



**DRAINAGE & WASTEWATER
MANAGEMENT PLAN (DWMP24):
ENVIRONMENTAL REPORT**

STRATEGIC ENVIRONMENTAL
ASSESSMENT – Non-Technical
Summary

May 31, 2023

Prepared for:

Yorkshire Water

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Revision	Description	Author		Quality Check		Independent Review	
V01	Draft for comment	C.O'Connor	Jan 2023	S Mustow	Jan 2023	S.Mustow	Jan 2023
V02	Final for comment	K Ramsay / K Lo	May 2023	C O'Connor	May 2023	C O'Connor	May 2023

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Abbreviations

List of Abbreviations	
AMP	Asset Management Plan
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BNG	Biodiversity Net Gain
BRAVA	Baseline Risk and Vulnerability Assessment
Defra	Department for Environment, Food and Rural Affairs
DWF	Dry Weather Flow
DWMP24	Drainage and Wastewater Management Plan
GhG	Greenhouse Gas
HRA	Habitats Regulations Assessment
INNS	Invasive non-native species
L1/ L2/ L3	Level 1, 2, or 3 areas within the DWMP24
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
MCZ	Marine Conservation Zone
NCA	National Character Area
NNR	National Nature Reserve
NRV	Non-Return Valves
ODA	Option Development and Appraisal
ODPM	Office of the Deputy Prime Minister
Ofwat	Water Services Regulation Authority



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PO	Planning Objective
PR24	2024 Price Review
PRoW	Public Rights of Way
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	Sites of Special Scientific Interest
STW	Sewage Treatment Works
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 Zones
YW	Yorkshire Water



NON-TECHNICAL SUMMARY

This non-technical summary provides an overview of the Strategic Environmental Assessment (SEA) of Yorkshire Water's (YW) Drainage and Wastewater Management Plan (DWMP24). 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.

A.1.1 Overview of the Plan

The DWMP24 takes a long-term view to set out how YW 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 YW's long-term ambitions of reducing the risk of hydraulic modelled flooding and protecting and enhancing the environment and reducing the impact of their storm overflows on river water quality.

The levels of service considered through the DWMP24 are:

- Modelled hydraulic flood risk (internal sewer flooding and external sewer flooding)
- Modelled storm overflow performance – spills
- WwTW compliance flow and quality

The DWMP has considered different scenarios to meet statutory requirements for these issues, along with non-statutory ambitions, whilst providing a preferred plan, a core plan or a least cost. The DWMP24 will inform the PR24 (Price Review 24) planning process and represents an overall strategic 25-year plan. As such, the outputs of the DWMP24 will be reviewed in context with all other priorities affecting water companies including affordability to customers.

The overall study area aligns with the operational boundary for YW's provision of wastewater services. This 'Level 1' is split into seventeen Strategic Planning Areas (SPA) (Level 2) which are generally aligned



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with the Environment Agency’s (EA) river basins alongside four urban areas (Hull, Leeds, Sheffield, and York). These are further split into 617 catchments, (Level 3) (depicted by green shading).

Consultation was launched on the 1 July 2022 on the draft DWMP24 and ran for 12 weeks until 23 September 2022. A number of questions were posed to help understand what the customers, stakeholders and regulators wanted in terms of direction of the plan, how the plan had been built up and also thinking about the proposed scenarios, and the costs of plan presented. The outcomes of this survey were analysed and informed the final DWMP.

Responses on the dDWMP24 and Strategic Environmental Assessment (SEA) were received from the regulators Ofwat, the Environment Agency and a number of other stakeholders including the Consumer Council for Water (CCW), Natural England and Historic England, a number of Rivers Trusts, five local councils, a catchment-based partnership, a National Park and eleven customers. Ofwat and the Environment Agency provided full written responses with recommendations for improvements. This was also followed up by a multi-agency feedback session facilitated by Defra, which CCW also attended.

There are several key themes included in the responses received:

- Importance of partnership working.
- Support for a Best Value Plan (BVP) approach.
- Requirement to demonstrate compliance with all aspects of the Storm Overflows Discharge Reduction Plan (SODRP1).
- Provide increased clarity on the short, medium, and long-term elements of our plan.
- Support for reducing the levels of flood risk at properties.

Figure NTS-1, Figure NTS-2 and Figure NTS-3 summarise the outcomes from the consultation.



Figure NTS-1- Consultation Responses Summary

¹ <https://www.gov.uk/government/publications/storm-overflows-discharge-reduction-plan>





Figure NTS-2 - Preferred Scenario Feedback

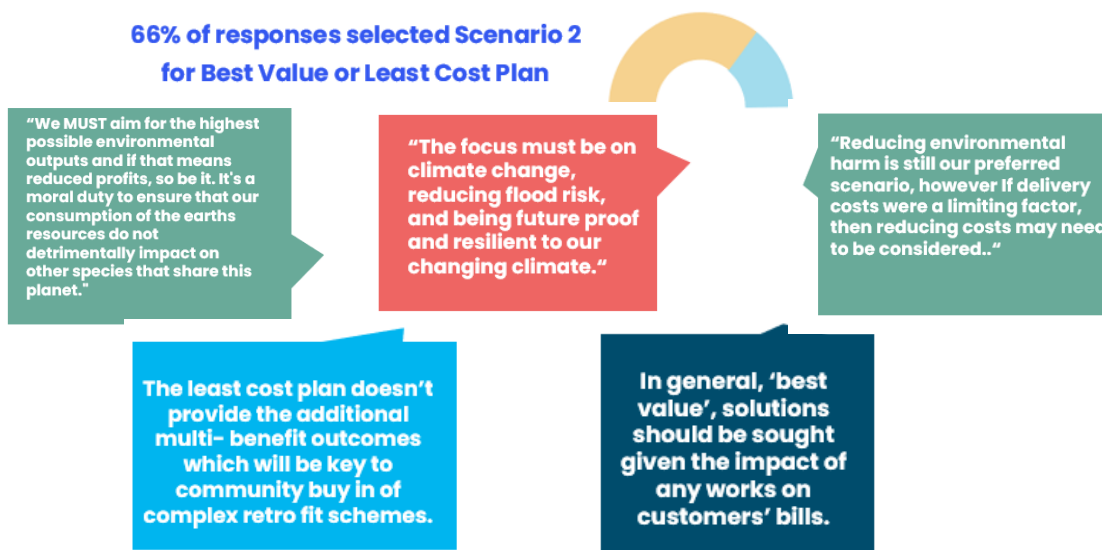


Figure NTS-3 - Support for Scenario 2 Best Value Plan (BVP) or Least Cost Plan

In addition to the individual response to the Yorkshire Water draft DWMP, Ofwat and the Environment Agency provided an industry overview which have been taken into consideration in the development of the final DWMP. The responses have been provided within the Statement of Response (Appendix A in the main report).



A.1.2 Changes from Draft to Final

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

Based on the feedback received, the approach to the DWMP between draft and final has changed, predominately to incorporate all the storm overflow assets at YW but also to develop flood clusters at level 4 catchments, linking them to storm overflows where applicable.

Sensitivity testing has been incorporated within the plan to allow for more adverse climate change rates and also population growth predictions. Potential bill impacts have been included for the plan, but this is stand alone and not linked to any bill increases for AMP8 and beyond. This will be determined by Ofwat based on the PR24 submission.

All aspects of the WINEP have been included within the plan costs (these are appraised and submitted separately on scheme-by-scheme basis through the WINEP process) and the approach to short-, medium- and long-term planning has been reviewed. Asset health metric and performance commitment information have been included within our final plans to increase the robustness of the plan in the long-term.

The Options Development and Appraisal sections have been reworked to reflect the new approach to solution build up, costing and benefits appraisal.

The plan has changed from a true catchment-based approach to one of specific delivery of the SODRP whilst trying to maintain links to modelled hydraulic flood risk and WwTW performance to ensure that the most effective solutions are delivered. All available data will be reviewed as schemes are developed, including asset health metrics.

A.1.3 Key Requirements, Issues and Opportunities

A full review of the Plans, Programmes and Environmental Protection Objectives relevant to the DWMP24 can be found in **Appendix B** of the Environmental Report in tabular format. These have been reviewed to establish, where relevant, the requirements applicable to the plan, identify constraints, opportunities, and potential inconsistencies and to inform the development of the SEA Framework and subsequent assessment.

A key change since the draft DWMP is the publication of Defra's Consultation on the Government's Storm Overflow Discharge Reduction Plan² (the 'SODRP consultation') on 26 August 2022, aiming to eliminate

² Defra (2022) [Consultation on the government's storm overflows discharge reduction plan \(defra.gov.uk\)](https://www.defra.gov.uk/consult/consultations/storm-overflow-discharge-reduction-plan/), accessed May 2022.



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all harm from storm overflows in the long-term. The SODRP outlines specific and time-bound targets that water companies will deliver, as a minimum.

Climate change and population growth are key factors which are increasing pressure on the wastewater system (and the wider environment), 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.

A.1.4 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 shown below in **Table NTS 1**:

Table NTS 1: SEA Objectives

SEA Topic	Overarching SEA objectives
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-economic	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
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. For the purposes of this appraisal, a significant negative assessment (indicated by a 'red' score within the



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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 DWMP24. 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.

A.1.5 Option development and assessment

The DWMP24 has been produced following a risk and benefits-based approach, following the guidance provided in the DWMP24 Framework set out in **Section 1** of the Environmental Report. The DWMP24 process itself provides a good coverage of the SEA topics, particularly in relation to water resources, flood risk, carbon, climate resilience and biodiversity – reflecting the nature of the plan and its objectives for the (water) environment, flood risk and wastewater compliance and the wider Six Capitals approach. The assessment shows less consideration of the historic environment and landscape than other SEA topics, again reflecting the nature of the plan. These topics are however considered through the SEA and will be subject to the usual development management controls as the plan is implemented hence this is not considered to be an issue. Overall, the SEA topics are well covered within the DWMP24 development process, demonstrating integrated consideration of the SEA themes throughout the plan production.

When developing the draft DWMP, Yorkshire Water identified generic options for storm overflows 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. Subsequently, a more extensive list of options were identified and reviewed within the DWMP24 Option Development and Appraisal stage for storm overflows.

Within this list of options, some options were screened from further assessment because they did not deliver the SODRP outcomes, in the case of innovative treatment processes, no suitable processes were identified, or not sufficiently developed to deliver in PR24.

In summary, the options being taken forward to meet storm overflow targets from the more detailed review of the shortlisted options are:

- Increase treatment capacity
- Network storage
- Impermeable surface water management – SuDS
- Catchment partnership support
- Impermeable area surface water removal – removal at source



- Infiltration reduction

Further measures will also be taken forward during delivery of any DWMP schemes (e.g., catchment partnership support), or through other activities (e.g., customer education campaigns), or considered in future cycles and in development of site-specific solutions (e.g., rationalise assets).

A.1.6 Development of approach and scenarios

The above options can be broadly defined by the approach taken as reduce and enhance blue-green plus grey options (those adopting a nature-based solution such as SuDS to remove 50% of the impermeable area, with the remaining need met through provision of grey options); and enhance grey options (such as network storage, where infrastructure is required). At the strategic level of the DWMP, Yorkshire Water has identified the approach to take to meet the requirements of the plan. During implementation of the plan, the capital delivery process will then identify the most appropriate option(s) to take forward within this approach, based on more detailed review of the specific project location within a local catchment.

Through application of the DWMP24 process and following on from consultation and changes in approach from draft to final, YW have identified which storm overflow sites require intervention across the asset base. YW have also identified where flood clusters require intervention to reduce modelled hydraulic flood risk. In relation to WwTW, YW have identified where WINEP and growth schemes are required to ensure WwTW flow and quality compliance is maintained. All these interventions are to changes in regulation or achieve targets and accommodate growth, climate change and creep.

YW have developed a long-term plan supported using its decision-making framework tool and its cost and benefits principles. YW have created a core, preferred and least cost plan as set out in Table NTS 2. In each scenario the plan has been constrained to deliver the regulatory requirements and targets of the SODRP alongside ensuring that WINEP and growth programmes for WwTW compliance are met. The least cost plan is a predominately grey solution plan. The core and preferred plan have had a company ambition applied to the SODRP to deliver 20% blue-green solutions in AMP8 and 50% blue-green solutions in each subsequent AMP. Some flood risk reduction is achieved as a secondary benefit through the core and least cost plan where blue-green SODRP interventions are made. Modelled hydraulic flood risk is tackled directly through additional measures in the Preferred Plan.



Table NTS 2: Proposed Plans

Plan	Achieves	Approach (Grey or Blue-Green with Grey)	Flood Protection
Least Cost Plan	<ul style="list-style-type: none"> Address SODRP targets (compliance) Address WINEP WwTW and growth metric (compliance) 	<ul style="list-style-type: none"> <1% blue-green delivery for SODRP 	<ul style="list-style-type: none"> minimal modelled hydraulic flood risk impact
Core Plan	<ul style="list-style-type: none"> Address SODRP targets (compliance) with company blue-green ambition applied Address WINEP WwTW and growth metric (compliance) 	<ul style="list-style-type: none"> 20% blue green delivery on Storm overflows in AMP8, 50% blue green delivery on Storm overflows in AMPs 9,10,11,12 	<ul style="list-style-type: none"> Increasing levels of modelled hydraulic flood risk impact linked to delivery of blue-green SODRP solutions
Preferred Plan	<ul style="list-style-type: none"> Address SODRP targets (compliance) with company blue-green ambition applied Address WINEP WwTW and growth metric (compliance) Incorporates modeled hydraulic flood risk solutions 	<ul style="list-style-type: none"> 20% blue green delivery on Storm overflows in AMP8, 50% blue green delivery on Storm overflows in AMP9,10,11,12 	<ul style="list-style-type: none"> Modelled hydraulic flood risk reduction to all 1 in 30-year return period internal flooding by delivering SODRP blue-green solutions and dedicated flood risk reduction programme

A.1.7 Adaptive Planning

As the future is inherently uncertain in terms of climate change, growth and new technologies it is essential that the DWMP strategy is flexible enough to cope with changes. The DWMP24 adopts an adaptive planning approach which enables strategies to be developed in the context of different future scenarios. As part of completion of Ofwat’s data tables, a series of adaptive pathways have been compiled as detailed above and the preferred plan has been sensitivity tested to demonstrate the changes in costs of adverse climate change and adverse growth on the preferred plan.

In general, each periodic review will determine spend and performance commitments will monitor performance. There will be many and varied triggers which will bring about a change to an adaptive pathway or within the adaptive pathway for the DWMP. These are listed below:



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- Each cycle of the DWMP will bring about changes and decisions based on the latest information and data sets available to apply to our models and assets.
- A regulatory change
- WINEP requirements on each Periodic Review
- Data provided by the SODRP investigations into no local ecological harm
- Data provided by Event Duration Monitoring (EDM), real-time EDM / Continual Water Quality monitors
- Increased confidence and development of blue-green solutions
- Partnership opportunities/co-funding opportunities

A.1.8 Other Related Assessments including HRA

Through the development of the plan, consideration has been given to other related assessments at the plan level. An HRA Stage 1 Screening and Stage 2 Appropriate Assessment has been undertaken at plan level to check if proposals within the plan are likely to have a significant effect on the conservation objectives of sites within the national site network (previously known as 'European Sites'), i.e., Special Protection Areas and Special Areas of Conservation. The screening has identified the relevant sites within and adjacent to (within 5km) of the study area, their qualifying features, and the potential negative and positive impacts on the sites.

Through a review of the DWMP in relation to these sites, it has been possible to screen out some L3 catchments from further consideration due to distance and a lack of hydrological connectivity resulting in no likely significant effect to the national site network. The remaining L3 catchments underwent plan level appropriate assessment, screening out further catchments. At this stage, given the strategic nature of the plan and the proposed measures (which are currently not location or scheme specific), it has not been possible to screen out some catchments/measures, as such further HRA screening will be required as the plan develops.

There is potential for the DWMP to result in positive impacts to the national site network (such as through improved water quality), as well as negative impacts (such as through construction works).

The plan level appropriate assessment carried out on the remaining L3 catchments shows that with appropriate mitigation, no likely impact is expected on any protected sites. Whilst there are high level threats identified within the report, these are expected to be mitigated by siting the options appropriately, 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.



A.1.9 Reasons for Selecting the Preferred Approach in the DWMP24

Following the development of the constrained list, the options were further refined for delivery against the Outcomes, Goals and Outputs for the PR24 Storm Overflow Reduction Driver Guidance. This included a discharge specific review against the locations identified through the Risks and Issues process.

The review of the constrained options list has considered:

- PR24 driver guidance
- Current catchment evidence
- AMP 7 investment
- PR24 Profiling of WINEP actions
- YWS asset specific understanding
- Feasibility and deliverability
- Other PR24 WINEP investment proposed outside the drivers considered within this Options Development Report

The inclusion/omission of the options within the DWMP24 is summarised in **Table 6.2.1** of the Environmental Report, along with the headline reasons for these decisions.

A.1.10 SEA Assessment of the Preferred Plan DWMP24 and Cumulative Effects

YW have chosen to follow the preferred plan as it meets the regulatory requirements in line with the SODRP, WINEP and WwTW growth needs. It also provides provision for hydraulic flood risk reduction. It applies their company ambition to deliver more blue-green solutions. The core and least costs plans deliver minimal hydraulic flood risk reduction which is not in line with the consultation feedback and the least cost plan delivers minimal blue-green interventions which does not deliver expectations set out in the consultation feedback or provide wider benefits.

The DWMP24 aims to protect and enhance the environment, support resilient communities, and contribute to economic growth. The outcomes of the DWMP24 relate to key issues for drainage and wastewater: environmental improvements to tackle SOs, WwTW flow and quality compliance and modelled hydraulic flood risk, whilst accommodating climate change, growth and creep. The most sensitive environments are prioritised for action first. As such the overall direction and purpose of the DWMP24 shows positive alignment with the SEA objectives.



A.1.11 Assessment of the DWMP24

The reasons the preferred approach was selected, and other options rejected are set out in **Table 6.2.1** of the Environmental Report.

Table NTS 3 draws together the total effects of the draft DWMP24 in combination with the underlying trend, to establish the cumulative effect.

The key for Table NTS 3:

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



Table NTS 3: Summary of total plan effects and cumulative effects

SEA Objective	Total plan effects	Cumulative effects
<p>Biodiversity & Geodiversity</p>	<p>The plan prioritises measures where SOs are discharging in or close to high priority sites (as defined by SODRP). This will provide a significant positive permanent benefit for aquatic biodiversity. As the implementation of the plan progresses, the benefits of the plan will extend across the plan area.</p> <p>WwTW upgrades to cope with additional demand from population growth will prevent damage to aquatic biodiversity from that population increase.</p> <p>The blue/ green approach offers the potential for long term positive effects on terrestrial biodiversity and geodiversity, with 50% blue-green delivery to be implemented by 2050. 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, and their design.</p> <p>The construction of grey infrastructure (and to some extent blue/green infrastructure) 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).</p>	<p>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.</p> <p>Changing climate could impact on the quality of soils across the region through temperature extremes and changing rainfall patterns.</p> <p>Development pressure is likely to increase the risk of habitat loss and fragmentation, particularly outside of the extensive designated areas.</p> <p>Through partnership working, measures such as blue/green infrastructure offer the potential to increase resilience to climate change by allowing the movement of species through the environment and supporting natural soil processes.</p> <p>Reduced spills from SOs and WwTW upgrades will support biodiversity, reducing susceptibility to the above threats.</p>
<p>Human Health</p>	<p>Human health is particularly important in this region where the health of residents is slightly lower than the average for England, with some</p>	<p>The population of the UK is ageing, putting additional pressures on public finances and services.</p>



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SEA Objective	Total plan effects	Cumulative effects
	<p>health indicators significantly below the national average in some parts of the region.</p> <p>SOs discharging to designated bathing waters will be reduced, providing a permanent positive effect on human health. This may increase the uptake of open water swimming, providing further health and well-being benefits.</p> <p>The plan will reduce sewer flood risk to properties, with the greatest extent provided by the Preferred Plan of over 40,000 internal flood incidents predicted to be prevented by 2050. The reductions will provide immediate permanent human health benefits in relation to health (exposure to sewage) and well-being (stress, anxiety).</p> <p>Blue/ green infrastructure measures 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.</p> <p>Potential exists to provide public access above below-ground grey infrastructure assets (such as storage), such as play areas, gyms, etc. (this will be location specific).</p>	<p>Policy is placing increasing emphasis on access to green space, green infrastructure, and improved accessibility to sustainable modes of transport. Surface Water Management measures provide an opportunity to support these measures, improving health and well-being.</p>
Socio-economic	<p>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.</p> <p>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).</p>	<p>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 flood risk reduction and water quality improvement measures will reduce risks and support a good economic and social environment.</p>



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SEA Objective	Total plan effects	Cumulative effects
	<p>Where flood risk is reduced and the blue-green approach is adopted, given the scale of blue/ green infrastructure required, the socio-economic effects are likely to be a major positive, permanent effect. Environmental attractiveness draws in investment and enhances the value of property, contributing to the conditions for growth and economic security, contributing to public health and civic pride. The multi-functional nature of blue/ green corridors can provide active travel routes (such as footpaths and cycle paths), increasing low-cost transport options and recreational opportunities and providing opportunities for community cohesion on a permanent basis.</p>	
<p>Carbon & Material Assets</p>	<p>Given the scale of grey infrastructure (such as below ground storage) to be implemented through the core pathway of least cost, there is expected to be a moderate adverse effect on carbon and material assets through the construction of grey infrastructure, and the subsequent on-going increased wastewater treatment requirements.</p> <p>In contrast, blue/ green infrastructure is typically less resource intensive to construct, operate, or maintain, providing nature-based solutions. There may be opportunities through adaptive planning to increase the uptake of this hybrid approach through the implementation of the plan, thus reducing the significance of the impact.</p> <p>The DWMP may increase pressure on land use. 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.</p>	<p>The future trend is towards reducing carbon emissions and increased resource efficiency, which is not supported through the grey infrastructure approach and is supported through the blue/ green infrastructure approach.</p>
<p>Water Resources</p>	<p>The DWMP24 will result in 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. The benefits increase with the adoption of blue/ green infrastructure through the support of natural hydrological processes such as increased infiltration of surface water.</p>	<p>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. The DWMP24 has accounted for these pressures and is</p>



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SEA Objective	Total plan effects	Cumulative effects
	<p>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.</p>	<p>designed to address them to help address these issues.</p>
Flood Risk	<p>The DWMP will result in positive permanent effects by reducing the modelled hydraulic flood risk, both directly by measures target to flood risk and indirectly as a secondary benefit when tackling storm overflows using the blue-green approach.</p> <p>The Preferred Plan is predicted have the largest impact of hydraulic flood risk reduction. Hence, it will have significant positive, permanent, long-term effect to flooding.</p> <p>Further positive permanent effects may also be achieved in terms of reduced surface water flood risk where surface water management is improved to reduce the risk of sewer flooding.</p>	<p>Flood risk (from all sources of flooding) is anticipated to increase as climate change progresses as a result of changing rainfall volumes and intensity. The draft DWMP24 has accounted for the anticipated changes whilst reducing the risk of sewer flooding to help address this issue.</p>
Heritage	<p>At the plan level, there are no anticipated 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.</p> <p>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 (see Table NTS-4 below).</p>	<p>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 DWMP24 will help to address those risks associated with sewer flooding.</p>
Landscape	<p>Below ground grey infrastructure, once restored post construction, is not anticipated to have a landscape impact.</p> <p>Where blue/ green infrastructure measures are planned within urban areas, there is potential for a positive benefit in terms of townscape (design dependent); where planned within rural areas there is</p>	<p>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. Green/ blue infrastructure may help address these issues where it is implemented.</p>



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SEA Objective	Total plan effects	Cumulative effects
	<p>potential for positive landscape impact (dependent on design reflecting the local landscape charter). Given the proposed scale of implementation of this option, it is noted as a minor positive permanent impact.</p>	
<p>Climate Change Resilience</p>	<p>Grey infrastructure, such as below ground storage, will provide wastewater storage for later treatment and release, supporting climate change resilience.</p> <p>The blue/ green approach will increase climate change resilience by slowing the flow of water, promoting natural flood risk reduction, supporting biodiversity in terms of habitats and their connectivity and in urban areas helping to counter the urban heat island effect. Given the extent of such infrastructure proposed through the DWMP, this could be a major positive effect.</p>	<p>The plan will support the wider move to increase resilience to climate change.</p>



A.1.12 Measures to Prevent, Reduce & Mitigate Adverse Effects and Enhance Beneficial Effects

Whilst the overall assessment of the plan (Table NTS 3) does not identify any significant adverse effects (indicated by a 'red' score in the appraisal matrix), there is the opportunity as the plan is taken forward to prevent, reduce, mitigate, and compensate adverse effects and maximise the beneficial effects of the plan.

These should be noted within the wider context of the plan – the purpose of the plan is for YW, 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.

The inclusion of wider social and environmental values (such as carbon, water quality, green space) within the optimizer tool (see Section 5.1), has integrated consideration of the wider benefits of the blue/green infrastructure option within development of the plan.

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 costs in the optimiser tool associated with the increased wastewater treatment requirements that will arise as a result of the grey infrastructure approach, to reflect the increased treatment capacity required and increased operational costs. *YW are working to review the impact of increased flows from grey approaches to SO's. This will be incorporated in future cycles of the DWMP and reviewed on specific schemes in AMP8 and has been incorporated for a number of solutions where advanced modelling work has enabled this approach.*
- Given the adaptive planning approach taken by the draft DWMP24, it is recommended that the framework setting out how decisions will be made as the plan is implemented, is reviewed to consider how wider environmental issues are incorporated within the triggers and pathways used to evaluate progress and determine future interventions. *The final DWMP24 includes adaptive pathways to enable the development of strategies in the context of different future scenarios relating to climate change and growth and will be reviewed as schemes progress into the asset management lifecycle.*
- YW recognise the need to undertake further work ahead of the final DWMP24 due in March 2023 in line with the Storm Overflow Discharge Reduction Plan which will be confirmed by 1st September 2022. This will determine the long-term delivery strategy for storm overflows in line with the DEFRA guidance, including priority overflows, designated bathing waters (including the recent inland bathing designation at Ilkley) and screening of storm overflows. *The final DWMP24*



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has incorporated all storm overflow assets within its plan and the requirements of the SODRP targets and guidance as is currently issued.

- The modelled costs, benefits and hydraulic performance of the blue/ green infrastructure 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. *Several partnership schemes are already delivering benefits in AMP7, including:*
 - *The Living with Water (LWW) partnership commenced work in 2023 on its first collaboratively designed and delivered scheme as part of the blue-green plan for dense urban areas in Hull;*
 - *A new partnership is currently being formed for Doncaster, Immingham and Grimsby (DIG) which includes SuDS and sewer monitoring to reduce sewer flooding;*
 - *The Growing Resilience project in the Calderdale area focusing on habitat creation and restoration in upland areas to slow the flow of water, delivered between 2019-2021.*
 - *The Landscapes for Water and Catchment Partnerships (CaBA) which includes numerous catchment based solutions incorporating nature based solutions such habitat restoration, woodland creation, natural flood management and upland restoration across some including to 5,500 hectares of YW/National Trust land in the South Pennines.*

YW will look to build on these as a platform for partnership working in AMP8 and beyond, embedding this approach and learning from existing partnerships.

- As experience and knowledge of the performance of the blue/ green infrastructure 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 final DWMP24 includes an increasing uptake of this approach through the delivery phase, supported by the adaptive planning approach and application of a company ambition for delivery of blue-green solutions for storm overflows.*
- YW and wider partners should continue joint working with momentum, which is essential to implement the blue/ green infrastructure approach which can achieve wider social and environmental benefits beyond those directly associated with overflows, flood risk and WwTW compliance. *See above for current partnership working which relates to Yorkshire Water's performance commitment Working with Others.*
- Information developed through the plan making stage should be shared where this may assist and influence other stakeholders (e.g., planning authorities, developers, LLFA), particularly where this could influence wider stakeholders. *This remains a valid recommendation once as solutions are progressed into the asset management lifecycle they will be supported by partnership working where practicable.*



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Within subsequent DWMP24 cycles, consideration should be given to the potential to include consideration of catchment level nutrient management. *There is currently one designated 'nutrient advice area' within the Yorkshire Water region, the Hornsea Mere. Yorkshire Water do not have any impact to Hornsea Mere however are committed to continue to work to the latest designations in respect of potential nutrient neutrality risks.*

Other key changes made since the draft DWMP, informed in part by the SEA process, include:

- Selection of the Preferred Plan which includes achievement of SODRP targets through a 20% blue green approach in AMP8, increasing to 50% thereafter.

A.1.13 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 NTS 4 below.

Given the adaptive planning approach taken by the DWMP24, it is recommended that the framework setting out how decisions will be made, is reviewed to consider how wider environmental issues are incorporated within the triggers and pathways used to evaluate progress and determine future interventions.

Table NTS 4: Measures to prevent, reduce, mitigate, and compensate effects

Option Type	Measures to prevent, reduce, mitigate, compensate
Impermeable area surface water management - SuDS	<p>Opportunities to increase the uptake of this option should be maximised as the plan progresses (see the comment regarding the adaptive planning approach in the paragraph below).</p> <p>Along with water management, blue/ green infrastructure should be designed to achieve multi-functional benefits, including active travel routes (footpaths, cycle paths), recreation, biodiversity, landscape/ townscape, and reducing the urban heat island effect. Connectivity of this infrastructure within the wider environment should also be considered, including in terms of habitat networks and access routes.</p> <p>Blue/ green corridors should be designed and implemented following SuDS guidance, including in relation to pollution control and discharge to watercourses and groundwater.</p> <p>Opportunities for partnership working should continue to be identified and implemented. Early and effective partnership working is essential for implementation of this option.</p> <p>As implementation of this option progresses, consideration should be given to extending its use to upstream, rural areas, particularly where this may provide opportunities to help address the flash flood risk that results from the steep topography. Whilst increased long-term climate resilience may offer habitat and socio-economic benefits in the longer-term, careful consideration is required of the impact of changes made, and case-by-case consideration of the impact of drainage changes on habitats and land uses, including:</p> <ul style="list-style-type: none"> • the social and economic implications, such as to farming practices; and • habitat impacts (both positive and negative), particularly for the most important habitats such as SACs, Ramsar sites and SSSIs.



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<p>Network Storage</p>	<p>Where possible, opportunities should be taken to reduce the extent of grey infrastructure (such as storage tanks) through the use of a hybrid solution (such as, in conjunction with, SuDS features, modification of upstream watercourses, rain gardens, etc.). Such an approach would provide the opportunity for wider enhancements, such as for biodiversity.</p> <p>Grey infrastructure should be designed in a manner which slows the flow of water to the receiving environment.</p> <p>Where water quality allows and where feasible, promote discharge from grey infrastructure containing surface water to waterbodies 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.</p> <p>Further catchment specific assessments are required to identify the most appropriate location or routing, design and construction methods for grey infrastructure. Cost and programme allowance should include for this, including issues such as ecology, heritage, consenting (e.g., discharge consents) 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.</p> <p>Reducing the extent of grey infrastructure through use as part of a hybrid solution provides the greatest opportunity to minimise resource use, including carbon. Some further reduction in resource use is likely to be able to be achieved within construction through design optimisation, such as materials selection.</p> <p>Given storage will typically be an end-of-pipe solution, the new infrastructure will often 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.</p> <p>Siting of storage should also consider efficient use of land (such as optimising reuse of previously developed land). Given the sterilization of land from further development, development policies and context (as established through Local Development Plans) should also be considered.</p> <p>Opportunities should be sought to provide wider benefits for the land during post construction reinstatement, in keeping with the landscape setting. This may include habitats, recreational access, and/ or amenity value.</p>
<p>WwTW upgrade</p>	<p>Consideration should be given to project specific environmental effects, including but not limited to:</p> <ul style="list-style-type: none"> • The nature of the site and any sensitive receptors (e.g., terrestrial, and aquatic biodiversity, heritage, archaeology, landscape, local land uses sensitivity to odour and noise) • 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.

