the requirements of SEA regulation 12 (2), the Environmental Report has then identified, described and evaluated the likely significant effects of the DWMP proposals (and any reasonable alternatives). A summary of likely effects is provided within Section 5.3.7 of the Environmental Report, with potential cumulative effects summarised within Table 5.8.	
SoR4.02	ENVIRONMENTAL IMPACT	Secondly, the draft DWMP, including the associated environmental reports, does not consider the impact of current drainage systems on the environment. Instead, it considers only the impact of the interventions and schemes proposed in the drainage strategies.	Comment noted. Consistent with the requirements of SEA regulation 12 (2), the Environmental Report has then identified, described and evaluated the likely significant effects of the DWMP proposals (and any reasonable alternatives). Section 3.4 of the Environmental Report does establish a baseline for the water environment for the Wessex region.	
SoR4.03	STORM OVERFLOWS	By 2035, sewerage undertakers will be required to have improved 75% of overflows discharging to high priority sites, including Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation (SAC). However, we advise that the individual and combined impact of storm overflows within the catchment of particularly sensitive protected sites should be recognised and assessed. The government's Guiding Principles state that "We expect overflows that do the most harm or impact on the most sensitive and highest amenity sites to be prioritised first." The DWMP should therefore show how the risk screening analysis for storm overflows impacting protected sites prepared by Natural England for Wessex Water has been taken into account.	Noted. The Storm Overflow Assessment Framework has been followed to prioritise storm overflows discharging to high priority sites. This is evidenced in Section 10.3 and shown in Figure 116.	

SoR4.04	NUTRIENT NEUTRALITY	The government's plan defines storm overflows 'near' designated bathing waters, i.e. having an impact on the bathing water, as those located within 5km upstream. Similar precaution should be taken with protected sites. Governments' 16 March 2022 policy paper Nutrient pollution: reducing the impacts on protected sites makes clear the importance of DWMPs in addressing pollution on protected sites subject to nutrient-neutrality requirements. We expect DWMPs to explicitly address this requirement.	The Storm Overflow Assessment Framework has been followed to prioritise storm overflows discharging to high priority sites. This is evidenced in Section 10.3 and shown in Figure 116	
SoR4.05	ENVIRONMENTAL IMPACT	is unclear to us whether surface water draining into Wessex Water infrastructure and then into the environment becomes Wessex Water's responsibility to manage, where significant environmental risks or impacts are demonstrated. This issue should be addressed within the DWMP and relevant environmental requirements, such as HRA and 25 Year Environment Plan objectives should be taken into account. The discharge at Nailsea to the Tickenham, Nailsea and Kenn Moors SSSI is a good example. Whilst Wessex has indeed pledged a significant contribution in PR19 to help address the problem, funding from other relevant bodies (e.g. the LPA) has not been forthcoming, and as yet no secured solution is in place to address the ongoing pollution, contributing to this SSSI being in Unfavourable Declining condition.	Noted.	
SoR4.06	ENVIRONMENTAL IMPACT	It is not clear how protected sites, including their sensitivity and the degree of impact from Wessex Water assets, have been taken into account in the production of the Plan, other than the initial Risk-Based Catchment Screening phase. For example, there is no mention of protected sites in the WRC catchment drainage plans. Including the conservation objectives of associated protected sites and their condition status within the catchment drainage plans would help ensure that clear requirements, such as those highlighted above, are addressed and that the need for investment in priority areas for nature recovery is made clear. Natural England advise that, for the DWMP to make a genuinely meaningful contribution to the recovery of protected sites, the plan should identify all protected sites impacted by Wessex Water's drainage systems, the sites' conservation objectives and their condition status. The DWMP should then identify all assets in each site's catchment, including STWs, CSOs and SWOs, and determine the impact of each asset on the site, as well as their impact in combination. This approach will highlight and prioritise the potential interventions and schemes that will make the most effective contribution to each site's recovery. The DWMP HRA does list the European sites within 1km of WRCs, as well as European Sites associated with drainage areas, but this does little in practice to develop a strategic approach to contributing to the recovery of the sites and does not consider SSSIs. The approach described above seems appropriate in showing how the DWMP can contribute to meeting the conservation objectives of protected sites, and indeed to meet HRA requirements.	Comment noted. The SEA and HRA of the DWMP are strategic assessments, proportionate to the level of detail available. For example, Section 3.2 of the Environmental Report presents an overview of the designated sites and features within the Wessex operation area, included figures that delineate the sites and areas designated. Section 4 sets of the approach to assessment which includes designated conservation sites biodiversity. Where location specific information has then be identified, this has been then reflected in the assessment of likely significant effects.	
SoR4.07	ENVIRONMENTAL IMPACT	The following excerpts from the draft plan illustrate this selective focus on the environmental impact of schemes rather than the impact of the drainage system as a whole: "The schemes in the drainage strategies […] 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." p.179 "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)." p.180	Comment noted. Consistent with the requirements of SEA regulation 12 (2), the Environmental Report has then identified, described and evaluated the likely significant effects of the DWMP proposals (and any reasonable alternatives).	

SoR4.08	NATURE BASED SOLUTIONS	The government's guiding principles state that "In helping to protect and enhance the environment, we expect DWMPs to consider the use of nature-based solutions, where feasible, as part of their option development and assessment." Natural England welcomes the prominent position of nature-based solutions and case studies within the draft DWMP. We look forward to the increasing employment of such schemes as the plan is implemented	noted	

Table 74: Heritage England's feedback on the draft DWMP

Reference	Theme	Natural England	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR4.09	HERITAGE	While we appreciate the challenges of undertaking the SEA process without details of scale, location and design of schemes, we note from the SEA that some adverse and uncertain effects on cultural heritage/landscape have been identified. However, there may be the potential to avoid, minimise and mitigate any negative impacts as schemes are developed. Where relevant, we would also expect schemes to include opportunities for enhancing the historic environment through improving people's understanding, access and enjoyment of heritage assets and their settings. This should take account of impacts (positive and negative) on designated and non-designated heritage assets. Recommend Heritage Impact assessments.	Comment and advice noted. The potential for the use of Heritage Impacts Assessments (where relevant) to help inform early detailed scheme development is noted in Table 3.2 of the PAS document.	
SoR4.10	HERITAGE	Section 6.4 Monitoring the Effects of the DWMP and in particular, Table 6.1 Potential Indicator for Monitoring Effects. Objective 12 (historic environment) may unintentionally convey that Historic England monitors the condition of all designated heritage. assets. In fact, our Heritage at Risk programme does not do this; grade II listed buildings outside of London are excluded for example. The local authority conservation and archaeological advisers may also have relevant information for monitoring this objective.	Comment noted. The monitoring indicator text (Table 6.1 of the PAS) has been revised to reflect the comment	

Table 75: LLFA responses to the draft DWMP

Reference	LLFA	Theme	Lead Local Flood Authority Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR5.01	HAMPSHIRE COUNTY COUNCIL	PARTNERSHIP WORKING	As the Lead Local Flood Authority for the Hampshire area, the County Council agrees with the water company that drainage responsibilities are complex and therefore engagement with other Risk Management Authorities (RMAs) is essential to the preparation and delivery of the DWMP. The County Council is keen to continue to work with the regional water companies in Hampshire and to contribute where it can to the development of DWMPs for Wessex Water, Southern Water and Thames Water, regional water resource management plans and the Water Resources South-East Regional Plan particularly with regard to the management of surface water. However, we are mindful of the demands that effective participation places on our resources especially when these processes occur at the same time. The County Council would therefore support proposals to explore how the development of regional plans can be best coordinated to potentially streamline engagement processes, provide a consistent approach where possible, and encourage involvement by avoiding duplication of effort.	Noted	will consider for phase 2.
SoR5.02	HAMPSHIRE COUNTY COUNCIL	PARTNERSHIP WORKING	The County Council welcomes the visibility and focus that the draft DWMP brings to current and future risks, and the long-term plans to address those risks. The most important future challenge for all authorities within the water management sector is changing mindsets to ensure that water is more widely regarded as a precious resource in its whole lifecycle and not solely as a risk (in the case of flooding) or a right (in the case of drought). As the effects of Climate Change begin to become more and more apparent across the UK, including drought and surface water flooding, all organisations within the water sector need to work together to ensure that a constant, clean supply of water is not taken for granted, and everyone needs to work to protect it. The County Council believes strongly in adopting a joined-up approach to this, challenging current thinking and designing truly inclusive water management systems which tackle both water quality and quantity. Data sharing must be a key part of our approach. The availability of up-to-date information, clear plans / maps of systems, and interactions of water company assets with wider water systems/cycles, is critical to the management of resilient wastewater and combined sewer systems.	Noted. Data and maps are available through the DWMP portal on our website. Established data sharing agreements and licenses facilitate collaboration and data sharing.	
SoR5.03	HAMPSHIRE COUNTY COUNCIL	INVESTMENT SCENARIOS	We note that the draft DWMP has highlighted significant 'unconstrained' investment requirements for the long term. We also note the water companies understanding that these are "currently unaffordable in the current climate." (Non-technical summary report.pdf). The County Council however supports your conclusion that significantly more investment in drainage and wastewater is needed because of growth and climate change, to reduce the combined nature of the sewerage systems, and to provide a more sustainable and resilient service. The impact of storm overflow spills on water quality and the harm that this is causing appears to be well understood. A step-up in investment is required urgently and proposals that defer this, and therefore delay the delivery of significant improvements, is not supported.	Noted, the core plan proposed within the final DWMP provides a step change in the level of investment for AMP 8 and beyond, with ambition to do more where possible.	
SoR5.04	HAMPSHIRE COUNTY COUNCIL	DRAINAGE STRATEGIES	The County Council notes that there are 3 Drainage and Wastewater Strategies covering areas of Hampshire: Christchurch Drainage and Wastewater Strategy; Ringwood Drainage and Wastewater Strategy; and Fordingbridge Drainage and Wastewater Strategy. All 3 Strategies are part of the Hampshire Avon Management Catchment and Wessex Water's Drainage and Wastewater Management Plan. The Christchurch Drainage and Wastewater Strategy covers the area served by Christchurch Water Recycling Centre (WRC), also known as Sewage Treatment Works, and includes Christchurch, Sopley and Bransgore. The long-term strategy for the catchment includes undertaking customer engagement to reduce water consumption. The County Council would suggest that this should be part of an ongoing strategy.	Section 8.2.2 has been updated to provide clarity on the planning objectives that form part of a Wessex-wide programme.	

SoR5.05	HAMPSHIRE COUNTY COUNCIL	DRAINAGE STRATEGIES	The Ringwood Drainage and Wastewater Strategy confirms that the Ringwood WRC is at capacity to meet its permit agreed with the Environment Agency. The Short-Term Strategy sets out that the performance of the WRC and network, and any changes in expected future development or climate change, will be monitored. Only, if necessary, does the Strategy explain that solutions will be identified and implemented. As the WRC is already at capacity, it is suggested that exploring solutions should be part of the short-term strategy. It is noted that the Fordingbridge WRC is known to be approaching capacity to meet its permit so it is suggested that a similar short term strategy is adopted in this catchment.	The Ringwood and Fordingbridge drainage strategies have been updated to reflect WRC investments detailed in the WINEP.	
SoR5.06	DORSET COUNCIL	PARTNERSHIP WORKING	I welcome the ambition in delivering environmental improvements (including flood risk reduction) via partnership working. The consultation process has generally worked well, but the acid test will be the realisation of improvements 'on the ground'. More flexibility of approach in the use of sewerage infrastructure where spare capacity exists and magnitude of flood risk is an overriding concern. Yes. Note that Nature Based Solutions will not always be the most beneficial approach in reducing flood risk. Evidence based delivery is critical.	noted	
SoR5.07	BCP COUNCIL (CUSTOMER)	GENERAL COMMENT	I would like to see the surface water drains extending further out to sea	Noted – this would require a collaborative approach with BCP council.	
SoR5.08	BCP COUNCIL	PLANNING POLICY	1. The DWMP does address Wessex Water's role in development and urban growth and demonstrates the importance of Local Development Plans and SFRAs. We also acknowledge Wessex Water's recent Minor Development Policy and it is pleasing to see that growth has been taken into account in forming the DWMP. However, we would like to see more discussion on Wessex Water's commitment to strongly influencing planning policy at a national and local level. For policies to be enforceable at planning application stage they must sit within the NPPF or in local Development Plan Documents. Policies within Local & Neighbourhood Plans must be supported by a robust evidence base. We would like to see Wessex Water's commitment to strengthening this evidence base (through SFRAs SuDS SPDs etc.) and corresponding policies i.e. reducing brownfield runoff, reducing volume, water reuse. Internal, Wessex Water policies whilst helpful, carry little weight as they have not been through the Local Plan examination or Neighbourhood Plan referendum process. Wessex Water's robust influence in planning policy making may also help us resist development in inappropriate sewer flood risk locations and help justify developer contributions where development cannot be avoided. The DWMP portal is a strong start to the kind of evidence needed, however, we need for it to be portable to SFRA portals and to agree what data can be used for what purposes. Wessex Water's commitment to this work would be invaluable and help support future delivery of the SAB role, either by LLFAs, LPAs, WASCs or otherwise. 2. Understandably (given the current media focus), the DWMP focusses heavily on overflow spills and their reduction. We note the sections on flooding and your conclusion that Wessex Water's focus should be on "flooding other causes" i.e. blockages etc. Given your findings with respect to blockages and public consultation on foul vs surface water flooding impact we understand the conclusion here and note that you will nevertheless pursue a programme of 2D modelling in PR24 and will include a "modest programme" with respect to reducing hydraulic flood risk. We are pleased that this level of investment will continue but concerned that this cause of flooding will increase with climate change, particularly at coastal locations. We note that reduced drainage capacity due to sea level rise will be considered in future DWMPs, which we accept but would strongly encourage that this be addressed in the next DWMP. Given your statements around the uncertainty relating to environmental harm from sewer spills, we wonder whether the level of investment required to meet CSO targets (that have perhaps not been substantiated with respect to levels of harm) is coming at the expense of more investment around sewer capacity, particularly considering the climate emergency? It would be good to see these two factors discussed in more detail and how decreasing investment in one might impact the other by shifting investment to this. We fully support your expected commitment and focus on sewer lining and blockages etc. and note the positive benefit this will bring particularly with respect to foul sewer flooding; however, we have concerns with respect to your comments about not keeping up with asset deterioration and gradual degradation of hydraulic capacity because of climate change. The sewerage system (as well dealing with wastewater if foul or combined) is effectively a type of pluvial flood defence in	Section 8.3.6 provides details of how Wessex Water influences National and Local policies. Established data sharing agreements and licenses facilitate collaboration and data sharing between RMAs. 2. As part of detailed design of solutions to address storm overflows, if flooding also concerns exist within sub-catchments upstream of storm overflows solutions will be considered that deliver both storm overflow and flood risk benefits where possible. The detailed designs could include a hybrid of solutions including separation and storage options. Nature based solutions will be prioritized to achieve multiple outcomes where partnership funding enables these to become best value solutions. The Final DWMP identifies a need for a step change in investment in asset maintenance and	

			BCP's urban areas. In future, DWMPs we would want to see how Wessex Water intends to deal with this loss of capacity over time either through customer or private funding. In the meantime, and in this DWMP, we would like to see Wessex Water commit to supporting and providing professional advice to LLFAs that are developing SWMPs so that they can consider possible degradation of drainage system in models, (which we would need to in the absence of a funded strategy to prevent this). 3. The DWMP talks extensively about partnership working, which is encouraging, however, one area of continual disappointment and irritation for customers is a shared reporting mechanism around flooding and drainage issues between all RMAs, and data sharing. A number of LLFAs in the Southwest are using FORT to capture flood reporting and share data. We would like to see Wessex Water commit to and take a lead role in using and helping develop FORT within this DWMP. We are very encouraged to see Wessex Water's data being added to the DWMP and note that some data can be downloaded in raw format. We would like to see Wessex Water go further and share more of their data, including historic flood reports and models, so that we can use this to evidence scheme requirements and support planning policy improvements. 4. We note that the DWMP considers various options including grey and green infrastructure. The DWMP comments that grey infrastructure options have often been appraised as being better value in monetary terms. Does this consider future operational maintenance expenditure and the difference between maintaining green vs grey infrastructure? We understand why absolute cost is likely to be the overriding factor given impact on customer bills, however, has any analysis been undertaken to identify multifunctional benefits and the cost benefit these have, using say CIRIAs B£ST tool? In our view these should be considered by OFWAT when considering the scenarios put forward. For partnership schemes and subsequent local levy or FDGIA contributions, these elements maybe important in maximising possible contributions. We suggest the DWMP considers the impact of the potential mismatch between solutions that come out favourably due to cost for DWMP purposes and those than might be more favourable if seeking partnership funding opportunities i.e. through green infrastructure or climate change grants and how any negative impacts might be mitigated.	enhancement to keep up with the challenges associated with climate change. The assessment of the DWMP takes into the impact of climate change account foul and surface water networks. The drainage strategies set out the proposed approach for short, medium and long-term measures and strategy development which can align with development of SWMPs. 3. Established data sharing agreements and licenses facilitate collaboration and data sharing between RMAs. 4. Section 10 details how best value solutions have been derived to consider wider multiple benefits which also take into account whole life costs of schemes. CIRIA B£ST values are considered as part of detailed designs. We are supporting a current UKWIR research regarding further refinement of the valuation of wider benefits of SuDS.	
SoR5. 09	BCP	REPORT IMPROVEMENTS	some of the links in the full report did not seem to go the right location).	Noted.	
SoR5. 10	BCP	INVESTMENT SCENARIOS	The Unconstrained and Full scenarios are not likely to be politically achievable in the current economic environment. Given the economic climate, it would be tempting to defer any increase in bills until 2030 i.e. the "Sound Science" scenario (in the hope of great economic stability), however, this would likely not be acceptable either given the current focus on Combine Sewer Overflows. The core scenario, however, appears to start us on investment path without sufficient understanding of the levels of harm being caused by overflows. We would suggest the DWMP advocate for the core scenario, but that investment focuses on addressing spills which are known to be causing harm based on existing data and input from key stakeholders. We would then suggest that during the first DWMP AMP cycle, further data on CSO harm could be incorporated into the next DWMP review, where the impacts of CSO spills, can then be better balanced against other planning objectives. This may also give time for government policy to adapt to new data on CSO spills and industry consultation responses and better inform investment profiling between now and 2050. This may also provide time to progress possible options for joint Drainage, Waste & Surface Water Management Plans for specific catchments / areas. which may better inform confidence levels around partnership funding possibilities. It may also provide time to improve development control policies, review more definitive Local Authority growth plans for new unitary authorities (such as BCP) and evaluate the potential impacts of WASC or LLFA owned SuDS – for instance could real time control of the network, make better use of attenuation features provided on new development (where they are not in use because rainfall has fallen elsewhere in the catchment)?	comments noted. Storm overflow prioritisation is detailed in Section 10.3. Noted, support and resources for development of partnership schemes are available when LLFA has resources to progress.	

SoR5. 11	B&NES-HIGHWAYS	PARTNERSHIP WORKING	I can confirm that we were pleased with the level of involvement that Wessex Water has allowed us during the evolution of the document to this stage. We are in agreement with the Partnership Priority Catchments, Risk Based Catchment Screening, baseline Risk and Vulnerability Assessments and Problem Characterisation presented in the document all of which accurately represent prior discussions and feedback. The drainage strategies presented are well thought out and appropriate. We look forward to continued partnership working with Wessex Water towards the shared aims of those drainage strategies for catchments in our area.	noted	
SoR5. 12	BRISTOL CITY COUNCIL	PARTNERSHIP WORKING	In Table 7 please identify the Local Flood Risk Management Strategy as potential for DWMP partnership working opportunities.	Noted – table updated	
SoR5. 13	BRISTOL CITY COUNCIL	INVESTMENT SCENARIOS	It would be useful to see each scenario with associated SuDS costs.	7bn investment for Avonmouth (vs 200/300m grey solution) - one final scenario and will include SuDS where best value.	
SoR5. 14	SOUTH GLOS COUNCIL	NAV	The Lyde Green development area located in the northeast of Bristol is shown outside of the WW region. The reason for its exclusion is because a NAV has been appointed as the water and sewerage undertaker for the development. Other new developments in South Glos have also appointed a NAV as the water and sewerage undertaker. Due to the rise in number of NAV's being appointed to serve new developments across the Wessex area, SGC LLFA wonder if a section should be included in the DWMP that covers NAVs and how they function with the delivery of the DWMP objectives. It also raises the question as to whether the NAV's will need to produce their own DWMP or be expected to contribute towards objectives in the WW DWMP for the Wessex area.	noted - for OFWAT NAVS will need to be aware of the DWMP and contribute to DWMP objectives where they have influence. Further consideration of the role of NAVs within the DWMP will be discussed as part of the Cycle 1 to Cycle 2 review group.	

Table 76: Catchment Partnership responses to the draft DWMP

Reference	LLFA	Theme	Lead Local Flood Authority Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR6. 01	DORSET CATCHMENT PARTNERSHIP	NUTRIENT NEUTRALITY	1. Dorset is home to precious chalk streams and other important protected freshwater and connected habitats. Our partners would like to see chalk streams and designated waterbodies prioritised for both speed and standard of solutions deployment within the Plan. This includes increased focus on protecting and restoring the aquatic ecology of rivers and the water environment, particularly those which are subject to nutrient neutrality requirements. 2. We recognise the challenges around delivering nutrient neutrality at a catchment scale; however, the impact of nutrient inputs occurs immediately from the point of discharge, so we would welcome mitigation and nutrient reduction outcomes being delivered locally to the asset being offset (e.g. at a waterbody level). 3. We would welcome greater recognition of the locally declared Climate and Ecological Emergencies, and links to the strategies for these which have been published by BCP and Dorset Councils. 4. We agree that 'schemes within the plan should at minimum do no harm to the environment or communities in which they are located' (p 179) but support Natural England's request that the environmental impact of existing assets, particularly those which do not have schemes or interventions planned, is made clear, as this forms part of the over-all impact of Wessex Water's asset network into the future. 5. We welcome the inclusion of and focus on innovative nature-based solutions, and welcome the evidence-based design of the Plan. It could be made clearer that tried-and-tested solutions will be deployed in parallel with encouraging innovation, to help address climate and ecological objectives in a shorter timeframe. 6. We recognise that there are synergies and link up between the partnership opportunities highlighted in the DWMP and the developing PR24 WINEP projects list. We would welcome greater acknowledgement of these proposed projects, which could be presented as case studies, in later iterations of the Plan. 7. Although there are currently no inland Bathing Waters in Dorset, a number of river locations are popular recreational swimming spots for local residents and visitors. We would welcome the plan recognising the importance of these locations (e.g. Fiddleford Manor, Eyebridge, and Stour Valley Nature Reserve on the Dorset Stour, or Moreton Ford and Wareham Bridge on the Dorset Frome) for identifying and reducing impacts of assets on water quality.	Noted, 1. Section 10 outlines the factors that have influenced the best value plan, with detail of how WRC and Storm overflow improvements have been prioritised. This has been done in accordance with WINEP and Storm Overflow Assessment Framework guidance which promotes work in sensitive environments. 2. Whilst we continue to promote and explore catchment and nature-based solutions we recognise localised/waterbody requirements, and thus the need for improvements at or upstream of points of discharge. With regulatory guidance restricting the use of catchment offsetting, this has led to the inclusion of many WRC upgrades, often through 'grey' solutions to achieve stringent permit limits. 3. Table 9 has been added to the report 4. Noted. It must be recognised the DWMP is a Strategic Plan. Asset level assessment is not within the scope of the existing framework. 5. Noted – Further details provided about the best value solutions in Section 10, prioritising nature-based solutions or hybrid solutions. Noted. The developing WINEP water quality partnership projects are detailed in Table 32.	
SoR6. 02	DORSET CATCHMENT PARTNERSHIP	NUTRIENT NEUTRALITY	We recognise the challenges around delivering nutrient neutrality at a catchment scale; however, the impact of nutrient inputs occurs immediately from the point of discharge, so we would welcome mitigation and nutrient reduction outcomes being delivered locally to the asset being offset (e.g. at a waterbody level).	duplicate comment	
SoR6. 03	DORSET CATCHMENT PARTNERSHIP	INVESTMENT SCENARIOS	The 'Core' scenario offers the bare minimum investment and does not deliver the ambition of environmental benefit the partnership would like to see. However, the company's scheme development and management processes mean that investment will be evidence-based on existing data or that collected in-AMP. This gives confidence about deliverability and direction of	Noted. Further to the consultation responses, a new more ambitious core scenario has been proposed, proposing a step change in level of investment, while also considering impact on customers bills and deliverability.	

			investment, even if the scope and ambition is low. The 'Unconstrained' scenario would be widely unaffordable and significantly disruptive for customers, although the prioritisation of nature-based solutions in this scenario is welcomed. Given the current economic situation, it's unlikely our partners would feel able to support this scenario. The 'Full' scenario is also a significant cost to customers (unaffordable to many) and does not make wide use of nature-based solutions to deliver environmental benefits. This scenario could be re-balanced to perhaps deliver fewer schemes but deliver better environmental benefits per scheme through nature-based solutions for a greater percentage than the scenario currently describes. The 'Sound science' scenario- offers no reason for deferring improvements out of AMP8. Whilst we support working from an evidence base and prioritising action on those assets causing most environmental harm, a substantial amount is known about enough assets for implementation work to begin in AMP8; restricting this to investigations and delaying implementation to AMP9 means delaying the environmental benefits implementation will bring. Parallelising prioritised work on well-understood assets and investigating those assets requiring further data for prioritisation would give a more balanced approach to delivery.		
SoR6. 04	DORSET CATCHMENT PARTNERSHIP	CLIMATE CHANGE	We would support greater emphasis and prioritisation on protecting and enhancing designated habitats and waterbodies, particularly chalk streams, within Dorset's catchments, including those where nutrient neutrality is an important consideration. There is an opportunity here for greater reference to the declared Climate and Ecological Emergencies in Dorset, and the strategies published by Dorset Council and BCP Council to address them. We agree that partnership working has a strong role to play in delivering DWMP outcomes, particularly through the design and implementation of nature-based solutions, and look forward to supporting Wessex Water in developing these for the Dorset catchments.	The Final DWMP prioritises groundwater catchments in several ways including: Increased investment in lining activities – promoted by the - Groundwater planning objective (Section 5.13), - the WINEP Groundwater flagship project - Our proposed use of wetlands to use nature-based solutions to treat storm overflows (Section 11.3) - Innovative development of partnership groundwater flood forecasts to facilitate greater preparedness - Partnership support towards the EA led Piddle Valley frequently flooded communities project to explore ways to reduce groundwater inundation into the network. 6. Table 9 has been added to the report to reflect relevant ecological emergencies and strategies within the Dorset and BCP areas.	
SoR6. 05	DORSET CATCHMENT PARTNERSHIP	STAKEHOLDER ENGAGEMENT	There is a substantial amount of information presented within the portal, which is to be applauded. However, much of it is highly technical and not interpreted for a lay audience, which makes its use limited. Our partnership benefitted from walk-throughs of the portal by DWMP staff at various stages of the Plan's development, but it still requires a fundamental and quite detailed understanding of water industry terminology and processes to interpret some of the data within the portal, making it inaccessible to our non-technical partners.	The customer document provides a simplified summary of the DWMP. for cycle 2 a simplified version our website could be considered and we welcome input from catchment partnerships to help scope what this would look like.	
SoR6. 06	DORSET CATCHMENT PARTNERSHIP	CLIMATE CHANGE	We would welcome greater recognition of the locally declared Climate and Ecological Emergencies, and links to the strategies for these which have been published by BCP and Dorset Councils.	Duplicate comment Table 9 has been added to the report to reflect relevant ecological emergencies and strategies within the Dorset and BCP areas.	
SoR6. 07	DORSET CATCHMENT PARTNERSHIP	ASSET MANAGEMENT	We agree that 'schemes within the plan should at minimum do no harm to the environment or communities in which they are located' (p 179) but support Natural England's request that the environmental impact of existing assets, particularly those which do not have schemes or interventions planned, is made clear, as this forms part of the over-all impact of Wessex Water's asset network into the future.	The DWMP is a strategic document and the framework does not set out to consider an asset level plan. Level of environmental impact is amalgamated at a level 3	

SoR6.08	DORSET CATCHMENT PARTNERSHIP	NATURE BASED SOLUTIONS	We welcome the inclusion of and focus on innovative nature-based solutions and welcome the evidence-based design of the Plan. It could be made clearer that tried-and-tested solutions will be deployed in parallel with encouraging innovation, to help address climate and ecological objectives in a shorter timeframe.	Noted	
SoR6.09	DORSET CATCHMENT PARTNERSHIP	PARTNERSHIP WORKING	We recognise that there are synergies and link up between the partnership opportunities highlighted in the DWMP and the developing PR24 WINEP projects list. We would welcome greater acknowledgement of these proposed projects, which could be presented as case studies, in later iterations of the Plan.	Noted – details provided in Table 32.	
SoR6.10	DORSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	Although there are currently no inland Bathing Waters in Dorset, a number of river locations are popular recreational swimming spots for local residents and visitors. We would welcome the plan recognising the importance of these locations (e.g. Fiddleford Manor, Eyebridge, and Stour Valley Nature Reserve on the Dorset Stour, or Moreton Ford and Wareham Bridge on the Dorset Frome) for identifying and reducing impacts of assets on water quality.	We recognize the growing interest in use of river locations for recreation and bathing. Section 2.2.10 details how we plan to	
SoR6.11	DORSET CATCHMENT PARTNERSHIP	MONITORING IMPLEMENTATION	The partnership supports the need for evidence-based delivery, and the linked requirement for appropriately robust baseline and impact monitoring relating to any interventions implemented. We agree with the Bristol Avon Catchment Partnership that the Plan's programme provides an opportunity for greater understanding of the developing suite of nature-based solutions and their short-, medium- and long-term multiple benefits to the environment.	Noted	
SoR6.12	SOMERSET CATCHMENT PARTNERSHIP	MONITORING IMPLEMENTATION	We would welcome further detail behind the targets, including water quality monitoring and the sharing of data (in particular more openness and better access to data). We feel there is currently a lack of clarity around what action will look like and what is ultimately going to be achieved/delivered on the ground. We are interested in how Wessex Water plan to be held accountable at both a stakeholder and community level, so that targets are transparent, and the public can question them. This will afford Wessex Water the opportunity to justify any actions taken and to elaborate on why targets may, or may not, have been met in any given scenario.	The DWMP portal on our website presents key data from the DWMP assessment. Greater clarity of the proposed WINEP programme ahead of completion of the Final DWMP has led to information being added (including the proposed storm overflows identified for investment), although as noted in the report there still remains uncertainty regarding significant areas of the WINEP Progress of the DWMP will be reported on against the planning objectives and thresholds that were agreed in the strategic context phase of the Cycle 1 plan development. There will be an opportunity to review these as part of the Strategic Context phase of Cycle 2 of the framework.	
SoR6.13	SOMERSET CATCHMENT PARTNERSHIP	NUTRIENT NEUTRALITY	We recognise the challenges around delivering nutrient neutrality at a catchment scale, however the impact of nutrient inputs occurs immediately from the point of discharge, so we would welcome mitigation and nutrient reduction outcomes being delivered locally to the asset being offset (e.g. at a waterbody level).	New more stringent regulatory permits have led to the WINEP identifying greater investment at prioritised WRCs, where solutions will be required at the point of discharge. The PR24 Business Plan will determine the funding available.	
SoR6.14	SOMERSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	We would welcome a stronger focus on aquatic biodiversity, including fish recovery and biodiversity, with greater consideration of Biodiversity targets and Local Nature Recovery Strategies.	Comment noted. The DWMP is high level in nature but has been informed by legislation, guidance and local Plans and Programmes. SEA Objective 1 included consideration of effects on biodiversity. WINEP scheme are water quality improvements that would deliver subsequent improvements to biodiversity. We have responded by explaining more in sections 2.2.10, 5.1.1. and 6.2.23.	
SoR6.15	SOMERSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	We would welcome reference to invasive non-native species in the section about Somerset. Somerset has a dense network of watercourses and is especially at risk from INNS. There are several high-risk INNS starting to spread in Somerset, especially floating pennywort and water primrose and zebra mussel. These represent a significant risk to the aquatic environment and flood risk and to water management infrastructure. There is huge cost saving to be had from	Comment noted. -The SEA considered potential for effects under SEA Objective 1 (Biodiversity). This included a guide question: The need to control the spread of Invasive Non-Native Species (INNS).	

			effective control of aquatic INNS and we would welcome this being referenced and adopted in the DWMP for the Wessex area, especially the low-lying areas of Somerset.	-Where flood risk and drainage issues are identified to be impacted by INNS – Wessex Water will evaluate and take appropriate action where INNS have spread on to our sites and assets. We will ensure that biosecurity measures are in place to avoid the spread of relevant species and that INNS present on our assets and managed/eradicated where appropriate. However the management of INNS in the wider aquatic environment relates to riparian responsibilities and is beyond the remit of the DWMP. Where INNS are impacting on the performance of Wessex Water's drainage and wastewater infrastructure and causing a flood risk or posing a wider environmental threat, we will work in combination with relevant risk management authorities to request they use their statutory powers to assist with resolving concerns.	
SoR6. 16	SOMERSET CATCHMENT PARTNERSHIP	PARTNERSHIP WORKING	We would welcome improvements in the communication between the Somerset Catchment Partnership and Wessex Water going forward and an increased commitment to SCP with improved clarity of the contact points between SCP and Wessex Water. We would welcome more detailed and active 1:1 discussions, engagement, and collaboration, to work up partnership delivery options to enable us to effectively deliver outcomes that will improve environmental water quality and wider benefits to the community.	Noted	
SoR6. 17	SOMERSET CATCHMENT PARTNERSHIP	PARTNERSHIP WORKING	We are keen for the DWMP to seize this opportunity to increase the effectiveness and delivery of SuDS schemes and maximise this delivery through alignment with partnership programmes.	noted	
SoR6. 18	SOMERSET CATCHMENT PARTNERSHIP	PARTNERSHIP WORKING	We wish to support efforts to increase communications and engagement with Local Planning Authorities and Strategic Planning teams at Local Authorities, the Somerset Rivers Authority, to enable early collaborative thinking on integrated projects to deliver multiple-benefit, nature-based solutions that ensure efficient, cost-effective and environmentally beneficial outcomes.	Noted.	
SoR6. 19	SOMERSET CATCHMENT PARTNERSHIP	STAKEHOLDER ENGAGEMENT	We recognise the difficulties with translating this level of information through to communities, and that increased capacity and resources are often required to educate communities and enable them to make informed decisions. SCP are happy to help with providing and sharing communications where appropriate.	noted with thanks	
SoR6. 20	SOMERSET CATCHMENT PARTNERSHIP	PORTAL IMPROVEMENTS	Partially easy, although the data and information could be made more accessible to lay members of the public who may not necessarily have detailed understanding of water industry terminology and processes.	Noted. The customer document provides a simplified summary of the DWMP. for cycle 2 a simplified version of our website could be considered, and we welcome input from catchment partnerships to help scope what this would look like.	
SoR6. 21	SOMERSET CATCHMENT PARTNERSHIP	INVESTMENT SCENARIOS	We feel it is difficult as a Partnership to comment on the different investment scenarios. However, we would support a scenario that enables the maximising of environmental targets whilst minimising the effects on the end payer. We agree with comments made by Bristol Avon Catchment Partnership, that decision making must be based on robust baseline/data/evidence. We support the sharing of data via the DWMP portal to enable all partners to make informed decisions and help to align plans and investment moving forward. At present, SCP would welcome more detail on what is to be monitored and how. We understand that all storm overflows will be monitored through Event Duration Monitoring (EDM). Although this will provide useful data, we would be interested in any potential for further monitoring to be installed that also captures the amount and composition of	Detail of storm overflows that are monitored and data available on the DWMP portal. Details of our future ambitions to secure funding for Continuous water quality monitoring (CWQM) are contained within Section 10.1.7. Detail of proposed investment in storm overflows for Amp 8 is also now available on the DWMP portal. Outputs from any funded CWQM will in due course be shared via the DWMP Portal. Welcome discussion for future partnership monitoring.	

			the discharges. Particularly in areas that SCP is focussing effort through various partnership projects, initiatives, and funding to improve the ecology and biodiversity of waterbodies.		
SoR6. 22	SOMERSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	We would support greater emphasis and prioritisation on protecting and enhancing designated habitats and waterbodies, particularly around protected and significantly important sites such as the RAMSAR, SPA, SSSI and NNR sites, within Somerset's catchments, including those where nutrient neutrality is an important consideration.	Comment noted. The DWMP is high level in nature but potential effects on designated sites have been considered within the Environment Report, linked to the application of SEA Objective 1 (Biodiversity) in the assessment. This has formed part of the screening process and WINEP process prioritised nutrient neutrality work	
SoR6. 23	SOMERSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	We would support greater emphasis and prioritisation on protecting and enhancing designated habitats and waterbodies, particularly around protected and significantly important sites such as the RAMSAR, SPA, SSSI and NNR sites, within Somerset's catchments, including those where nutrient neutrality is an important consideration.	Noted, the WINEP and Storm overflow prioritisation take these factors into account. The optimisation process helps to identify the best value plan focusing on the outcomes.	
SoR6. 24	SOMERSET CATCHMENT PARTNERSHIP	ECOLOGICAL EMERGENCY	We would welcome more focus and reference to the climate and ecological emergencies that have been declared in Somerset, both by Somerset County Council and local District Councils.	Table 12 has been added to the report to reflect ecological emergencies and strategies within the Dorset and BCP areas.	
SoR6. 25	SOMERSET CATCHMENT PARTNERSHIP	ENVIRONMENTAL IMPACT	We support the inclusion of Biodiversity but would also welcome more focus on protecting and restoring the aquatic ecology of the rivers and water environment due to the direct connections between storm overflows, WRCs and drainage systems discharging into our rivers and streams.	WINEP schemes deliver water quality improvements such as NBS which also deliver biodiversity benefits. We have responded by explaining more in sections 2.2.10 and 5.1.1.	
SoR6. 26	SOMERSET CATCHMENT PARTNERSHIP	PARTNERSHIP WORKING	We agree that partnership working has a strong role to play in delivering DWMP outcomes, particularly through the design and implementation of nature-based solutions that complement the required engineered solutions, and look forward to supporting Wessex Water in developing these for Somerset catchments.	Noted.	
SoR6. 27	SOMERSET CATCHMENT PARTNERSHIP	STORM OVERFLOWS	We welcome the commitment to monitor all storm overflows by the end of 2023. This is essential to understand the nutrient loading at these sites and within the catchment as a whole. We also feel there is a lack in addressing the legacy nutrient issue and would welcome development on this point within the DWMP. We agree with both Bristol Avon and Dorset Catchment Partnerships comments, on the need to emphasise robust pre- and post- development monitoring programmes, for any options and interventions being delivered through more nature-based solutions. It has been recognised we are still at the early stages of understanding the environmental effects of delivering these solutions. The installation of nature-based solutions through the DWMP provides a good opportunity to increase our knowledge and understanding. This will ensure that genuine benefits are delivered over the long-term for aquatic environment and wider ecosystem.	Noted. At the time of producing the dDWMP, nutrient neutrality expectations on water companies were still in their infancy. Based on the draft of the Levelling-up and Regeneration Bill (LURB) currently going through Parliament, we are planning to upgrade WRCs ≥2,000 population equivalent to achieve 'technically achievable limits' for phosphorus and/or nitrogen in these nutrient advice areas. See section 10.2.	
SoR6. 28	BACP	MONITORING IMPLEMENTATION	Decision making must be based on robust baseline/data evidence - There is a need for robust pre- and post-development monitoring programmes for any options/interventions being delivered through more natural solutions. It has been recognised that we are still at the early stages of understanding the environmental effects of delivering these solutions. The installation of nature-based solutions through the DWMP provides a good opportunity to carry on increasing our knowledge and understanding. - There must be more focus on aquatic biodiversity, including fish recovery/biodiversity and greater consideration of Biodiversity targets/ Local Nature Recovery Strategies.	Noted We have responded by explaining more in sections 2.2.10 and 5.1.1.	
SoR6. 29	BACP	PARTNERSHIP WORKING	1. The Partnership welcomes the current communication and involvement with the WINEP process. We are keen to build on this conversation moving forwards with the Water Companies and understand how the skillsets and experience of the Partners can	1. Noted, additional 1:1 sessions to develop ideas for partnership opportunities will be scheduled between publishing the final DWMP and start of AMP 8.	

			complement the delivery and wider asset improvements that Wessex Water will be looking to deliver in AMP8. In particular, more detailed 1:1 discussions and collaboration to work up partnership delivery options would enable us to effectively deliver outcomes that will improve environmental water quality and wider benefits to the community. 2. - The Partnership is keen for the DWMP to seize this opportunity to increase the effectiveness and delivery of SuDS schemes and maximise this delivery through alignment with the Partnership Programmes. Ensuring that SuDS schemes are targeted in the most effective locations to address urban surface-water issues in the catchment, in particular where we know storm overflows are releasing on a regular basis and effecting popular/well-used blue spaces across the catchment, for example, Bristol Harbour. 3. The Partnership feel that increasing the capacity and staff dedicated to working on the DWMP's will be valuable to support the partnership conversations and collaborations, as we recognise the significant amount of time it takes to work effectively with partners to deliver multiple benefits outcomes. 4. Focussed effort to increase communications and engagement with Local Planning Authorities/Strategic Planning teams at Local Authorities- early thinking on integrated solutions to deliver multiple benefit outcomes will be beneficial and ensure more efficient and cost-effective outcomes. 5. The Partnership acknowledge that there is a big challenge with translating this level of information through to community level, in particular there is a big knowledge gap with communities on how WRC's and storm overflows operate and implications with Climate Change- increased capacity and resources required to enable communities to educate and enable communities to make informed decisions. BACP can help provide and share communications with wider partners/local volunteer groups/wider members of the public, etc. 6. At present, wild water swimming is recognised in the Plan at the designated Bathing Water site at Henleaze in Bristol and the Plan confirms there are no Storm Overflows at this site. The Partnership is keen for the DWMP to recognise that there is an increasing demand for wild water swimming and water-contact sports in other locations across the catchment. This increasing recreational use of the waterways should be factored in to the prioritisation process for addressing and reducing the impact of Storm Overflows across the catchment, especially in urban areas where there is increasing ambition to restore biodiversity and engage wider audiences. For example, SS Great Britain are planning for a voluntary Marine Conservation Reserve within Bristol.	2. Noted 3. Noted 4. Noted 5. Noted 6. Refer to Section 2.2.10	
SoR6. 30	BACP	ECOLOGICAL EMERGENCY	We support the inclusion of Biodiversity, we would welcome more focus on protecting and restoring the aquatic ecology of the rivers and water environment due to the direct connections between storm overflows, WRCs and drainage systems discharging directly in to our rivers and streams. In Section 4.1, the partnership is also keen for the DWMP to give greater recognition to the Ecological Emergencies that have been declared by the Local Authorities and in particular the decline in freshwater fish. In Table 27, Section 9.2.3, 'Population' is identified, however more emphasis could be focussed on the effects of 'Population Growth' as this will have a direct link to the DWMPs. In Section 4.2.6- would welcome inclusion of Partnership working with the Catchment Partnerships to deliver nature-based solutions that complement the required engineered solutions.	Refer to Biodiversity action plan and environmental emergencies in section 2.2.10. The word 'growth' has been added to the table. NBS mentions in section 6.2.6. 7. We have responded by explaining more in sections 2.2.10, 5.1.1 and 6.2.6. Also see Appendix C Environmental report has been updated.	
SoR6. 31	BACP	PARTNERSHIP WORKING	The Partnership feel that increasing the capacity and staff dedicated to working on the DWMP's will be valuable to support the partnership conversations and collaborations, as we recognise the significant amount of time it takes to work effectively with partners to deliver multiple benefits outcomes. - Focussed effort	noted see above re: resources	

SoR6.32	BACP	STORM OVERFLOWS	The Partnership is keen for the DWMP to seize this opportunity to increase the effectiveness and delivery of SuDS schemes and maximise this delivery through alignment with the Partnership Programmes. Ensuring that SuDS schemes are targeted in the most effective locations to address urban surface-water issues in the catchment, in particular where we know storm overflows are releasing on a regular basis and effecting popular/well-used blue spaces across the catchment, for example, Bristol Harbour. - The Partnership feel that increasing	noted -	
SoR6.33	BACP	STAKEHOLDER ENGAGEMENT	Focussed effort to increase communications and engagement with Local Planning Authorities/Strategic Planning teams at Local Authorities- early thinking on integrated solutions to deliver multiple benefit outcomes will be beneficial and ensure more efficient and cost-effective outcomes.	noted	
SoR6.34	BACP	STORM OVERFLOWS	At present, wild water swimming is recognised in the Plan at the designated Bathing Water site at Henleaze in Bristol and the Plan confirms there are no Storm Overflows at this site. The Partnership is keen for the DWMP to recognise that there is an increasing demand for wild water swimming and water-contact sports in other locations across the catchment. This increasing recreational use of the waterways should be factored in to the prioritisation process for addressing and reducing the impact of Storm Overflows across the catchment, especially in urban areas where there is increasing ambition to restore biodiversity and engage wider audiences. For example, SS Great Britain are planning for a voluntary Marine Conservation Reserve within Bristol.	Noted Refer to Section 2.2.10	
SoR6.35	BACP	STAKEHOLDER ENGAGEMENT	The Partnership acknowledge that there is a big challenge with translating this level of information through to community level, in particular there is a big knowledge gap with communities on how WRC's and storm overflows operate and implications with Climate Change- increased capacity and resources required to enable communities to educate and enable communities to make informed decisions. BACP can help provide and share communications with wider partners/local volunteer groups/wider members of the public, etc.	noted with thanks	
SoR6.36	BACP	STORM OVERFLOWS	The Partnership welcomes the commitment to monitor all storm overflows by the end of 2023. Decision making must be based on robust baseline/data/evidence. We support the sharing of data via the DWMP portal to enable all partners to make informed decisions and help to align plans and investment moving forward. At present, the Partnership would welcome more detail on what is to be monitored and how. We understand that all Storm Overflows will be monitored through event duration monitoring (EDM). We recognise that this will provide useful data, however we wonder if there is any potential for further monitoring to be installed that also captures the amount and composition of the discharges? Especially, in areas that the Partnership is focussing effort through the Partnership Programmes and securing significant investment to improve the ecology and biodiversity of the river.	Detail of storm overflows that are monitored and data available on the DWMP portal. Details of our future ambitions to secure funding for Continuous water quality monitoring (CWQM) are contained within Section 10.1.7. Detail of proposed investment in storm overflows for Amp 8 is also now available on the DWMP portal. Outputs from any funded CWQM will in due course be shared via the DWMP Portal. Welcome discussion for future partnership monitoring.	
SoR6.37	BACP	MONITORING IMPLEMENTATION	We would like to emphasise the need for robust pre- and post-development monitoring programmes for any options/interventions being delivered through more natural solutions. It has been recognised we are still at the early stages of understanding the environmental effects of delivering these solutions. The installation of nature-based solutions through the DWMP provides a good opportunity to carry on increasing our knowledge and understanding. This will ensure that genuine benefits are being delivered over the long-term for the aquatic environment and wider ecosystem.	noted	
SoR6.38	BACP	ECOLOGICAL EMERGENCY	1. We support the inclusion of Biodiversity, we would welcome more focus on protecting and restoring the aquatic ecology of the rivers and water environment due to the direct connections between storm overflows, WRCs and drainage systems discharging directly in to our rivers and streams.	1. Refer to Biodiversity action plan and environmental emergencies in section 2.2.10. 2. We have responded by explaining more in sections 2.2.10, 5.1.1 and 6.2.6. Also see Appendix C	

			2. In Section 4.1, the partnership is also keen for the DWMP to give greater recognition to the Ecological Emergencies that have been declared by the Local Authorities and in particular the decline in freshwater fish. 3. In Table 27, Section 9.2.3, 'Population' is identified, however more emphasis could be focussed on the effects of 'Population Growth' as this will have a direct link to the DWMPs. In Section 4.2.6- would welcome inclusion of Partnership working with the Catchment Partnerships to deliver nature-based solutions that complement the required engineered solutions.	3. Population ?? 4. Report amended	

Table 77: Other stakeholders and customers' feedback

Reference	LLFA	Theme	Lead Local Flood Authority Feedback	Wessex Water response	If not addressed in final cycle 1 DWMP, why?
SoR7.01	DRAINAGE BOARD	STAKEHOLDER ENGAGEMENT	It's unfortunate that we at the Drainage Board haven't had the capacity to engage effectively in the consultation. Skimming the summary document I haven't yet found any mention of IDBs and their local role in Drainage and Surface Water Management. . . . I wonder if we have missed an opportunity to be more involved at the local and catchment scale ?	The Internal Drainage Board was identified in the dDWMP as part of the Somerset Level 2b section (given the majority of the IDB are sits within Somerset). A new Section has been created within the Final DWMP in Section 6.3.8.1 which provides greater detail of the essential role that the IDB has in drainage and surface water management. The collaborative work with the IBD is recognised is also recognised by the involvement in Figure 39 – a case study for the collaborative work at Highbridge where the IDB supported the works to the rhyne system to facilitate the scheme.	
SoR7.02	DRAINAGE BOARD	ENVIRONMENTAL IMPACT	absence of any reference in invasive non-native species in the section about Somerset. Somerset has a dense network of watercourses and is especially at risk from INNS. There are several high risk INNS starting to spread in Somerset, especially floating pennywort and water primrose and zebra mussel. These represent a significant risk to the aquatic environment and flood risk and a to water management infrastructure. There is huge cost saving to be had from effective control of aquatic INNS and this really should be referenced and adopted in the new DWMP for the Wessex area, especially the low lying areas of Somerset.	The DWMP is high level in nature but potential effects on designated sites have been considered within the Environment Report, linked to the application of SEA Objective 1 (Biodiversity) in the assessment. Where flood risk and drainage issues are identified to be impacted by INNS – Wessex Water will evaluate and take appropriate action where INNS have spread on to our sites and assets. We will ensure that biosecurity measures are in place to avoid the spread of relevant species and that INNS present on our assets and managed/eradicated where appropriate. However the management of INNS in the wider aquatic environment relates to riparian responsibilities and is beyond the remit of the DWMP…. Where INNS are impacting on the performance of Wessex Water's drainage and wastewater infrastructure and causing a flood risk or posing a wider environmental threat, we will work in combination with relevant risk management authorities to request they use their statutory powers to assist with resolving concerns.	
SoR7.03	CADW	REPORT IMPROVEMENT	TBC if any feedback.	Noted	
SoR7.04	WILTSHIRE FISHERIES ASSOCIATION (tom@lending-law.co.uk)	REPORT IMPROVEMENT	on page 247 "Hampshire Avon Factsheet", the link to the video explaining inundation from groundwater doesn't seem to work. Process being implemented too slowly.	Link to video added. Our Final DWMP has identified a requirement for a step change in levels of investment and proposing 4 times as much infiltration sealing going forward to progress faster. See new section 11.3. We are also looking to use wetlands as nature based solutions to treat discharges from groundwater induced storm overflows – refer to the Shrewton case study in Figure 80	
SoR7.05	RIVER FROME RECONNECTED	REPORT IMPROVEMENTS	6.3.3 and 6.3.9 need to separate out mention of the River Frome Reconnected and the Frome Catchment Innovation Programme as two related but separate entities.	Have updated the text in sections 6.3.3 and 6.3.10.	

SoR7.06	RIVER FROME RECONNECTED	PARTNERSHIP WORKING	The Partnership feel that increasing the capacity and staff dedicated to working on the DWMP's will be valuable to support partnership conversations and collaborations, as we recognise the significant amount of time it takes to work effectively with partners to deliver multiple benefits	noted - resources of Wessex and stakeholders/ partners	
SoR7.07	RIVER FROME RECONNECTED	PARTNERSHIP WORKING	Good opportunity to collaborate and work up catchment-based solutions/ nature-based solutions to align the DWMP Strategies	noted	
SoR7.08	RIVER FROME RECONNECTED	PARTNERSHIP WORKING	Continued focussed effort to maintain or increase communications and engagement with Local Planning Authorities/Strategic Planning teams at Local Authorities- early thinking on integrated solutions to deliver multiple benefit outcomes will be beneficial and ensure more efficient and cost-effective outcomes	noted	
SoR7.09	RIVER FROME RECONNECTED	STAKEHOLDER ENGAGEMENT	Big challenge with translating this level of information through to community level- big knowledge gap with communities on how WRC's and Storm Overflows operate and implications with Climate Change- increased capacity and resources required to enable communities to educate and enable communities to make informed decisions. RFR and Frome Forum can help provide and share communications with wider partners/local volunteer groups/wider members of the public, etc	*noted with thanks*	
SoR7.10	CUSTOMER	INVESTMENT SCENARIOS	Managing the any increase in bills over an extended period and accepting that there will be some storm water escape but managing this within a framework.	noted	
SoR7.11	CUSTOMER	INVESTMENT SCENARIOS	I would be willing to accept significantly higher water bills in order to facilitate maximal investment in water infrastructure, in order to better protect & enhance our environment.	noted	

Annex I. Assurance

Our Boards assurance statement is provided in Appendix E.

Our external auditors’ report can also be found in Appendix E.

Appendix A. Drainage and wastewater drainage strategies

Drainage and wastewater strategy reports are available on our DWMP portal, on our DWMP website.

Please goto our website[83] to download this appendix, as Technical Appendix A is available to download as a separate document, and is not included in this report.

Appendix B. DWMP Customer research

Please goto our website[83] to download this appendix, as Technical Appendix B is available to download as a separate document, and is not included in this report.

Appendix C. DWMP Environmental report

Please goto our website[83] to download this appendix, as Technical Appendix C is available to download as a separate document, and is not included in this report.

Appendix D. DWMP Resilience

Please goto our website[83] to download this appendix, as Technical Appendix D is available to download as a separate document, and is not included in this report.

Appendix E. Board assurance statement

Please goto our website[83] to download this appendix, as our Board assurance statement is available to download as a separate document, so is not included in this report.

Appendix F. DWMP data table

Please goto our website[83] to download this appendix, as our DWMP data table statement is available to download as a separate document, so is not included in this report.

Appendix G. DWMP data table commentary

Please goto our website[83] to download this appendix, as our DWMP data table commantry is available to download as a separate document, so is not included in this report.

Appendix H. Glossary and References of related documents

This Appendix is provided below. It is also available to download from our DWMP website, as a technical appendix.

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 nn^{th} 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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