



Drainage and Wastewater Management Plan

Level 2 - River Basin Plan
Adur and Ouse



from
**Southern
Water** 

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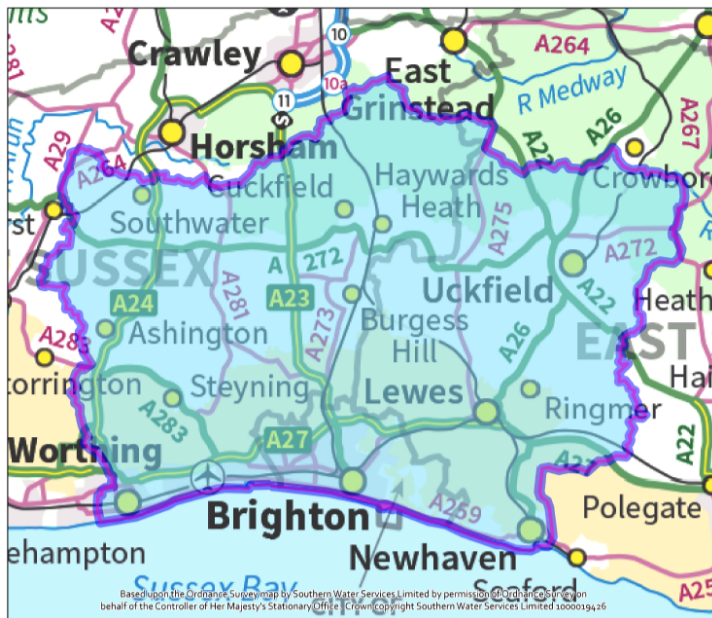
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Adur and Ouse River Basin Catchment



We have developed the first Drainage and Wastewater Management Plan (DWMP) for the Adur and Ouse River Basin Catchment.

We have 68 wastewater systems in this catchment, with over 354 pumping stations and over 4,881 km of sewers. We cover 13% of the geographical area (mainly the urban areas and villages including Brighton, Worthing, Haywards Heath, Burgess Hill, and Lewes) with 96% of the homes in the catchment connected to our wastewater systems.

Across Adur and Ouse we have:



68
sewerage
catchments



4,881
kilometres
of sewers



68
wastewater
treatment
works



354
wastewater
pumping
stations



13.4%
of region
connected to
a mains
sewer



96%
of homes
connected
to a mains
sewer



92%
of businesses
connected
to a mains
sewer

Our DWMP sets out our priorities for the Adur and Ouse River Basin Catchment. These include:

- Reducing the number of spills from the 112 storm overflows which together currently spill around 2600 times per annum
- Separating or attenuating excess rainwater in the sewer networks to reduce the risks of flooding and frequency of storm overflow discharges, especially in Lewes, Ashington, Ditchling, Lindfield, Shoreham and Barcombe
- Planning for potential significant developments at Burgess Hill, Brighton Marina and West Grinstead
- Improving the resilience of our networks and treatment works to prevent pollution incidents, particularly in Lewes, Newhaven and Brighton (Portobello)
- Reducing the risk of sewer blockages by increasing sewer jetting and targeting customer campaigns to reduce the amount of FOG (fats, oils and grease) and unflushables in the sewer network around The Lanes in Brighton and Church Road, Portslade
- Investigating the potential opportunity to designate the River Ouse at Barcombe Mills as an inland bathing water.

All the stages we followed in developing the DWMP for the Adur and Ouse are set out in the subsections below. Please explore these pages to find out more. You can find detailed investment needs in the tables on the Adur and Ouse [Options Development and Appraisal page](#).

Working with others – Adur and Ouse catchment

We have worked with a wide range of organisations with responsibilities for drainage, flooding and protection of the environment whilst developing our DWMP. The organisations we worked with in the Adur and Ouse River Basin Catchment include

- West Sussex County Council
- East Sussex County Council
- Mid Sussex District Council
- Adur and Worthing Councils
- Brighton and Hove City Council
- Crawley Borough Council
- Horsham District Council
- Lewes District Council
- Wealden District Council
- The Environment Agency
- Natural England
- South Downs National Park Authority
- The South Downs National Park Authority
- The Adur and Ouse Catchment Partnership and member organisations including:
 - The Ouse and Adur Rivers Trust
 - The Sussex Wildlife Trust
 - The Woodland Trust
 - The Royal Society for the Protection of Birds
 - Inland Fisheries and Conservation Authority
 - Rural Sussex
- South East Water

Working together to co-create the DWMP is important. Our drainage and wastewater systems are often inter-connected with the systems managed and operated by others and affect the natural environments within the catchment.

A wide range of issues and concerns have been raised and discussed throughout the development of the DWMP for the Adur and Ouse. These include

- It is challenging to find areas to implement SuDS (Sustainable Drainage Systems) in historic built up areas such as Brighton although there is potential to retrofit in parks and public areas and should be encouraged to address rain runoff issues. For example, raingardens are being installed in the Carden Avenue area.
- Groundwater levels are high and cause both infiltration, contributing to hydraulic overload, and exfiltration of sewage into the groundwater protection zones. Private sewers are likely to be contributing to the issues. Wastewater systems need to be constructed to higher design standards to ensure resilience to high groundwater levels.
- There are clusters of flooding but generally these are quite widespread across whole area. Investigations are needed to understand whether hydraulic overload can be tackled at source in the upper catchments in the Downs as well as through separating rain runoff from the foul system. Highways authorities should be encouraged to incorporate attenuation tanks for the highway runoff.
- Storm overflows are operating within permits but coastal areas and high-quality bathing waters are critical to the local visitor economy. The impact of storm overflows and the volume of runoff in the sewers needs to be addressed by working with highways and the Council to find solutions.
- Tide locking of outfalls can be an issue in some parts of the river basin catchment (RBC). This can affect capacity through siltation of the pipes
- Blockages are common in built up areas. Smart technologies should be deployed to identify and proactively clear blocks before they create flooding issues as well as continuing with targeted customer behaviour change campaigns.
- A review of the 'Right to Connect' policy for rural areas would be very valuable and it could be used to influence government policy.
- There are numerous environmentally designated sites in the RBC. The impact of discharges that are hydraulically connected to designated Habitat sites must be reviewed once the sites have been condition assessed by Natural England.

We are progressing these issues through the development of the DWMP as set out in our investment needs for the Adur and Ouse. Further, we commit to working with others to co-develop and co-deliver schemes that meet multi-organisational objectives and which benefit the environment, our customers and communities.

We developed and ran a series of activities between 2020 and 2022 as we prepared our DWMP for the Adur and Ouse. The dates and purpose of the various webinars, workshops, meetings on individual wastewater systems and interim consultation were as follows:

The dates and purpose of the webinars and meetings

The regionally based webinars presented and discussed issues and information relevant across the whole or our operating region. You can view the presentations used in the webinars on our [Who we're working with](#) page.

The presentations we discussed at the Adur and Ouse workshops are below

Workshop 1

Held in September 2020, participants discussed the findings of the risk based catchment screening and proposed additional planning objectives for the DWMP. [Workshop slides](#).

Workshop 2

Held in May 2021, participants

1. discussed the results from the BRAVA risk assessments and the proposed investment strategy for the wastewater catchments within the River Basin
2. identified the generic options that should be explored to address the identified risks, and
3. discussed which wastewater catchments to progress through the Options Development and Appraisal stage of the DWMP. [Workshop slides](#).

Workshop 3

Held in March 2022, we reviewed and discussed the draft investment programme for the River Basin Catchment. This included the types of investment, priorities and timing for investment needs and the wider opportunities arising from the proposed investment in terms of partnership projects and catchment wide solutions providing multiple benefits. [Workshop slides](#).

You can view the findings from our [interim consultation](#).

Risk based catchment screening for the Adur and Ouse catchment

Risk based catchment screening (RBCS) is a process where existing, readily available data is used to identify where there is a current and/or potential risk or vulnerability in the sewer catchment to future changes, such as new residential development or changes in climate. This enables effort to be focused on these catchments during the development of the DWMP in order to understand these risks in more detail and why they are likely to occur.

The RBCS involves the assessment of each sewer catchment against 17 indicators set out in guidance published by Water UK. Water companies can add additional indicators to ensure that other important issues are highlighted at this early stage in the development of the DWMPs. We have included an additional metric on customer complaints as this provides a flag for catchments with ongoing or outstanding concerns.

Find out more about the [risk based catchment screening](#) process.

The results for the RBCS for the Adur and Ouse river basin catchment can be downloaded here:

[RBCS – Adur and Ouse catchment](#)

BRAVA for the Adur and Ouse catchment

The Baseline Risk and Vulnerability Assessment (BRAVA) is an important step in the development of our DWMP in order to understand current system performance and future vulnerabilities. Understanding the current and future risks means that we can identify the investment needed to manage and reduce the risks to Band 0 (not significant level of risk).

A BRAVA assessment has been completed for each of the wastewater systems in the Adur and Ouse catchment that were flagged during the [Risk Based Catchment Screening \(RBCS\)](#). A risk assessment was completed for each of the national planning objectives for all 14 planning objectives. The output of the BRAVA shows:

- the current risks and issues in each wastewater system within the Adur and Ouse catchment - providing a baseline to assess future risks
- the future risks in 2030, 2035, 2045 and 2050 (where the methodology currently allows us to assess the future risks) so we can understand how the current risks may change without additional investment
- the key issues behind the future changes in risk including:
 - a deterioration in the condition of our wastewater systems
 - climate change - including the increasing frequency and severity of droughts and storms
 - customer behaviour - including issues such as sewer blockages or use of environmentally degrading materials such as chemicals, pesticides and plastics
 - growth and urban creep
 - a combination of any or all of these that are relevant in the catchment being assessed.

Results for the BRAVA for the Adur and Ouse river basin catchment

[BRAVA Summary – Adur and Ouse](#)

Notes

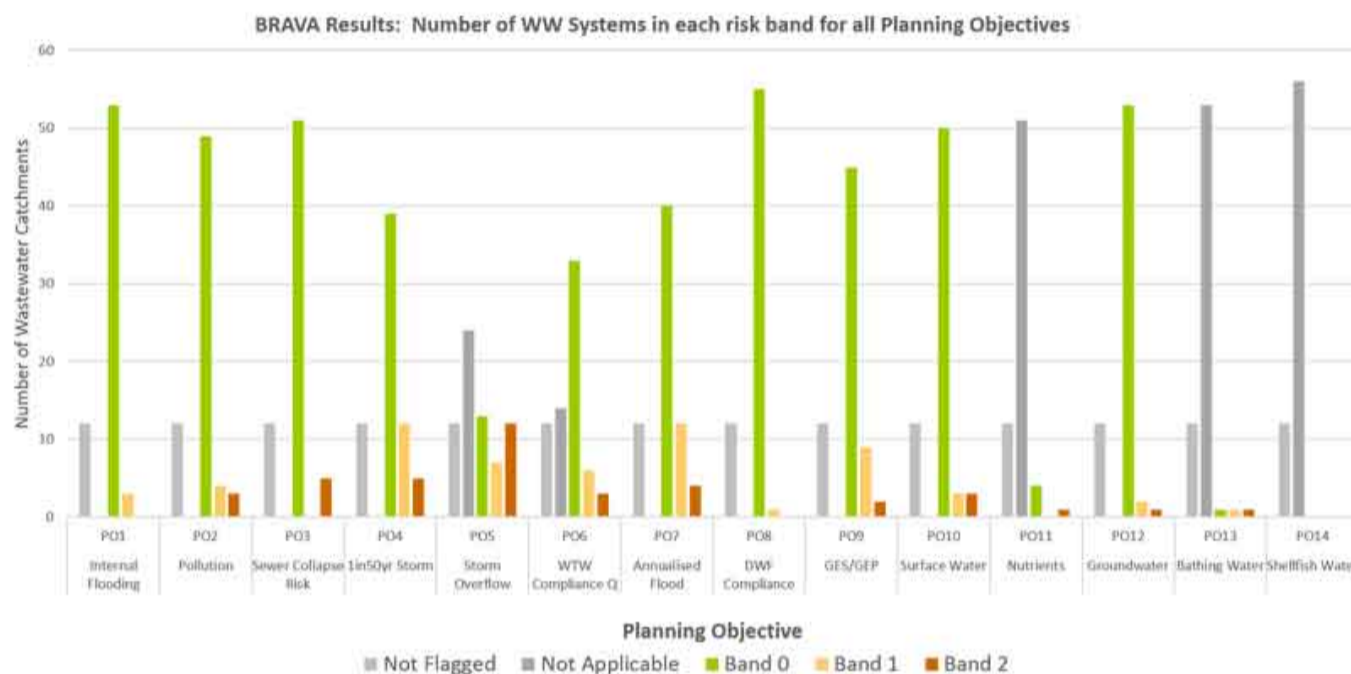
1. In the BRAVA results table, “not flagged” means no risks were identified in the initial Risk Based Catchment Screening using the nationally set criteria. Wastewater systems not flagged were screened out and did not progress to the BRAVA stage. “Not applicable” means the Planning Objective was not relevant within the wastewater system. For example, where a system has no Storm Overflows, this will be marked as “Not applicable”.
2. Please check the [DWMP glossary](#) for any unexplained acronyms.

Problem characterisation – Adur and Ouse

The Problem Characterisation stage of the DWMP uses the results from the Baseline Risk and Vulnerability Assessment (BRAVA) to explore the causes of risks and the primary drivers. A [technical summary](#) provides information on our approach to the problem characterisation.

Current risks in the Adur and Ouse Catchment

The graph below illustrates the combined results of the 2020 BRAVA assessment for all 68 wastewater systems in the Adur and Ouse river basin catchment. It shows how many wastewater systems have a risk under each of the 14 planning objectives. For example, for the risk of internal flooding, 53 wastewater systems are in band 0 (not significant), 3 are in band 1 (moderately significant), there are none in band 2 (very significant) and 12 were 'not flagged' for inclusion (i.e. screened out at the risk based catchment screening stage of the DWMP).



The graph illustrates that **storm overflows, flooding in a 1 in 50 year storm** and **sewer collapse** are the main concerns in this river basin based on the BRAVA results for 2020. This is illustrated by the brown bars being the highest for planning objectives 5, 4 and 3.

The wastewater systems with the highest number of planning objectives in band 2 (very significant) are **Shoreham** and **East Worthing**, each with 4 band 2 risks. **Peacehaven, Goddards Green** and **Newhaven East** have 3 planning objectives in band 2. All other catchments have fewer risks.

The specific risks and the causes of risk for each of the wastewater systems are explained in the summary of the problem characterisation for each system. These are available to download from the link next to the name of each system in the table below.

Future risks in the Adur and Ouse Catchment

The 2050 BRAVA results help us to identify the future challenges for drainage and wastewater management in the Adur and Ouse river basin catchment. These are:

(a) Growth

There are several wastewater catchments where new homes, businesses, roads and other infrastructure is planned. The main areas identified for potential new development in the Adur and Ouse catchment are:

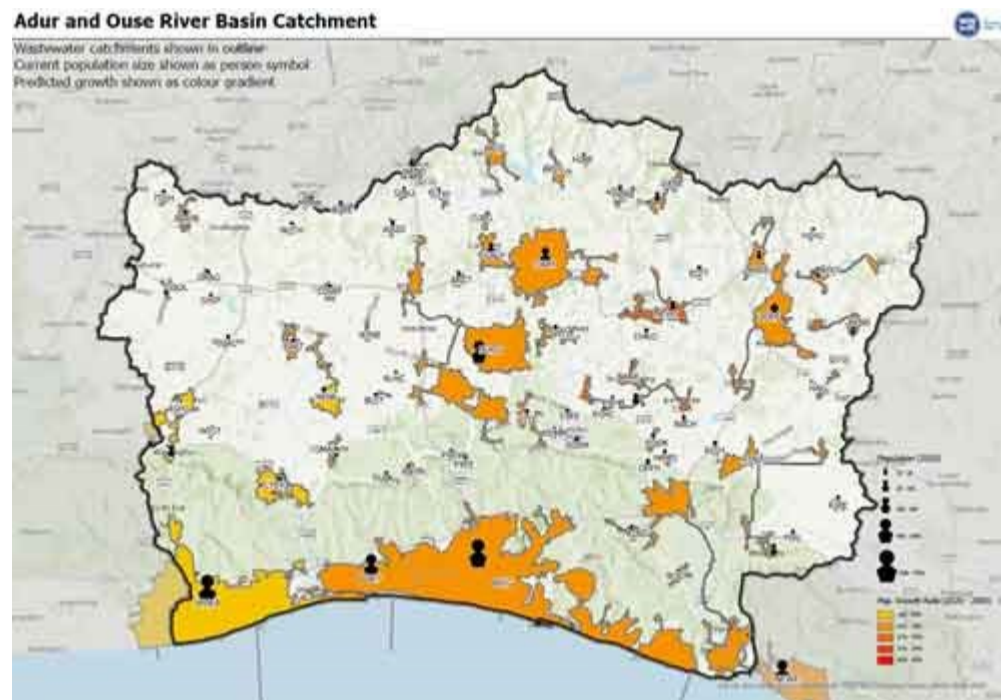
- Brighton
- Burgess Hill
- Worthing
- Scaynes Hill

The BRAVA results show that the additional homes and businesses will increase the risks of non-compliance with our Dry Weather Flow (DWF) permits from the Environment Agency in 13 of the 68 wastewater systems, including **East Worthing, Newhaven East, Shoreham, Goddards Green, Neaves**

Lane Ringmer, Ashington, Barcombe New and Ditchling. This means further investment will be needed in the future to increase the capacity of our treatment works to accommodate the new homes and businesses.

The additional development may mean that our current permits for wastewater treatment quality might be exceeded by 2050 without further investment in 4 wastewater systems, **Balcombe, Danehill, Kingston Hollow and Staplefield.**

A map of the Adur and Ouse catchment showing the estimated future growth in each wastewater system is shown below. The [technical summary](#) explains how we have considered population growth and urban creep in our DWMP.



(b) Climate change

Climate change will bring greater variability of our weather with warmer wetter winters and hotter drier summers. The impacts we will see will be more intense summer storms that exceed the capacity of the drainage and wastewater networks and cause localised flooding. Hence, the risk of flooding from sewer systems is increasing due to climate change. The [technical summary](#) explains how we have incorporated climate change into our DWMP.

We will work with partner organisations, such as East and West Sussex County Council and the Environment Agency, who have responsibility for flooding and drainage to consider options and develop opportunities to find solutions that reduce the risks from flooding.

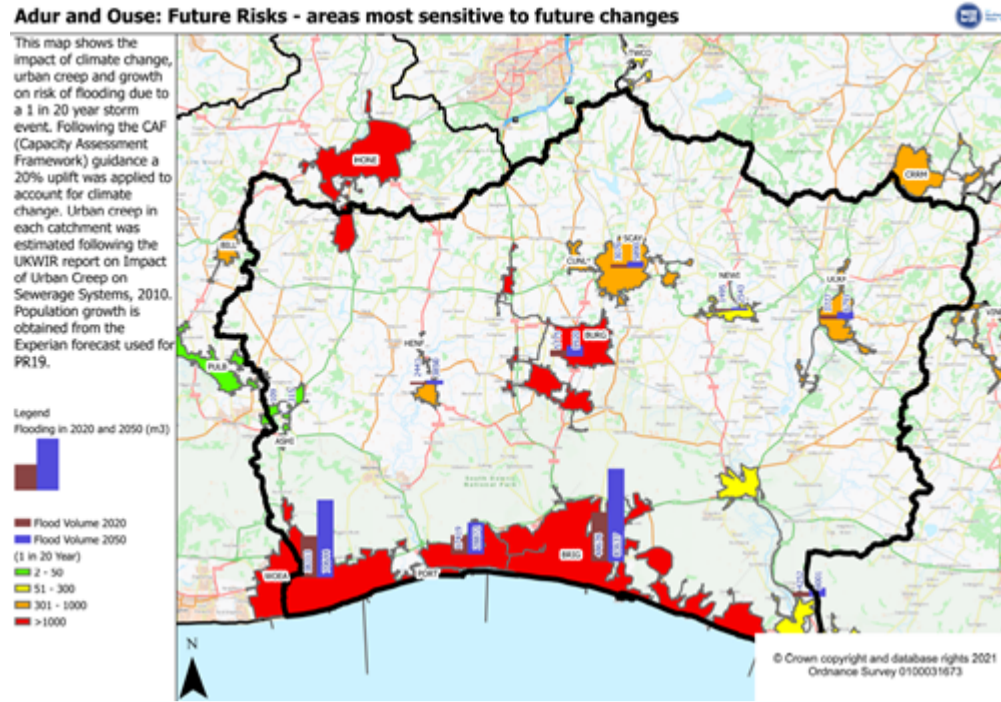
We will need to adapt our wastewater systems to operate in future climates. There will be an increasing need to slow the flow entering our sewer networks so the systems can carry the water without flooding homes and businesses and/or without causing discharges from storm overflows. Preventing additional rainfall entering foul sewer networks, including combined sewer networks where possible, could delay the need to upgrade and enlarge the vast underground network of sewers.

Climate change is expected to have an impact on the risk of flooding in several wastewater systems, especially **Brighton, East Worthing, Newhaven East, Shoreham, Henfield and Cuckfield** where there is already a very significant risk from rainfall related flooding. The flooding risk will increase by 2050 in all wastewater system unless measures are taken to manage and reduce these risks. The BRAVA results for planning objective 5 indicate that the risk of storm overflow discharges for 12 wastewater systems is likely to increase to very significant by 2050.

The map below highlights the potential impact of climate change on each of our wastewater systems, and an estimate of the change in rainfall volume that the drainage and wastewater systems will need to accommodate.

The map highlights the potential impact of climate change on each of our wastewater systems. It shows the impact of climate change, urban creep and growth on the risk of flooding in a 1 in 20 year storm. We followed Water UK's capacity assessment framework to apply a 20% uplift to rainfall forecasts to assess the potential increases in flood volumes shown on the map. Urban creep was estimated using the approach developed by the UK Water Industry Research (UKWIR) report on Urban Creep in sewerage systems (2010).

The map highlights that we will need to adapt to climate change. Adaptation will need to consider options for reducing the volume of surface water entering the sewer network in order to avoid the need for significant increases in the capacity of the existing drainage and wastewater networks.



Investment planning for each wastewater system

We used the BRAVA results and our understanding of the causes of risks and drivers to propose an **investment strategy** for each of the wastewater systems. Find out more information on [how we determined the investment strategies](#). The strategies help us to target the wastewater systems that need further investment to reduce the potential risks to customers and the environment. We have produced a table that lists the [proposed investment strategy for each catchment](#).

We used a risk based approach to identify the wastewater systems that we need to progress in this first round of DWMPs. For these systems we will develop an investment plan. Our technical summary sets out [how we have selected the systems to take forward](#).

The table below lists the wastewater systems in the Adur and Ouse river basin catchment that we're progressing further during this first round of the DWMPs into the investment planning stage. We have included a catchment map and an explanation of the causes of risks for these systems (see links in the table below).

The maps and causes of risks for the remaining wastewater systems in the Adur and Ouse will be published when available.

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Problem characterisation – Adur and Ouse

System Ref	Wastewater system	Wastewater system map	Information on causes of risks
BRIG	Peacehaven Brighton	Peacehaven Map	Peacehaven Causes of Risks
BURG	Goddards Green	Goddards Green Map	Goddards Green Causes of Risks
NEWE	Newhaven East	Newhaven Map	Newhaven Causes of Risks
PORT	Shoreham	Shoreham Map	Shoreham Causes of Risks
SCAY	Scaynes Hill	Scaynes Hill Map	Scaynes Hill Causes of Risks
WOEA	East Worthing	East Worthing Map	East Worthing Causes of Risks

Options development and appraisal for Adur and Ouse

Our approach to options development and appraisal (ODA) is explained in a [technical summary](#).

We commenced the ODA process at the river basin catchment (RBC) scale (level 2 planning). This enabled us to look across all the wastewater systems in the river basin and consider generic options that could work at the catchment scale, as well as those specific to a wastewater system.

The generic options are grouped into those that help tackle the risks at 'source', those that help to improve the wastewater system, 'the pathway', and those that protect or mitigate the impacts on the receiving waterbodies, 'the receptors'. This process helped to identify the types of options that could be used individually or in combination with other options to address the risks.

We held meetings with partner organisations to build upon the list of generic options relevant to each wastewater system. As a group we identified and proposed 'unconstrained' options to tackle the drivers and causes of risks identified during the Problem Characterisation stage of the DWMP. These unconstrained options were then progressed by us through the options development and appraisal.

The options appraisal involved evaluating each of the options in two stages, firstly to screen out unviable options to leave a set of 'constrained' options, and then a second stage to reduce the list further to leave only potentially 'feasible' options (see the Options Development and Appraisal technical summary for full details of this process). The process for evaluating the benefits and how we have taken the environment into account is set out in our [Strategic Environmental Assessment \(SEA\)](#) Scoping Report and the SEA Progress Report.

Only feasible options with positive benefits proceeded to the costing stage and this resulted in the selection of the preferred options and confirmed whether each was 'least cost' or provided 'best value'.

The feasible options column in the table below shows how we applied the process within each wastewater system. Beginning with the generic options through the appraisal stages, the table shows the point at which some options were rejected and why. If an option was not rejected, it was costed and became either the final best value or the least cost preferred option (see [ODA technical summary](#) for details of this process).

Our final preferred options are set out in the Investment Needs tables for each wastewater system. The accompanying maps show the location of the proposed options within the wastewater system.

Please check the [DWMP glossary](#) for any unexplained acronyms.

The options and investment needs are not committed funding but an identification of the needs for funding. We will include these options in our future business plans as part of the Ofwat periodic review of water company funding to secure the investment needed to implement these options.

System ref.	Wastewater system	Generic options screening	Feasible options	Investment needs	Investment needs map
BRIG	Peacehaven Brighton	Options Screening	Feasible options screening	Investment needs	Map
BURG	Goddards Green	Options Screening	Postponed	Postponed	Postponed
NEWE	Newhaven East	Options Screening	Feasible options screening	Investment needs	Map
PORT	Shoreham	Options Screening	Feasible options screening	Investment needs	Map

System ref.	Wastewater system	Generic options screening	Feasible options	Investment needs	Investment needs map
SCAY	Scaynes Hill	Options	Postponed	Postponed	Postponed

Note: The areas highlighted for customer education in the investment needs maps are indicative areas of likely focus, as they were derived from historical incident data.

Programme appraisal

The Programme Appraisal stage of the DWMP follows the Options Development and Appraisal (ODA) process. The ODA process identified the preferred options for investment in our wastewater systems to reduce the current risks as well as the risks up to 2050.

The Programme Appraisal brings the investment needs for each wastewater system together into an investment needs programme for the Adur and Ouse Catchment. Each investment need has an associated estimated cost to deliver the actions, and an indicative timetable based on when the risk occurs.

These investment needs provide indicative costs that allow us to understand the level of funding required to reduce the risks. The funding has not been secured at this stage. The DWMP informs the development of our 5 yearly Business Plan which is submitted to our economic regulator, Ofwat, to agree how we should invest the money received from our customer bills.

We assess the priorities for investment during the Programme Appraisal stage of the DWMP. We look across the river basin catchment to review the investments needed, the timing of these needs and how they combine to reduce the risks to our customers and the environment. We looked at the wider risk reduction that each option provides across all the planning objectives. Some actions, like separating rainwater from wastewater sewers, could reduce risks under several planning objectives such as storm overflows, external flooding, bathing water quality, shellfish water quality and good ecological status. The details of the method for prioritisation can be found in our Technical Summary on Programme Appraisal.

Our priorities for investment in the Adur and Ouse River Basin Catchment include

- Reducing the number of spills from the 112 storm overflows which currently spill around 2600 times per annum
- Separating or attenuating excess rainwater in the sewer networks to reduce the risks of flooding and frequency of storm overflow discharges, especially in Lewes, Ashington, Ditchling, Lindfield, Shoreham and Barcombe
- Planning for potential significant developments at Burgess Hill, Brighton Marina and West Grinstead
- Improving the resilience of our networks and treatment works to prevent pollution incidents, particularly in Lewes, Newhaven and Brighton (Portobello)
- Reducing the risk of sewer blockages by increasing sewer jetting and targeting customer campaigns to reduce the amount of FOG (fats, oils and grease) and unflushables in the sewer network around The Lanes in Brighton and Church Road, Portslade.
- Investigating the potential opportunity to designate the River Ouse at Barcombe Mills as an inland bathing water.

We progressed 4 wastewater systems through the ODA stage in the first cycle of the DWMP. These 4 wastewater systems serve a population of around 553 000 which is approximately 76% of customers in this river basin catchment.

We extrapolated the investment needs for these four systems to the other 64 systems in the Adur and Ouse river basin catchment. This provides an estimate of the total investment needs required to reduce the risks in all our wastewater systems in the catchment to Band 0 (not significant). This concept of “Band Reduction” and full details of the process for extrapolation is explained in the Technical Summary on Programme Appraisal.

A graph to illustrate the extrapolation of investment needs across the whole river basin catchment is shown in figure 1.

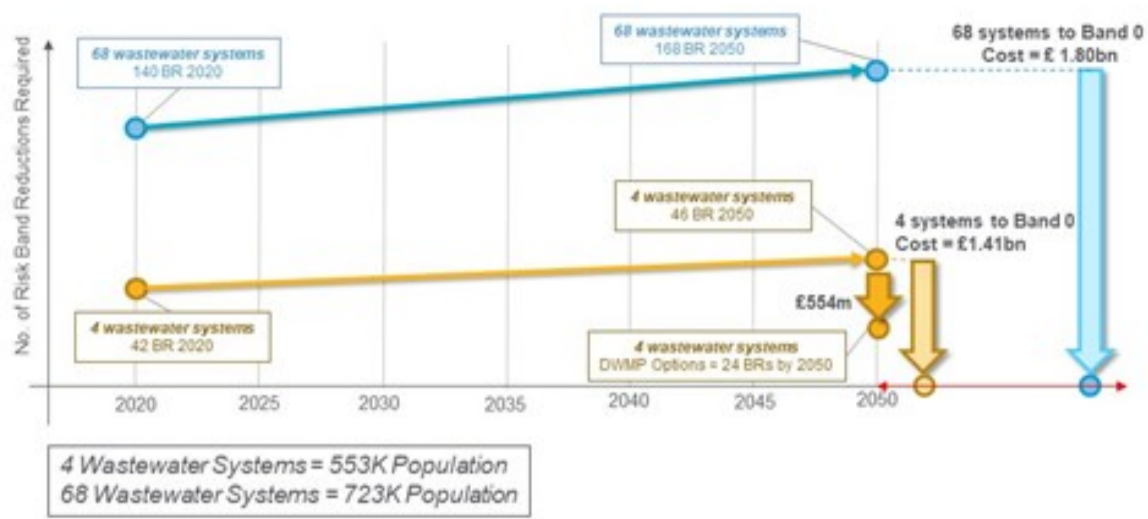


Figure 1: Adur & Ouse: Extrapolated Investment Needs and Risk Band Reduction

The programme appraisal for the Adur and Ouse identified the following:

- A total of 42 band reductions are required in 2020 to reduce the risks across the 14 planning objectives in the 4 wastewater systems.
- By 2050, this requirement will increase to 46 band reductions due to the impacts of climate change, growth and creep.
- The options identified to date would cost around £554 million for the 4 systems and is expected to provide 22 band reductions in 2050 (the options do not result in a band zero for all risks).
- The Adur and Ouse River Basin consists of 68 wastewater systems which require 140 band reductions in 2020 and 168 band reductions by 2050 in order to achieve Band 0 across 14 planning objectives.
- Extrapolating the risks across all the systems in the Adur and Ouse will cost around £1.8 billion for a population of 723,000. This illustrates the scale of investment needed to achieve Band 0 by 2050 across all 14 planning objectives.

Consultation on the Adur and Ouse river basin catchment

We held a preliminary consultation on our draft DWMP in September and October 2021. The purpose of the consultation was to gain feedback and advice from our customers and organisations on our developing Plan.

We specifically asked about:

- Our Strategic Environmental Assessment Scoping Report
- Our selection of wastewater systems to take forward into the Options Development and Appraisal stage of the DWMP in the first cycle, and
- Our developing plans on each of the 11 river basin catchments.

Our report on the [initial DWMP consultation](#) is now available.

We didn't receive any responses from the initial consultation relating specifically to the Adur and Ouse catchment. However, we know from the meetings held with the organisations that we have been working with that some key issues are:

- Bathing waters are a high priority for the local and visitor economy. Temporary and holiday accommodation such as seasonal caravan occupation increases the loads on the wastewater systems.
- A focus on reducing spills will reduce the risks.
- Pipe rehabilitation programmes are needed to prevent infiltration / exfiltration and protect groundwater.
- Surface water needs to be removed from the systems to mitigate against the impacts of climate change, overflows, flooding, growth and creep, and potentially provide wider multiple benefits.
- Partnerships are needed to identify suitable locations where SuDS (Sustainable Drainage Schemes) could be introduced to reduce flooding and slow the flow into the drainage systems.
- Blockages are the biggest cause of internal flooding so targeted customer education and sewer jetting is needed to reduce the risks.
- Upgrades are needed to outfalls and large storm water tunnels that discharge over sea walls / into tidal waters. These issues are critical and need to be taken into account in long term investment planning.

How we responded to the issues raised during the workshops and the preliminary public consultation is set out in our [Register of Stakeholder Comments](#).

We held a full 12 week public consultation on the draft Regional (Level 1) DWMP between Monday 13 June and Monday 05 September 2022. Our [Statement of Response](#) to the issues raised is published on the home page of our website, and a report and analysis on the consultation is published on the [Have your say page](#).