Drainage and Wastewater Management Plan

Strategic Environmental Assessment – Non-Technical Summary

May 2023

Pennon

South West Water

Bournemouth Water

Bristol Water

Revision	Description	Author		Quality Check		Independent Review	
0	Final	K. Ramsay K. Lo	30/05/23	C. O'Connor	30/05/23	C. O'Connor	30/05/23

This document entitled 'Drainage and Wastewater Management Plan- Strategic Environmental Assessment Report' was prepared by Stantec Limited ("Stantec") for the account of South West Water (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Contact details

If you have any queries or questions, you can email dwmp@southwestwater.co.uk.

South West Water, Peninsula House, Rydon Lane, Exeter, EX2 7HR

www.southwestwater.co.uk

Abbreviations

List of Abbreviations	
AMP	Asset Management Plan (AMP8 period is 2025-2030)
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BGI	Blue green infrastructure
BNG	Biodiversity Net Gain
BRAVA	Baseline Risk and Vulnerability Assessment
Defra	Department for Environment, Food and Rural Affairs
DSMP	Drainage and Sewerage Management Plan
DWF	Dry Weather Flow
DWMP	Drainage and Wastewater Management Plan
EPA	Environmental Performance Assessment
GhG	Greenhouse Gas
HRA	Habitats Regulations Assessment
IGGI	Integrated green grey infrastructure
INNS	Invasive non-native species risk assessment
L1/ L2/ L3	Level 1/ Level 2/ Level 3 DWMP
LLFA	Lead Local Flood Authority
MCZ	Marine Conservation Zone
NCA	National Character Area
NNR	National Nature Reserve
ODA	Options Development and Appraisal
ODPM	Office of the Deputy Prime Minister
Ofwat	Water Services Regulation Authority
PO	Planning Objective
PR24	2024 Price Review for AMP8
PRoW	Public Rights of Way

List of Abbreviations	
RBCS	Risk Based Catchment Screening
RBD	River Basin District
RBMP	River Basin Management Plan
RNAG	Reason for Not Achieving Good
SAC	Special Areas of Conservation
SEA	Strategic Environmental Assessment
SO	Storm Overflow
SODRP	Storm Overflow Discharge Reduction Plan
SPA	Strategic Planning Area (please note that SPA to an environmental audience usually refers to a 'Special Protection Area' - in this report this term is not abbreviated)
SSSI	Site of Special Scientific Interest
SW Water	Southwest Water
SuDS	Sustainable Drainage Systems
uFMfSW	updated Flood Map for Surface Water
UKCP	UK Climate Projections
WFD	Water Framework Directive
WHS	World Heritage Site
WRZ	Water Resource Zone
WwTW	Wastewater Treatment Works

Non-Technical Summary

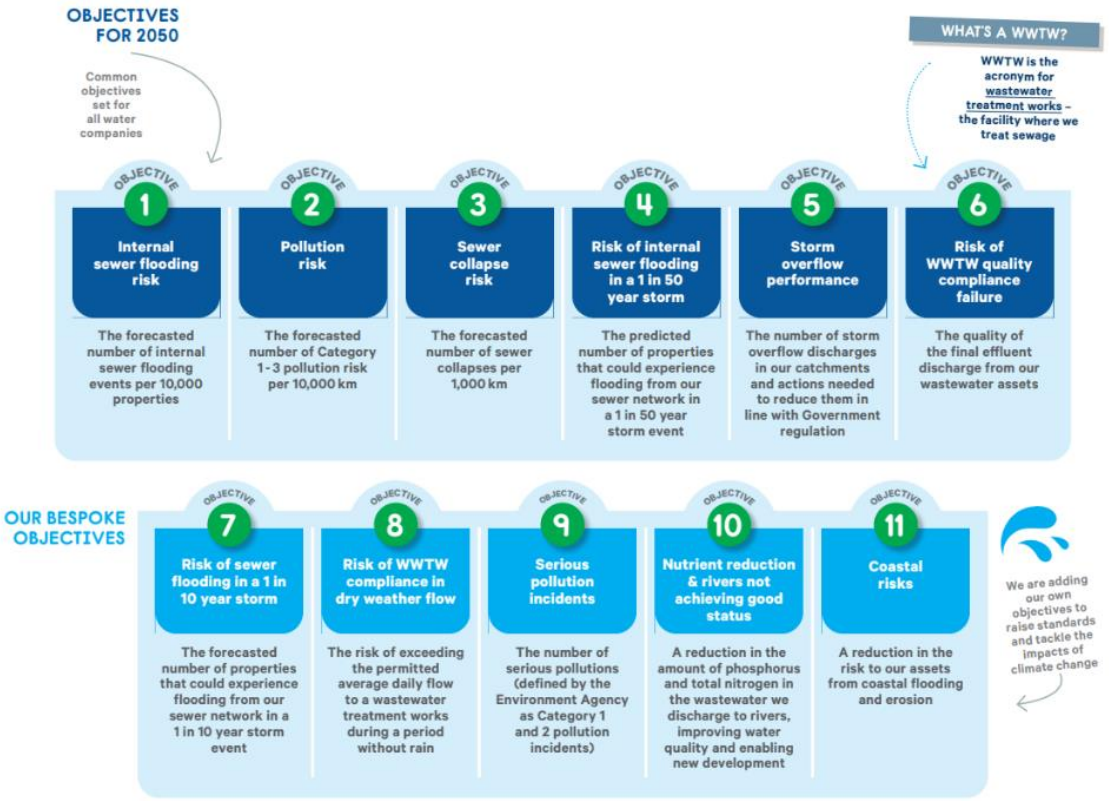
The non-technical summary provides an overview of the Strategic Environmental Assessment (SEA) of South West Water's (SWW) draft Drainage and Wastewater Management Plan (DWMP). It summarises the key issues using non-technical language as far as possible to make the report more accessible. For the full findings, reference should be made to the SEA report.

SEA provides an opportunity to consider ways by which the plan can contribute to improvements in environmental conditions; as well as a means of identifying and mitigating any potential adverse environmental effects that the plan might otherwise have. It informs the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the environment. By doing so, it helps make sure that the proposals in the plan are the most appropriate given the reasonable alternatives. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. This assessment has been undertaken as best practice, rather than a statutory requirement.

Overview of the Plan

Wastewater companies in England and Wales are subject to regulatory price controls and have committed to produce DWMPs in accordance with the Water UK framework. The framework results from collaboration between many organisations including Defra; Environment Agency; and water companies themselves.

The DWMP takes a long-term view to set out how SWW intend to extend, improve, and maintain a robust and resilient drainage and wastewater system encompassing the next 25 years and beyond to meet the requirements of SWW's long-term core objectives:



DWMP Consultation

SWW have worked with a range of stakeholders in developing the DWMP, including the Environment Agency, Local Planning Authorities, Natural England, Defra, SWW customers, and others.

SWW have actively led the development of DWMPs from inception to delivery, including chairing the national DWMP steering group on behalf of Water UK. This was used to gain the input of priority stakeholders.

In June 2022, the draft Drainage and Wastewater Management Plan (DWMP) was published for a 12-week formal consultation to gain feedback on the draft DWMP from customers, stakeholders and regulators and inform the development of the final DWMP.

Changes from Draft DWMP to Final DWMP

Changes in Programme

The publication of the Storm Overflows Discharge Reduction Plan (SODRP) in August 2022 amended the focus of the DWMP to achieve the following time-bound targets:

- by 2035, water companies to improve all storm overflows discharging into or near every designated bathing water; and improve 75% of overflows discharging to high priority nature sites.
- by 2050, this will apply to all remaining storm overflows, regardless of location.

Further changes came forward through the parallel WINEP programme (Water Industry National Environment Programme). WINEP measures are appraised and submitted separately through the WINEP process.

Based on the consultation feedback and the changes in the regulatory requirements (SODRP and WINEP), the key changes in programmes between the draft DWMP and final DWMP can be summarised as:

Storm Overflows - Case Studies

Case studies for several areas (e.g., Plymouth, Falmouth) were undertaken to investigate catchments in more detail to identify site specific solutions, alongside modelling, to ground-truth the AMP8 programme.

Inclusion of Coastal Storm Overflows

The government targets currently exclude coastal storm overflows that are not in or near a bathing or shellfish water. However, the DWMP has included these sites in the programme, as it is not acceptable for those overflows to continue to discharge at higher rates. The inclusion of these overflows within the WINEP is pending approval from Defra and Ofwat.

Change in Option Development and Appraisal Methodology

Option development and Appraisal have been carried out using multi-criteria analysis (MCA) screening in the PR24 WINEP SWW Options Screening Tool to determine the feasible options.

Inclusion of Nature Based Solution Commitment

In the final DWMP, SWW have stated an ambition for a minimum of 10% of the interventions being Nature Based Solution (NBS), with an increase to 20% by 2050. In addition to these statements, to maximise the potential for Green (such as habitat), Blue (such as ponds), Blue Green Infrastructure (BGI) and Integrated Green Grey Infrastructure (IGGI) (such as a pond with an overflow into a surface water sewer) interventions and demonstrate the ambition to NBS, SWW will adopt a "Green First" approach from the onset of solution identification once a project need has been identified.

The Green First approach will mean the scoping of each solution by looking at whether Green options can be appropriate, moving through the Green, Blue, Grey spectrum if not. However, there will always need to be a balance of the use of NBS and meeting urgency and certainty for a solution, which means a Blue or Grey solution (or hybrid such as BGI or IGGI) may be more practical.

A best value solution may not always be "Green" only. But by starting at Green, rather than the tradition of starting at Grey/traditional/known solutions (such as sewers and storage), this will lead to practical, best value solutions that will always look to provide as much environmental/biodiversity and societal benefit as is reasonably practicable, in addition to resolving the initial need.

The 'Green First' approach is detailed to delivering at least 10% of the solutions through nature-based approaches in the **Technical Appendix document** that forms part of the DWMP submission.

River Quality Monitoring

A soft start to the programme to enable a greater understanding of the equipment and to develop the supply chain capability.

Key Requirement, Issues and Opportunities

As part of the SEA, relevant plans, programmes, and environmental protection objectives relevant to the DWMP were identified, along with the baseline environment and likely future without the plan. These are summarised within the SEA Report.

Climate change and population growth are key factors which are increasing pressure on the wastewater system and the wider environment (such as through storm overflow discharges), including increased flood risk, a trend which is expected to continue. These are key issues in relation to water quality, flood risk, biodiversity, and human health, which the plan seeks to address.

The requirements around planning for drainage and wastewater are evolving, including the relatively recent introduction of the Environment Act 2021, the Storm Overflow Discharge Reduction Plan (2022), and net zero carbon targets.

How was the plan assessed?

SEA objectives were developed to state the direction and priorities of the SEA; give a structure to ensure a comprehensive and robust appraisal; and provide the basis for the identification of relevant indicators. They are:

Table E-1: SEA Objectives.

SEA Topic	Overarching SEA Objective
Biodiversity and geodiversity	Protect, conserve, restore and enhance biodiversity and geodiversity, including soils
Human health	Protect, conserve, and enhance human health and well-being, including resilient communities
Socio-economics	Protect, conserve, and enhance social and economic prosperity
Carbon & material assets	Address the causes of climate change and manage and improve efficient use of resources, including embodied carbon, carbon emissions, emissions to air and waste generation
Water resources	Protect, conserve, and enhance water resources
Flood risk	Reduce and manage flood risk, increasing flood resilience
Heritage	Protect, conserve, and enhance the historic environment, including archaeology
Landscape	Conserve, protect and enhance the landscape, townscape, and visual amenity

SEA Topic	Overarching SEA Objective
Climate change resilience	Adapt, and improve resilience to climate change

The SEA objectives are developed further into an SEA framework, including guiding questions, that has been used to assess if the plan, the components of the plan, and their reasonable alternatives are likely to bring positive, negative, neutral, or uncertain effects in relation to the SEA objectives. Consideration is given to the likely significance of identified effects in accordance with Schedule I to the SEA Regulations.

The SEA process is concerned with likely significant effects, including the measures envisaged to prevent, reduce, and as fully as possible offset any significant adverse effects of implementing the plan. SEA can effectively promote sustainable development by mainstreaming the environment into economic development and integrating green economy targets into strategic and project-related decision-making. For the purposes of this appraisal, a significant negative assessment (indicated by a 'red' score within the appraisal matrix) is considered to be a significant adverse effect; where the option is implemented by the plan, measures will be required to prevent, reduce, and offset the significant adverse effects.

It is important to note that the assessment has been undertaken at the strategic level, in line with the nature of SEA and the DWMP. There will naturally be variation in the effects of the plan across the plan area as the receiving environment and the implementation of options vary.

Option Development and Consideration of Reasonable Alternatives

Storm Overflows Measures

When developing the draft DWMP, SWW identified generic options for consideration in line with the Water UK Framework. These options were reviewed by the SEA team to ensure all reasonable alternatives were being considered. These options were taken through multi-criteria analysis (MCA) screening using the PR24 WINEP SWW Options Screening Tool. Options are scored according to the following primary criteria:

- Ability to meet the obligations,
- Contribution to the WINEP wider environmental outcomes (WEOs), including the potential impacts on, and changes to, natural assets,
- Technical feasibility,
- Deliverability.

A scoring-criteria is used, using a number of secondary and tertiary criteria to obtain a final weighted score for each option. Options that are screened out at this stage are those that:

- will not solve the risk or issue, even in combination with another option,
- are not likely or uncertain to solve the risk or issue,
- do not have fully established technology,
- have low confidence in terms of construction feasibility, or
- have low confidence in terms of being delivered within the obligation timescale.

All other options proceed to the constrained list. The constrained options were assessed for whole life cost, wider environmental benefits, natural capital and carbon.

Further analysis with regards to site feasibility was carried out to ensure that there were no prohibitive issues such as access, space or incompatible existing treatment associated with any of the options.

Whole life costs were established using the 2021/22 net present value, taking into account both capex and opex on a 30 year appraisal period.

The wider environmental benefits were assessed according to the WINEP Wider Environmental Outcome Metrics (Environment Agency, April 2022).

The PR24 WINEP Benefits Assessment Tool quantifies the total carbon sequestered (tCO2e/yr)) by any change in habitat type associated with the option.

The feasible options are summarized in **Table E-2**.

Table E-2: Feasible Options for Storm Overflows

Feasible Options
• Storage tanks (Storage)
• Source control SuDS upstream thinking
• Integrated construction wetland downstream of a wastewater treatment works (Wetlands)
• Disinfection of storm water overflows (i.e., UV at Final Effluent
• Combined sewer separation. Construct new surface water sewers (Surface Water Separation)
• Increase network capacity by installing larger sewers / Increasing capacity of wastewater sewer system (Increase capacity)
• Increase WasteWater Treatment Works capacity when networks solutions are insufficient and flows have to be sent to WWTWs thereby triggering a major FFT upgrade
• Inflow reduction/separation

Coastal Flooding Measures

Coastal flooding measures have been considered in the DWMP. A total of 656 Sewage Treatment Works (STW), 1,235 Sewage Pumping Stations (SPS) plus the associated wastewater infrastructure were assessed for coastal flood risk. Sites have been assessed based upon a number of different storm and flood scenarios considering the risks to the site, the defence of the site and wider EA flood defence work. Possible interventions to manage the risks have been identified:

- Provision of flood defences for the site, either as a SWW deliverable or as part of a wider programme of coastal defences working with EA and other LRMAs. Thereby delivering greater benefit for coastal communities.
- An alternative intervention is to relocate the asset to a more secure location ensuring ability to continue to service local communities. This option is more likely to be part of a wider decision to relocate communities at risk and would be taken in close collaboration with the EA and responsible LRMAs.
- Small scale localised measures to reduce vulnerability to flooding, such as raising the height of control panels above flood depth, relocating chemical storage within an existing WwTWs , and provision of bunding to WwTWs and standby generators. Given the small scale and localised nature of these measures within existing WwTWs, these are not assessed through the SEA process.

Further options may be developed over the long-term horizon of this plan as a result of advancing science and technology and societal changes. These will need to be considered within the five-year DWMP review cycle.

Development and Assessment of Combined Options

In choosing the right interventions, SWW have considered all the costs and benefits of each intervention, recognising that nature-based solutions can create recreational spaces and by preventing surface water from entering the network, reduce the usage of power and chemicals as a result of pumping and treating less. But they take time to take effect and make a difference.

Nature-based solutions bring with them the additional societal benefits of often providing a pleasant outside space for residents and visitors to enjoy. However, they also require careful planning and partnership working with stakeholders who share these objectives. This can result in a long lead time to carefully design and deliver the solution, meeting the needs of all stakeholders. more about environmental ambition and approach to nature-based solutions in can be found in the Technical Appendix.

Where there are more urgent interventions required with greater certainty, more traditional, engineered solutions – such as increased network and treatment capacity will be deployed. The use of interventions which deliver wider public benefits will be considered as far as possible.

Whilst UV treatment solutions do exist, they are complex to implement and use a high level of power and carbon and operating cost – UV solutions are not considered as sustainable. UV treatment solutions will be considered as a matter of last resort. Whereby other solutions have not been able to achieve the spill frequency reduction and harm to the environment is demonstrated to occur. In these circumstances UV treatment solutions will be considered.

At the strategic plan level, the options assessed in Table 12 above which remove surface water from the combined sewer network can be combined into a 'surface water separation' approach. This approach uses 'blue-green' measures such as inflow reduction, SuDS and sections of new surface water sewer to reduce flows, which is typically shown to removed 50% of the surface water flows from the network, with the remaining 50% to be achieved through the more traditional grey engineered approach.

The core element of the DWMP include:

- All storm water overflows spills meet Defra targets set out within the SODRP
- Wastewater treatment works, sewers and pumping stations are protected from coastal erosion and seawater intrusion
- Current flooding risks are maintained
- The wastewater treatment works maintain 100% compliance
- Wastewater quality standards are improved by reducing contaminants in discharges in line with the Defra targets

In developing the plan, the cost, maturity of technology and practicality have been considered.

If investing later, the bills are more affordable in the short term, and more focus can be on nature-based solutions to meet the needs, but in the short term there is a risk not meeting legal targets and allowing climate change risks to grow – continuing to be of concern to the customers and stakeholders.

If investing sooner, the targets set by Defra can be achieved, climate change risks can be addressed and the environment can be improved, but bills rises are steeper in the short term and delivery will rely on more traditional solutions as nature-based solutions may take longer to

take effect.

In order to balance these considerations, six scenarios have been created to develop the best value plan. The approach in the draft DWMP was revised based on feedback from the regulators and increased clarity on the Water Industry National Environment Programme (WINEP) drivers.

The DWMP framework seeks to develop adaptive pathways across a series of scenarios to deliver additional benefits for customers and the environment, whilst supporting business choices in an uncertain world. As part of the DWMP development, six adaptive pathways have been developed: four based upon climate change variations and a further two covering technology and population growth.

- Scenario 1a: Least Cost - this meets all legal targets for storm overflows and wastewater discharges in a future world with a 2°C increase to the climate.

- Scenario 1b: Best Value – this is the preferred plan. This scenario is the same as Scenario 1a with investments for storm overflow delivered by 2040, 10 years ahead of SODRP targets.

- Scenario 2: Climate Resilient - this builds on Scenario 1a, meeting all legal targets, maintaining flood risk to ensure no deterioration to 2050 and increasing the resilience to climate change. The choices in this scenario are based on preparing for the needs of a 4°C increase to the climate.

- Scenario 3: Reduced Flooding - this builds on Scenario 1a, meeting all legal targets for storm overflows and wastewater discharges in a 2°C increase to the future climate. The choices here reduce flood risk from the 2025 level of 10% of properties at risk of sewer flooding to a 5% level of risk

- Scenario 4: Enhanced Resilience - this builds on Scenario 2 - Climate Resilient, preparing assets for a 4°C increase in climate whilst also reducing future flood risk below 2025 levels.

- Scenario 5: Innovative Technology - this builds on Scenario 4 - Enhanced Resilience, meeting all current wastewater targets whilst preparing for a 4°C increase in climate with reduced levels of flooding. Additionally new technologies will be adopted to improve the analysis and operation of sewer network and monitor the quality of the effluent discharges from treatment works.

- Scenario 6: Lowest Risk- this is the highest cost and lowest risk scenario. It builds on all the elements of previous scenarios and is based on higher levels of population growth and an increased demand on the wastewater network in a 4°C future climate.

Assessment of the DWMP

SWW has selected Scenario 1b as the preferred plan to address SODRP targets. It responds to the pressures facing the wastewater system now and over the next 25 years. It delivers against proposed government policy and delivers improvements to support customers, communities, and society.

The plan requires an investment programme of £8.4 billion over 25 years to 2050 and will deliver the following outcomes:

- All storm water overflows will spill no more than ten times a year (no matter the weather, no matter the cost), without any ecological impacts or public health impacts, by 2040, focussing on high priority rivers and bathing water sites first.

- A further five wastewater treatment works, 14 sewer pump stations, and 80km of sewers have been identified as at risk from coastal flooding and erosion, and seawater intrusion, due to climate change and rising sea levels. It is planned to relocate those treatment and pumping sites at highest risk and continue to monitor these developing risks as the development of the understanding of the risk climate change poses to the assets.

- The wastewater treatment works will maintain 100% compliance despite the upward pressures from extra flows in the system. Moreover, 100% compliance with tighter environmental permits will be attained as the wastewater quality standards will be raised by reducing nutrient contaminants in discharges by 80% by 2037, in line with the Defra targets.

- Current flooding risks will be managed, so that the current percentage of the population at risk of flooding in a severe storm is maintained despite the upward pressures of climate change, population growth and urban development.

- Investment through to 2050 is paced across the five-year periods in the interests of intergenerational fairness, with a shift from traditional solutions to natural flood management so that overall, a minimum of 10% of the plan is delivered through nature-based solutions and all of our solutions are considered for nature-based delivery approaches.

Table E-3 below draws together the total effects of the DWMP in combination with the underlying trend, to establish the cumulative effect. The total effects and the cumulative effects of the plan can be defined as:

DWMP (overall approach, options selected, outcome) = total plan effects

Total plan effects + 'likely future without the plan' = cumulative effects

The likely future without the plan includes the changes that are likely to happen in the background outside of the control of the plan, whilst the plan is being implemented. This is presented as part of the baseline review in **Appendix C** of the environmental Report.

The DWMP aims to protect and enhance the environment, support resilient communities, and contribute to economic growth. The outcomes of the DWMP relate to key issues for drainage and wastewater: environmental improvements to tackle SOs, WwTW DWF discharge compliance and sewer flood risk, whilst accommodating growth and climate change. The most sensitive environments are prioritised for action first. As such the overall direction and purpose of the DWMP shows positive alignment with the SEA objectives.

KEY:

Major positive		Moderate positive		Minor positive		Neutral	
Major negative		Moderate negative		Minor negative		No relationship	

Table E-3 – Total Plan Effects and Cumulative Effects

SEA Objective	Total plan effects	Cumulative effects
Biodiversity & Geodiversity	The DWMP prioritises measures where SOs are discharging in or close to high priority sites (as defined by SODRP). This will provide a positive permanent benefit for aquatic biodiversity. As the implementation of the plan progresses, the benefits of the plan will extend across the plan area. WwTW upgrades to cope with additional demand from population growth will prevent damage to aquatic biodiversity from that population increase. The Preferred Plan includes a minimum of 10% of 'green' and 'blue-green' infrastructure components of the alterative scenarios. This option offers the potential for long term positive effects on terrestrial biodiversity and geodiversity. Within rural areas, catchment management provides an opportunity to slow the rate of drainage, including of important habitats, contributing to rewilding and supporting natural hydrogeological processes. Within more urban areas, blue/green corridors and SuDS provide opportunities to provide/enhance biodiversity. The level of benefit achieved will depend on the extent of implementation of these green options, their location (providing opportunities to link other habitats) and their design.	Climate change will impact wildlife in the future by various means including, but not limited to, drought, timing of seasonal activities, higher frequency of storms, native species redistribution, invasive non-native species, and increased potential for wildfire. Changing climate could impact on the quality of soils across the region through temperature extremes and changing rainfall patterns. Development pressure is likely to increase the risk of habitat loss and fragmentation, particularly outside of the extensive designated areas. Partnership working offers the potential to increase resilience to climate change by allowing the movement of species through the environment and supporting natural soil processes. Reduced spills from SOs and WwTW upgrades will support biodiversity, reducing susceptibility to the above threats.

SEA Objective	Total plan effects	Cumulative effects
	The construction of below ground storage, surface water management and WwTW upgrades will result in localised temporary loss of biodiversity during construction. The significance of the effect will depend on the current land use and ecological value (e.g., ranging from no value within a highway, to high value within a designated site). Careful siting, planning and construction will be required to avoid and minimise impacts. Potential exists for biodiversity net gain within reinstatement (again, this will be location specific).	
Human Health	Life expectancy in the south west is higher than the national average, meaning the numbers of elderly residents of the region will also increase. The increasing age profile across the region will place additional pressures on health services. SOs discharging to designated bathing waters will be reduced by 2035, providing a permanent positive effect on human health. These measures may increase the uptake of open water swimming, providing further health and well-being benefits. The 'green' and 'blue-green' infrastructure components also provide an opportunity to provide access to green spaces with improved connectivity through them, providing a permanent positive effect on human health. The level of benefit achieved will depend on the extent of implementation of these green options, and their design. There is another potential opportunity to provide public access to above below-ground storage assets, such as play areas, gyms, etc (this will be location specific and dependent on design).	The population of the UK is ageing, putting additional pressures on public finances and services. Policy is placing increasing emphasis on access to green space, green infrastructure, and improved accessibility to sustainable modes of transport. The 'green' and 'blue-green' infrastructure components provide an opportunity to support these measures, improving health and well-being.
	The Preferred Plan does not account for internal sewer flooding. As the population growth, more premises will be affected in relation to health (exposure to sewage) and well-being (stress, anxiety).	The Preferred Plan does not account for internal sewer flooding. Climate change will affect more premises in relation to health (exposure to sewage) and well-being (stress, anxiety).

SEA Objective	Total plan effects	Cumulative effects
	It is anticipated that the human health impact will be neutral during the construction of measures included within the DWMP.	
Socio-economic	The plan area experiences higher than average levels of unemployment, with a large number of neighbourhoods being the most deprived nationally. The water quality improvement measures will reduce risks and support a good economic and social environment. Although the Preferred Plan has small amount of 'green' and 'blue-green' infrastructure components (around 5%), it may provide some opportunities to allow the multi-functional nature of blue/green corridors to provide active travel routes (such as footpaths and cycle paths)	In both the short and longer term, there is uncertainty in relation to socio-economics across the country. Whilst the plan is unlikely to substantially affect this, the water quality improvement measures will reduce risks and support a good economic and social environment.
	The plan area experiences higher than average levels of unemployment, with a large number of neighbourhoods being the most deprived nationally. This can result in communities being more susceptible to the effects of flooding (e.g., residents are less likely to have home insurance or available funds for clean-up and replacement of goods). The Preferred Plan does not account for internal sewer flooding. As the population growth, more premises will be affected in relation to socio-economics.	The Preferred Plan does not account for internal sewer flooding. The climate change could affect more premises in relation to socioeconomics.
	Given the scale of work that will need to be implemented through the plan, there is likely to be a socio-economic boost such as employment opportunities through the construction phase. Whilst this will be temporary, it is expected to continue in the long-term until 2050.	

SEA Objective	Total plan effects	Cumulative effects
Carbon & Material Assets	Given the scale of below ground infrastructure to be implemented through the plan, there is expected to be a moderate adverse effect on carbon and material assets through the construction of below ground concrete storage, and the subsequent on-going increased wastewater treatment requirements. Grey infrastructure such as below ground storage and WwTW upgrades require relatively small areas of land on a permanent basis. Blue/ green infrastructure must be applied over much larger areas, however, it can be integrated with other land uses to provide multiple benefits. The green' and 'blue-green' infrastructure components are typically not resource intensive to construct, operate, or maintain, providing nature-based solutions with wider benefits, including carbon sequestration.	The future trend is towards reducing carbon emissions and increasing resource efficiency, which the below ground storage approach does not necessarily support. The majority of the negative impact is likely to be during the construction phase rather than operation (depending on the amount of pumping and additional treatment that may be required).
Water Resources	The DWMP will result in major positive permanent effects on water quality through reduction in spills from SOs and WwTW improvements to accommodate population growth and the changing climate. This will have secondary benefits for biodiversity, human health and socio-economics. There is potential for short-term, localised, temporary pollution of watercourses through construction works in close proximity to watercourses. However, in line with legal requirements and best practice, these are anticipated to be prevented through good construction practices.	Climate change and growth are anticipated to increase stress on the water environment, such as through changing rainfall patterns, extreme weather events and increased demand for water and associated wastewater treatment requirements. Both scenarios have accounted for these pressures and is designed to address them to help address this issue.

SEA Objective	Total plan effects	Cumulative effects
Flood Risk	The DWMP aims to achieve the requirement of SODRP. This will greatly reduce the storm overflows.	Flood risk is anticipated to increase as climate change progresses as a result of changing rainfall volumes and intensity. The DWMP accounts for the anticipated changes whilst reducing the risk of storm overflow to help address this issue.
	The preferred option excludes measures to directly address internal flooding risk.	The preferred option excludes measures to directly address internal flooding risk.
Heritage	The DWMP is not anticipated to have significant effects on heritage assets, although sewer flood risk reduction measures are likely to reduce the sewer flood risk to some heritage assets, such as Listed Buildings, providing a minor positive permanent effect.	Historic assets may be at greater risk from the direct impacts of future climate change, through flooding, sea level change, storms, and other factors; the DWMP will help to address those risks associated with sewer flooding.
	Construction works, particularly those that involve ground works are likely to have a minor negative effect on heritage assets, particularly archaeology. However, this will be location specific, with potential for significant adverse effects at the project level which will require further controls.	
Landscape	Below ground storage, once restored post construction, is not anticipated to have a landscape impact. The small amount “green” and “blue-green” infrastructure components of the DWMP provide less opportunity to create a positive benefit in terms of townscape (in urban area) or landscape (in rural area).	Climate change has the potential to impact high value landscapes through changing patterns of rainfall or sea level rise; population growth also has the potential to erode landscape quality.

SEA Objective	Total plan effects	Cumulative effects
Climate Change Resilience	Overall, the DWMP will have a minor positive permanent effect in supporting resilience to climate change directly in relation to managing wastewater, such as during more extreme weather events. The green and blue green options also support more natural hydrological cycle, groundwater recharge, and can help counter the urban heat island effect.	Resilience to the changing climate is a key issue nationally. The plan will support the wider move to increase resilience to climate change.

Measures to Prevent, Reduce & Mitigate Adverse Effects and Enhance Beneficial Effects

These should be noted within the wider context of the plan – the purpose of the plan is for SWW in partnership with others, to ensure the sustainability of drainage infrastructure, and the services it provides to customers and the environment to support economic growth and resilient communities, and to protect and enhance the environment.

Measures have been suggested throughout the SEA process and during revision of the draft DWMP in preparing the final plan. The SEA of the draft DWMP included the following recommendations, progress of which is noted in italics:

- Consideration should be given to including within the cost benefit analysis the carbon 'costs' (embodied and operational) of the plan, and the CAPEX costs associated with the additional wastewater treatment requirements from use of the storage option. *Carbon and wider social and economic benefits are now valued within the cost benefit analysis. More detailed catchment analysis has enabled the storage option to only be taken forward in catchments where there is capacity to treat the stored flows.*

- The modelled costs, benefits and hydraulic performance of the Surface Water Management approach should be kept under review and refined as appropriate as experience of such measures grows. It may be appropriate to undertake pilot schemes in partnership with others (including universities/researchers) to inform the development and implementation of this approach within AMP8; and its assessment within subsequent DWMPs. *SWW have undertaken case studies to investigate Plymouth and Falmouth catchments in more depth to inform the development the final DWMP. This recommendation remains valid as sector-wide learning continues.*

- As experience and knowledge of the performance of the Surface Water Management approach grows, its adoption within AMP8 should be increased where feasible within drainage communities as part of the solution (thus reducing the storage volume and subsequent water treatment as well as providing wider benefits). *The adaptive planning approach supports the implementation of this recommendation.*

- SWW and wider partners should continue joint working with momentum, which is essential to implement the Surface Water Management approach which can achieve wider social and environmental benefits beyond those directly associated with overflows, flood risk and WwTW compliance. *Joint working has continued, this will remain a valid recommendation throughout implementation of the plan.*

- Information developed through the plan making stage should be shared where this may assist and influence other stakeholders (e.g., planning authorities, developers, LLFA). For example, the plan has developed new data to identify the area of impermeable runoff that would need to be removed from the combined sewer network to achieve the ambitious target of zero internal flooding. This could influence wider stakeholders who could work to help achieve this. *This remains a valid recommendation once the plan is finalised.*

- Within subsequent DWMP cycles, consideration should be given to the potential to include consideration of catchment level nutrient management. *Since the draft DWMP, SWW have committed to implement catchment and nature based solutions, including an ambition for a*

minimum of 10% of our interventions being NBS, with an increase to 20% by 2050. In addition to these statements, to maximise the potential for Green, Blue, BGI and IGGI interventions and demonstrate our ambition to NBS, we want to adopt a "Green First" approach from the onset of solution identification once a project need has been identified.

- Consideration should be given to including within the cost benefit analysis the carbon 'costs' (embodied and operational) of the plan, and the CAPEX costs associated with the additional wastewater treatment requirements from use of the storage option. *Carbon and wider social and economic benefits are now valued within the cost benefit analysis. More detailed catchment analysis has enabled the storage option to only be taken forward in catchments where there is capacity to treat the stored flows.*

Adaptive Planning

One of the challenges in ensuring that the DWMPs are adaptive and responsive is identifying and trialling the use of early warning markers that align with the future change predictive modelling. These trigger markers will allow SWW to maximise the value of the assets in the face of future uncertainties, ensuring the interventions are applied at the most suitable and cost-effective time. SWW is currently considering what could constitute a set of early warning markers and will be taking on board a number of studies with this remit as the goal.

- Assessing whether it can link advice from the Met Office as more severe climate modelling forecasts come into play, with a reversal and upward trending of annual flooding metrics i.e., internal sewer flooding and external sewer flooding performance metrics
- Undertake collaborative research around adaptive climate change decisions for DWMP could be delivered by UKWIR or other research bodies.
- SWW, along with local universities has already invested in climate change induced impacts on our full water cycle of operations and services, the programme is called SIM4NEXUS, and the merit of further investment are assessed to see if such modelling has cost/benefit returns
- Track the impact of annual storms and relate trending to SO spills or regional flooding data
- Track number of properties experiencing coastal related risk incidences and seawater inundations
- Use the data enrichment trends, from better tracking of SO spills, now SWW have more event duration monitors and spill data
- River level heights in key locations around the region aligned with proposed river quality monitoring with the Environment Act.

Project Stage Implementation

As the plan is taken forward, further measures will be required to prevent, reduce, mitigate, and compensate adverse effects and maximise the beneficial effects of the plan. These are set out in **Table E-3** below.

Table E-3 - Measures to prevent, reduce, mitigate and compensate effects

Options	Measures to prevent, reduce, mitigate, compensate
Combined sewer separation. Construct new surface water sewers (Surface Water Separation)	Reduce the extent of new surface water sewers through use as part of a hybrid solution (such as SuDS features, modification of upstream watercourses, rain gardens etc). Such an approach would provide the opportunity for wider enhancements, such as for biodiversity. Design new surface water sewers in a manner which slows the flow of water to the receiving environment. Where water quality allows and where feasible, promote discharge to surface waters in preference to sewer. For larger schemes, undertake flood risk modelling of the proposed discharge of surface water flows to determine level of flood risk. Should fluvial flood risk reduction measures be required, they should be costed into this option and their associated environmental effects considered. Further catchment specific assessments are required to identify the most appropriate routing, design and construction methods for the new sewer route and outfall. Cost and programme allowance should include for this, including issues such as ecology, heritage, consenting (e.g., discharge consents[1]) and traffic management. The nature of constraints/impacts will vary on a catchment-by-catchment basis. For example, a number of the catchments have high historic value and will require greater specialist heritage input; particular care is required within areas of high biodiversity value, in particular for certain ecological designations where, as a minimum, HRA screening will be required. Reducing the extent of new surface water sewers through use as part of a hybrid solution provides the greatest opportunity to minimise resource use. SuDS within SWS schemes might also attenuate flows and lead to reduced pipe sizing and cost/env impact of downstream network. Some further reduction in resource use is likely to be able to be achieved within construction through design optimisation, such as materials selection.
Source control SuDS upstream thinking	Along with water management, SuDS features should be designed to achieve multi-functional benefits, including biodiversity, landscape/ townscape, and reducing the urban heat island effect. SuDS features should be designed and implemented following SuDS guidance, including in relation to pollution control and discharge to watercourses and groundwater such as elimination of storm water from being created, attenuation via adoption of water features, use of recycled water stormwater, etc
Storage tanks (Storage)	Limited reduction in resource use during construction and operation may be able to be achieved through design optimisation, such as materials and plant selection.

[1] Given the proposed short sections of new sewers, EIA screening is considered to be unlikely to be required.

Options	Measures to prevent, reduce, mitigate, compensate
	Further catchment specific assessments are required to identify the most appropriate siting, design, and construction methods for below ground storage. Cost and programme allowance should include for this, including issues such as ecology and heritage. The nature of constraints/impacts will vary on a catchment-by-catchment basis. For example, a number of the catchments have high historic value and will require greater specialist heritage input; particular care is required within or in proximity to certain ecological designations where, as a minimum, HRA screening will be required. Given storage will typically be an end-of-pipe solution, the new infrastructure will typically be sited near to watercourses. Careful consideration of pollution control will be required during construction. Consenting requirements should be reviewed, such as a Flood Risk Activity Permit for works close to watercourses. Siting of storage should also consider efficient use of land (such as optimising reuse of previously developed land). Given the sterilisation of land from further development, development policies and context (as established through Local Development Plans) should also be considered. Opportunities should be sought to provide wider benefits for the land during post construction reinstatement, in keeping with the landscape/townscape/seascape setting. This may include habitats, recreational access, and/or amenity value. Given the scale at which this option is being taken forward, consideration should be given to capturing these issues through design codes, or similar.
Increasing capacity of wastewater sewer system (Increase capacity)	The nature and extent of WwTW upgrades is currently unknown and as such measures to prevent, reduce, mitigate and compensate effects can only be considered at the strategic level at this stage. Consideration should be given to: • The nature of the site and any sensitive receptors (e.g., terrestrial and aquatic biodiversity, heritage, archaeology, landscape, local land uses sensitive to odour and noise) and the local published information for these topics (e.g., Landscape Character Assessments, Biodiversity Action Plans, Local Development Plans) • Effluent discharge requirements • Changes to the fluvial flood risk as a result of increased discharges • Seeking opportunities to reduce resource use during construction, increase efficiency in operation, increase effectiveness of treatment

Consideration shall also be given to the need to undertake the following project level assessments:

- Habitats Regulations Assessment
- Invasive Non-Native Species (INNS) Risk Assessment
- Water Framework Directive (WFD) Assessment
- Biodiversity Net Gain Assessment

<u>Habitats Regulations Assessment</u>

Appropriate siting of options within catchments is key to avoiding impacts to the national site network i.e., not siting options within European Sites or within 500-1000m of any European Sites

Importantly, another full HRA including stage 1 (screening) and stage 2 (appropriate assessment) where appropriate will be conducted on each L3 catchment at project level when more information is available. When implementing the DWMP, the following needs to be completed:

1. Using Appendix B of the plan level HRA report, and the DWMP, identify individual L3 catchments which have been screened out from further assessment and mitigation measures.
2. The 58 L3 catchments requiring mitigation (dependent on option) and the 493 that required appropriate assessment must have the recommended mitigations included in the plan taken forward, or a detailed enough location provided to ensure significant distance from the nearby national site.

Invasive Non-Native Species (INNS) Risk Assessment

Further site-specific assessment will be required during implementation of the plan where INNS are present or pose a risk.

Water Framework Directive (WFD) Assessment

WFD Assessments could be required during implementation of the plan in relation to specific schemes that emerge from it where for example:

- a flood risk activity permit is required for certain activities on an Environment Agency Main River; or
- the activity could affect a water body that is at high status.

Further review of the need for WFD Assessments should be undertaken as the plan is implemented.

Biodiversity Net Gain Assessment

More detailed consideration of the achievement of biodiversity net gain is required during the implementation of the plan. Whilst the statutory requirements of the Environment Act will only apply to projects requiring planning permission, the NERC Act duty to 'enhance' biodiversity also applies.

South West Water

Bournemouth Water

South West Water Limited, Peninsula House, Rydon Lane, Exeter EX2 7HR, Registered in England No 02366665

This document is available in different formats.