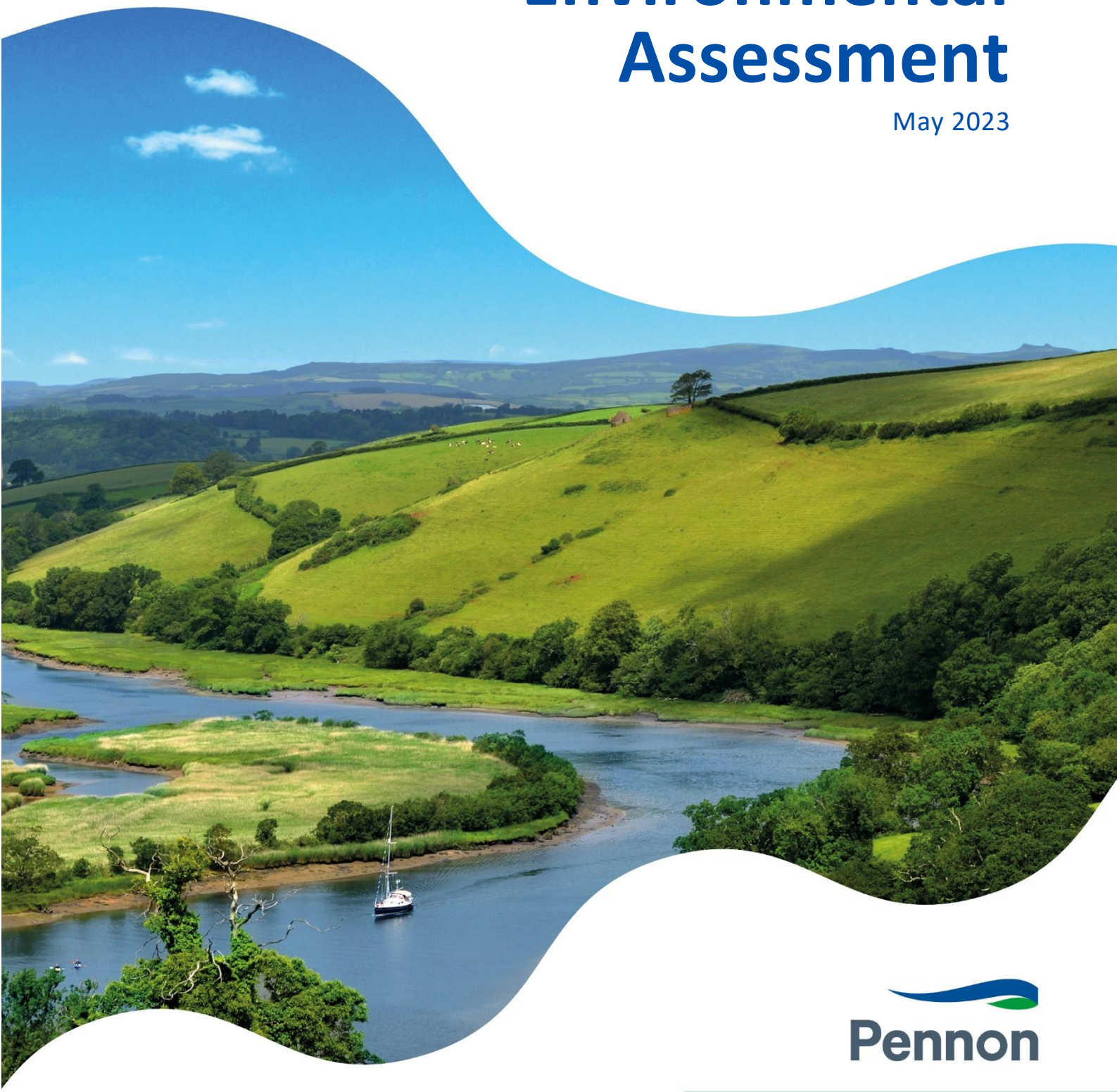
Drainage and Wastewater Management Plan

Strategic Environmental Assessment

May 2023



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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
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
RBCS	Risk Based Catchment Screening
RBD	River Basin District
RBMP	River Basin Management Plan
RNAG	Reason for Not Achieving Good
SAC	Special Area 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
SWW	South West 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

Introduction

Report Purpose

This Environmental Report sets out the findings of Stages B and C of the Strategic Environmental Assessment (SEA) process to support the development of the South West Water (SWW) Drainage and Wastewater Management Plan (DWMP).

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.

DWMPs are guided by Water UK's 'A framework for the production of Drainage and Wastewater Management Plans' (subsequently referred to as the 'Water UK framework')[1]. DWMPs set out the long-term investment plan for drainage and wastewater, defining priorities for investment. The Water UK framework advises that as DWMPs are not currently a statutory requirement, they do not fall within the remit of the SEA Regulations, although notes that it is best practice to undertake SEA on the final optimised plan. Subsequent to the framework, the Environment Act 2021 will make the preparation of 'drainage and sewerage management plans' by sewerage undertakers a legal requirement, however this is not yet enacted.

Overview of South West Water's DWMP

The SEA regulations require the environmental report to include:

'An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes. (SEA Regulations (2004) Schedule 2, paragraph 1).'

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 (**Figure 1**):

[1] https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/

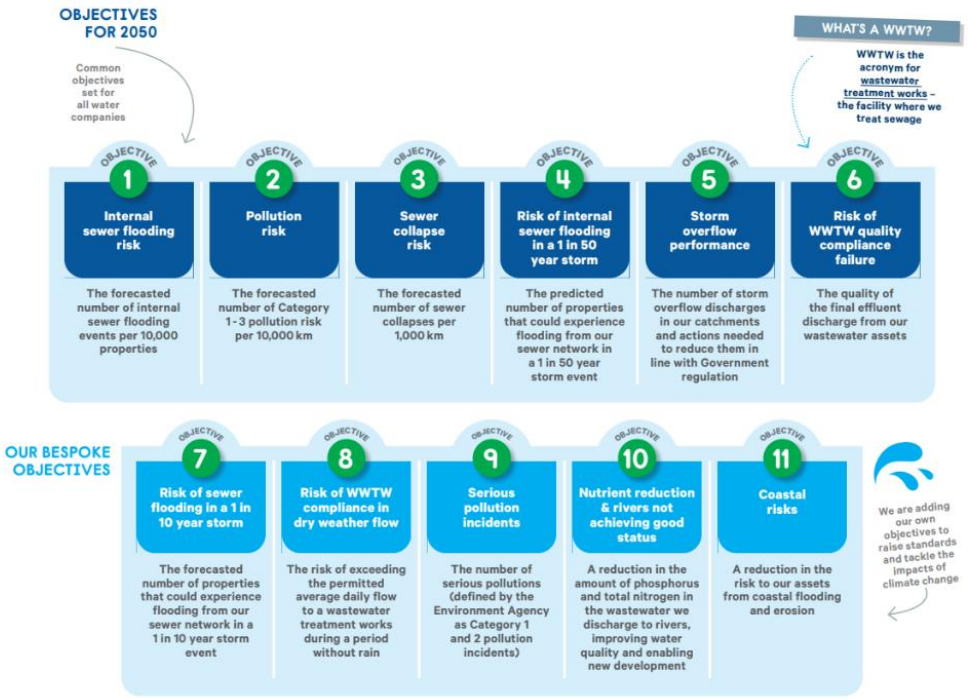

Figure 1: Planning Objectives

The DWMP applies across the operational area for SWW's provision of wastewater services, as shown in **Figure 2**. This Level 1 is split into 22 Strategic Planning Areas (Level 2 SPA), largely aligned with the Environment Agency's River Basin Districts (RBD). These are further split into 653 Level 3 Catchments, based on wastewater treatment works. A visualisation of this system can be seen in **Figure 3**.

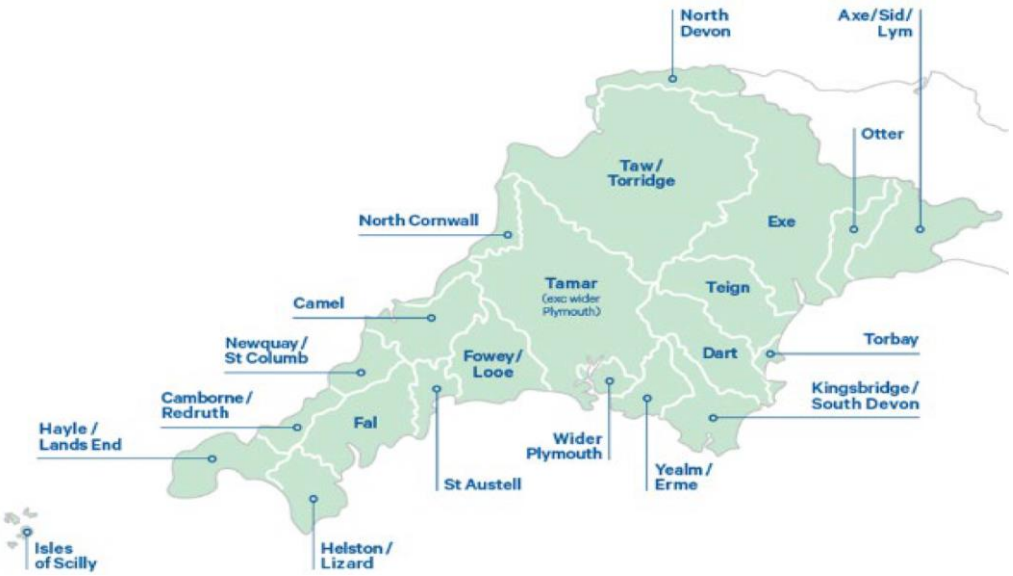

Figure 2: DWMP Area

Figure 3: Visualised Level System for the DWMP

DWMP Guidance

The Water UK framework sets out the following steps for developing the DWMPs, as shown in **Figure 4**.

English and Welsh water and wastewater companies that are subject to regulatory price controls have committed to produce DWMPs in accordance with the Water UK framework. The framework results from collaboration between many organisations including Blueprint for Water; Consumer Council for Water; Defra; the Environment Agency; Natural Resources Wales; Ofwat; the Association of Directors of Environment, Economy, Planning and Transport; the Welsh Government; and water companies themselves.

The SEA Process has been completed on the overall plan but has also informed its development, as is good practice. That means that SEA is not a standalone activity within a stage of the DWMP process shown above, it aligns to many of the stages shown in dark blue within Error! Reference source not found.**4**. Further details on the alignment of the SEA to the SWMP process are set out in later in this report.

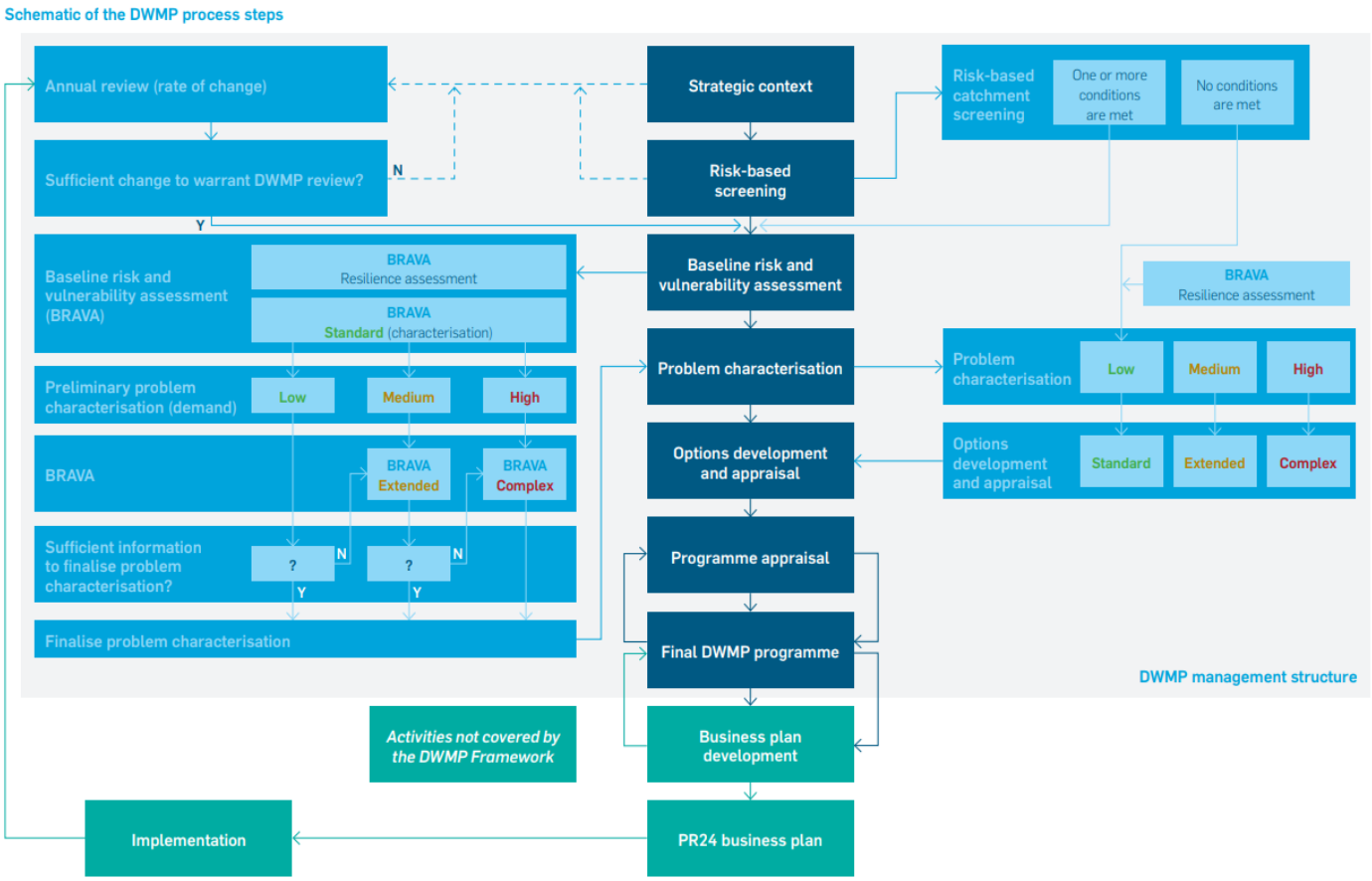

Figure 4: DWMP Process Diagram from Water UK framework

Partnership Working and DWMP Consultation

SWW have worked with various relevant stakeholders in the production of the DWMP, including the Environment Agency, Local Planning Authorities, Natural England, Defra, SWW customers, and others.

SWW's approach to customer and stakeholder engagement has been wide ranging and a mixture of online portals, social media and direct messages, focus groups and community outreach events. This includes an independent customer synthesis conducted by Frontier, and the development of an insight database to analyse over 32,000 survey responses collected over the last 5 years to inform the DWMP.

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) 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 those 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, Blue, Blue Green Infrastructure (BGI) and Integrated Green Grey Infrastructure (IGGI) 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 scope by looking at whether Green options can be appropriate, moving through the Green, Blue, Grey spectrum (as demonstrated in **Figure 5**) 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 discussed earlier) may be more practical.

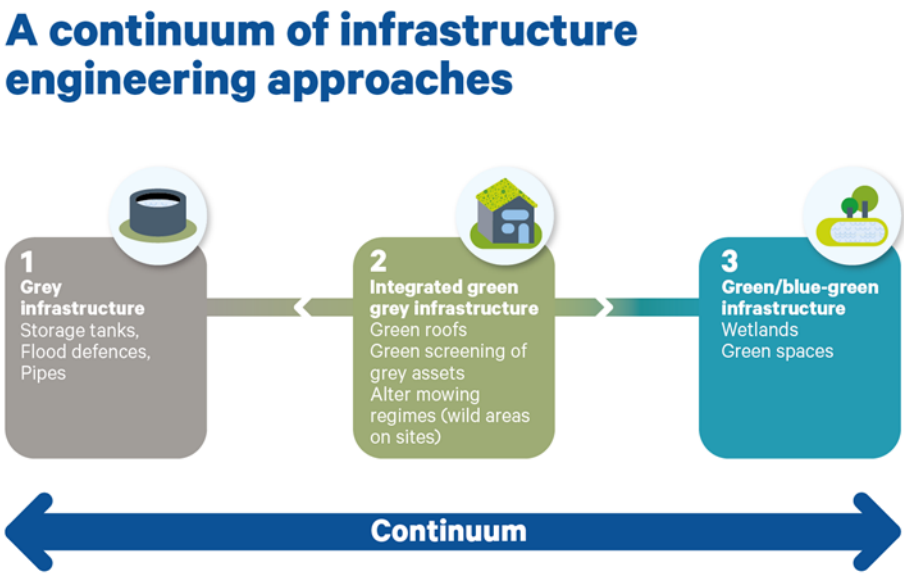

Figure 5: A continuum of infrastructure engineering approaches from Greening the Grey: A Framework for Integrated Green Grey Infrastructure (IGGI), 2017

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, 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.

SEA Process

Article 2(b) of the SEA Directive (Directive 2001/42/EC) defines 'environmental assessment' as a procedure including:

- Preparation of an Environmental Report (including documenting the likely significant environmental effects of the plan, including reasonable alternatives).
- Undertaking consultation on the plan.
- Taking the Environmental Report and consultation results into account in decision-making.
- Providing information when the plan is adopted and showing how the results of the environmental assessment have been considered.

The SEA Directive was transposed into UK law via the Environmental Assessment of Plans and Programmes Regulations 2004 ('SEA Regulations'). The SEA Regulations require an assessment of the effects on the environment of "plans and programmes which are prepared for water management and sets the framework for development consents".

The UK Government Practical Guide to SEA, the 'Practical Guide', establishes the following stages of the SEA process, summarised as:

- Stage A of the SEA process sets the context, identifies objectives, problems, and opportunities, and establishes an environmental baseline through a scoping stage.
- Stage B is the impact assessment phase when options are developed and refined through assessment.
- Stage C is the recording stage which cumulates in the preparation of this Environmental Report.
- Stage D is a consultation phase on the draft Plan and Environmental Report.
- Stage E is the subsequent monitoring of the significant effects of the implementation of the DWMP on the environment.

This is visualised in **Figure** below:

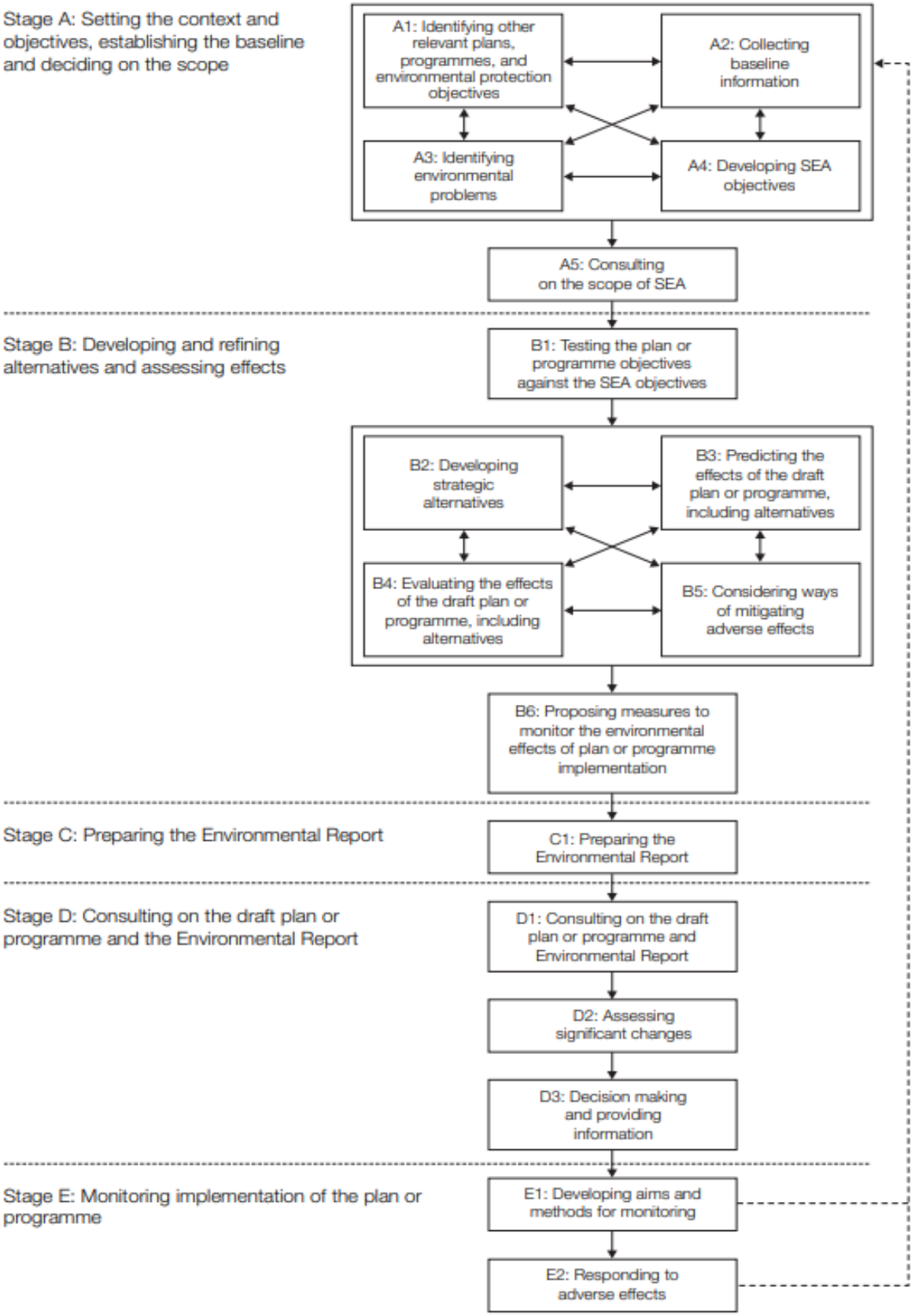

Figure 6: Stages of SEA

Schedule 2 of the SEA Regulations sets out what information environmental reports should contain, and this is detailed in Error! Reference source not found., which also identifies where the information is provided in this report.

Table 1: Environmental Report requirements and relevant report section

SEA Regulations, Schedule 2 Information for Environmental Reports	Where the information is provided in this SEA Environmental Report
1. An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes	Introduction Section
2. The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme.	Key Baseline and Policy Issues Section and **Appendix C**
3. The environmental characteristics of areas likely to be significantly affected.	Key Baseline and Policy Issues Section and **Appendix C**
4. Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds and the Habitats Directive.	Key Baseline and Policy Issues Section, **Appendices B and C**
5. The environmental protection objectives, established at international, (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.	Key Baseline and Policy Issues Section and **Appendix B**
6. The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as— (a) biodiversity; (b) population; (c) human health; (d) fauna; (e) flora; (f) soil; (g) water; (h) air; (i) climatic factors; (j) material assets; (k) cultural heritage, including architectural and archaeological heritage; (l) landscape; and (m) the inter-relationship between the issues referred to in sub-paragraphs (a) to (l).	Assessment of Options Section and Assessment of the Selected DWMP Section

SEA Regulations, Schedule 2 Information for Environmental Reports	Where the information is provided in this SEA Environmental Report
7. The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.	Prevent, Reduce, Mitigate, Enhance Effects Section
8. An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.	Assessment of the Selected DWMP Section
9. A description of the measures envisaged concerning monitoring in accordance with regulation 17.	Prevent, Reduce, Mitigate, Enhance Effects Section
10. A non-technical summary of the information provided under paragraphs 1 to 9.	Non-Technical Summary

A key aim of the SEA process is to ensure the appraisal is proportionate, relevant, and informative to the plan being assessed. The Scoping Report 'scoped in' all the 'SEA topics' identified in item 6 within **Table 1**.

The relationship between the DWMP process and SEA process is set out in **Table 2.** Consultation on the SEA Scoping Report

Stage A was completed through preparation and consultation on an SEA Scoping Report during 2022. The SEA consultation bodies (Natural England, the Environment Agency, and Historic England) were consulted on the SEA Scoping Report in Autumn 2022.

Feedback received during the consultation has informed the appraisal process and hence the development of the plan. A summary of the feedback received, and how comments have been addressed, is included in **Appendix A – Consultee Comments**.

Table 2: Relationship between DWMP Process and SEA

DWMP Stage	Overview	SEA Stage
Strategic Context	The strategic context document outlines the purpose of the DWMP, the objectives and the needs and drivers to be considered in producing the first DWMP.	

DWMP Stage	Overview	SEA Stage
Risk Based Catchment Screening (RBCS)	A process to assess and prioritise catchments for further investigation based on a number of screening criteria set out in the DWMP framework.	SEA scoping phase, documented in Scoping Report.
Baseline Risk and Vulnerability Assessment (BRAVA)	*Hydraulic modelling and desk top studies to quantify changing risks over time from climate change and population growth. The assessment considers historic performance data such as flooding incidents.*	
Problem Characterisation	The risks ('problems') identified by BRAVA are characterised to assess the scale of the risk and the impact it may have to determine the level of optioneering needed.	
Options Development and Appraisal (ODA)	Exploration of the available options and solutions to mitigate the risks. Including identification of solutions which may be delivered in partnership with others.	Assessed in **Assessment of the DWMP Components** in this report
Programme Appraisal	Select options for delivery based on 'best value' and prioritise the interventions, balancing the impact of cost to customers and the natural capital approaches.	Assessed in **Development and Assessment of Combined Options** of this report.
Draft DWMP	The draft DWMP was issued at the end of June 2022 for a period of consultation and customer research.	Internal assessment of the draft plan to aid discussion and inform the development of the plan.
Final DWMP	The final DWMP is being published in May 2023, taking into account the views of consultees. The final plan will inform Business Plan development as part of Price Review (PR24).	Following consultation feedback, the final DWMP was assessed through the SEA to inform the development of the plan. This SEA Environmental Report is being published in parallel with the plan.

Consultation on the SEA Scoping Report

Stage A was completed through preparation and consultation on an SEA Scoping Report during 2022. The SEA consultation bodies (Natural England, the Environment Agency, and Historic England) were consulted on the SEA Scoping Report in Autumn 2022.

Feedback received during the consultation has informed the appraisal process and hence the development of the plan. A summary of the feedback received, and how comments have been addressed, is included in **Appendix A – Consultee Comments**.

Difficulties and Limitations

This Environmental Report relies on baseline data and information published by third parties, such as nationally available datasets. As such, neither Stantec nor SWW are liable for their accuracy.

The baseline environment chapter has used professional judgement to review published datasets. The baseline information is provided at the strategic level, thus it does not identify some local issues, as these may not represent wider trends across the region. During implementation of the DWMP, more detailed optioneering and project development will identify specific locations and schemes where additional local datasets and baseline information are likely to be required to assess and manage environmental and social impacts. The baseline environment **Appendix C** also includes an assessment of a future environmental baseline. The very nature of this predictive assessment means that there is uncertainty in the reporting; for some topics predictions are available (albeit with variability in the spatial and temporal projections (e.g., predictions over 20 years or 25 years); others are reliant on professional judgement and observed trends.

Within the **Assessment of the DWMP Components** section, options are assessed as stand-alone measures; the **Development and Assessment of Combined Options** section assesses the overall approach taken in the plan based on the combination of options and wider measures within the plan, along with other reasonable alternative approaches. The plan is strategic in nature.

As the plan progresses through implementation these will be developed into more specific schemes, such as below ground storage with uses of green surface water management options. There will naturally be some fluidity within the implementation of measures that arise from the plan, such as the proportion of green and grey options within a catchment based on subsequent more detailed work. Whilst this limits the certainty within the assessment, it offers the potential to increasingly adopt the green and collaborative approaches as practices develop.

The DWMP prioritises investment over a 25-year horizon from 2025, PR24 will focus the investment over the next five years (AMP8). It is recognised that levels of confidence of the impacts and uncertainty increase in the longer-term planning horizon, noting that the plan is to be reviewed every five years.

As the development of DWMPs is new, some iteration in the SEA process is expected as the DWMP is developed, including in future DWMP reporting cycles. The five-year review cycle provides an opportunity to review the current findings based on the experience gained within the implementation of this first DWMP. One such example is the publication of the Storm Overflows Discharge Reduction Plan (SODRP) on 26 August 2022, changing the targets to be met by DWMPs after the publication of the draft DWMP.

The DWMP adopts an adaptive planning approach to ensure that the DWMPs are adaptive and responsive to issues such as climate change, based on early warning markers (such as climate modelling forecasts and emerging research) whereby higher levels of investment maybe required if higher risks emerge. By its nature, this increases uncertainty in the environmental effects (both positive and negative) of the plan.

Key Policy and Baseline Issues

The SEA Regulations require the environmental report to include:

The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme. (SEA Regulations (2004), Schedule 2, paragraph 2).

The environmental characteristics of areas likely to be significantly affected. (SEA Regulations (2004), Schedule 2, paragraph 3).

Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds and the Habitats Directive. (SEA Regulations (2004), Schedule 2, paragraph 4).

The environmental protection objectives, established at International, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation. (SEA Regulations (2004), Schedule 2, paragraph 5).

Key Policy Themes

A full review of the plans, programmes, and environmental protection objectives relevant to the SEA of the DWMP can be found in the table within **Appendix B**. These have been reviewed to establish, where relevant, the requirements applicable to the DWMP, identify constraints, opportunities, and potential inconsistencies and to inform the development of the SEA Framework and subsequent assessment.

The key themes and messages arising from the review of applicable plans, programmes, and objectives are summarised as follows in **Table 3**.

Table 3: Key Themes of plans, programmes and objectives

SEA Topic	Key themes
Biodiversity and geodiversity	• Conserve and enhance biodiversity, including designated and non-designated sites, priority habitats and species. • Contribute to nature recovery networks to increase habitat connectivity, including through green infrastructure. • Prevent habitat fragmentation. • Increase resilience of biodiversity to climate change. • Support biodiversity net gain (BNG). • Support the UK Government 25 Year Plan to Improve the Environment. • To have regard to the requirements of the Habitats Directive, including restoring favourable conservation status to sites. • To use all reasonable endeavours to avoid any pollution or deterioration in the habitat of wild birds. • Protect resources such as high-quality soils, good quality agricultural land and mineral resources. • Improve soil health • Promote catchment-wide approach to land management by relevant stakeholders. • Reduce risk of contamination and contribute to remediation.
Human health	• Recognise open spaces, water resources and access to nature are important to support human health, well-being, community cohesion and meet recreation needs. • Ensure communities are safe, prevent flood risks to health. • Ensure communities have secure water supplies and effective wastewater services. • Promote efficient use of water. • Foster social inclusion and community stakeholder participation. • Monitor and provide information to consumers on drinking water quality.
Socio-economics	• Promote a sustainable economy for social and economic prosperity, such as through protection of important infrastructure. • Reduce social deprivation and inequality. • Promote a green economy.
Carbon & material assets	• Contribute to net zero carbon targets to support the transition to the UK Government's 2050 net zero target through embodied and operational carbon. • Use resources efficiently throughout the lifecycle of a scheme. • Prevent and reduce waste generation, including hazardous wastes. • Encourage effective use of land, such as reuse of previously developed land and multifunctional use of land. • Reduce harmful air pollutants, especially in sensitive areas.

SEA Topic	Key themes
Water resources	• Maintain and improve water quality and water resources to achieve Good Ecological Status or Good Ecological Potential, support biodiversity and ensure high quality drinking water resources. • Prevent or limit pollutants into water resources (groundwater, surface water, coastal water), including wastewater discharges from treatment works and storm overflows. • Develop approaches resilient to climate change (extremes of weather, flood, drought, low flow etc). • Promote efficient use of water. • Contribute to healthy seas and oceans. • Improve the health and resilience of chalk catchments. • Support natural hydrogeological processes.
Flood risk	• Decrease and manage flood risk from all sources to people, residential and non-residential properties, community facilities and key infrastructure. • Increase resilience to flood risk from all sources. • Support a catchment wide approach to water management and biodiversity.
Heritage	• Conserve and enhance cultural heritage assets, including archaeology and built heritage and their settings. • Avoid effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets, including undiscovered resources. • Promote the conservation and enhancement of the historic environment, including historic landscapes. • Assess the potential impact of change in groundwater flows and chemistry on preserved organic and paleoenvironmental remains.
Landscape	• Protection of landscape, townscape, and seascape (including designated landscapes and landscape character). • Changes in water levels in the landscape (such as through low flows in rivers or flooding) could affect landscape and visual amenity.
Climate change resilience	• Increase resilience to the impacts of climate change both at present and in the future (such as changes to water availability, extremes of weather and flooding).

Key Environmental Features and Issues

A key part of SEA is to identify the current state of the environment and its likely evolution without implementation of the plan. From this, the characteristics of the environment which may be affected by the plan can be identified, along with any existing environmental problems which are relevant to the plan (including those of particular environmental importance).

A review of the baseline environment has been undertaken and is presented in **Appendix C**. To be proportionate and to retain a strategic approach, baseline information has been sourced from publicly available sources. Much of it is associated with the plans, policies and objectives identified within **Appendix B**. The SWW DWMP covers a large geographical area, therefore the baseline is a high-level review of conditions within the region. As the plan is implemented through project level measures, with defined locations, a review of the specific site baseline conditions will be required (see Project Stage Assessments and Controls During Implementation Section).

The likely evolution of the environment without the plan in place has been considered using judgement of the available information based on the underlying trends and the likely scenarios from current plans and projects.

The key baseline features and issues for each SEA topic are identified in **Table 4**.

Table 4: Environmental baseline and key issues related to SWW DWMP

SEA Topic	Summary Baseline features	Key issues
Biodiversity and geodiversity	• The SWW region is rich in habitat and species diversity and includes a variety of international and nationally designated sites such as SPAs, SACs, NNRs, SSSIs, and Ramsar sites. • The coastal regions of the SWW region are nationally important for marine biodiversity, though these are threatened by overfishing and pollution. • The SWW region has a high concentration of blanket bogs, marshland and wetland habitats. • SWW are currently leading peatland recovery projects in the region to restore 1600 ha of peatland. • SWW has geological features such as Dorset and East Devon coast that are of international importance.	• DWMP provides an opportunity to improve water quality, with resultant benefits for biodiversity. • Potential fragmentation of habitat, resulting in loss of biodiversity. • Potential for DWMP options to result in groundwater or surface water pollution that could affect local biodiversity. • DWMP options achieve biodiversity net gain where required and seek to achieve it where practicably possible in other instances. • Potential to support nature recovery networks and strategies through habitat creation/enhancement, connecting habitats, introduction of vegetation to reduce flows etc. • Climate change is anticipated to increase stress on biodiversity, representing dual crises. • Intensifying agricultural practices likely to result in the degradation of soils in the region. • DWMP should prioritise catchment management solutions that help manage soils and reduce impact on waterbodies. • Opportunity to reduce nutrient loads in surface water and groundwater (such as through catchment management). • Potential for soil & sediment contamination through construction processes. • All works must avoid damage to important peatlands.

SEA Topic	Summary Baseline features	Key issues
Human health	• Life expectancy in the south west is slightly higher than national average, as is disability free life expectancy. • National Planning Policy Framework (NPFF) promotes accessible green space and accessible green infrastructure. • There are a total of 27 air quality management areas in the SWW region, mostly designated as a result of nitrogen dioxide (typically associated with road traffic).	• DWMP provides an opportunity to improve water quality, with resultant benefits for water sources and bathing waters, reducing risk to human health and wellbeing. • DWMP provides the opportunity to reduce the risk of sewer flooding and associated risks to human health. • Sustainable drainage solutions have potential to improve the local environment of SWW region residents, improving recreation facilities and access to nature. • Climate change and hotter summers expected to increase heatwave risk to elderly, especially with an ageing population. Green infrastructure can help reduce the urban heat island effect.
Socio-economics	• 20% increase in population in the past 30 years, population growth expected to grow with post-pandemic working arrangements. • The SWW region has a slightly higher proportion of people employed than the national average. • 2.6 million international and 18.9 million domestic visits were made to the region in 2019. Tourism is a key driver of the economy. The majority of tourists in summer are concentrated in coastal areas of Cornwall and Devon. • Surfing & water sports are economically and culturally important to the region.	• DWMP provides the opportunity to reduce the risk of sewer flooding and associated economic costs. • Water pollution and sewage have the potential to harm economically important coastal spots, as well as popular lake and river locations, an issue which is seeing increasing political pressure. The DWMP provides a key opportunity to address this issue. • A reduction in pollution of watercourses across the region would be beneficial to recreation, tourism and the economy as a whole. • Construction work resulting from the implementation of the DWMP has the potential to cause temporary disruption and disturbance to services.
Carbon & material assets	• Transport, homes, agriculture and commercial buildings each contribute just over a 5th of Cornwall's carbon emissions. • Local authorities in SWW region have declared intention to reach net zero carbon, often by 2030. SWW have committed to net zero operational carbon by 2030. • 2.6 million tonnes of waste were managed in SWW region in 2019/20. 49% of this waste was recycled or composted, 34% was incinerated. • Maritime trade and defence activities are significant in the region, especially in the Plymouth port area.	• The Government's National Infrastructure Strategy (2020) outlines a legal commitment to decarbonise the economy by 2050. • Catchment and sustainable drainage based solutions to reduce surface water flows provide the opportunity to reduce the volume of wastewater requiring treatment (reducing infrastructure requirements and associated embodied carbon, along with operational carbon). • DWMP optioneering should look to promote nature-based solutions, offering the potential to create and restore habitats to sequester carbon dioxide. • Continued population growth is likely to drive increased demand for material assets such as housing, water and waste facilities, transport infrastructure, and more. • SWW region contains transport links that could be affected during construction works associated with the DWMP.

SEA Topic	Summary Baseline features	Key issues
Water resources	• Recent investments mean that 98% of regions bathing waters have achieved 'good' or 'excellent' designated standard. • Environment Act brings in requirement for near real time reporting of river water quality monitoring. • Phosphate, physical modifications and pollution from rural areas, are the most common pressures affecting the quality of region's watercourses. • A Category 1 incident (most harmful) has only occurred once in past 4 years. • Growth in tourism in the region will contribute to increased stress on the water resources of the area. • Cornwall and Devon are not considered to be seriously water stressed. • Isles of Scilly considered to be seriously water stressed.	• DWMP provides an opportunity to improve water quality through reduced storm water overflows, nutrient loading and other pollutants into watercourses. • Water Framework Directive requirements should be taken into consideration when selecting solutions. • Climate change is anticipated to increase stress on water resources, such as through low flows in rivers, increased temperatures.
Flood risk	• Significant areas of peatland on the moors of Exmoor, Dartmoor and Bodmin do much to prevent flooding in the region. Human activity has damaged these carbon-rich assets in many places. • Areas in the region are at high risk of flooding from inland waters (e.g., River Axe, Exe, Avon). • Areas in the region are at high risk of coastal flooding (e.g., along coast of Cornwall and Devon)	• Increased rainfall from climate change, urbanisation and population growth will mean more storm water runoff leading to additional 17,600 properties at risk of sewer flooding during 1 in 50-year storm event without DWMP implementation. • 112 wastewater treatment works could be at risk of exceeding design capacity without DWMP implementation. • With no mitigation, 4% of the population in 121 catchments are predicted to be at risk of sewer flooding in 1 in 50-year storm events by 2050. • On assuming 2°C rise in Global Mean Surface Temperature and low population growth scenario, the area of Cornwall and Devon would have around 15,000 – 35,000 people exposed to significant coastal flooding (1 in 75-year return period or more frequent) by 2050[2] • Raised sea levels not only increase the risk of flooding on the coast and in estuaries but also accelerate coastal erosion through larger more powerful waves.
Heritage	• SWW region is abundant in heritage and archaeological assets. Including two World Heritage Sites. • Better preservation techniques have resulted in the number of heritage assets at risk decreasing.	• Flooding, erosion and sea level rise have the potential to damage heritage assets. • DWMP should select options that reduce risk to historic assets or their settings.

[2] Sayers, P. *et. al* . Responding to climate change around England's coast - The scale of the transformational challenge, Ocean and Coastal Management 225 (2022).

SEA Topic	Summary Baseline features	Key issues
Landscape	• The landscape of the SWW region is known for its remote, open nature, offering a range of landscapes such as chalk ridges, granite hills, rugged coastlines, and sandy coves and beaches. • Two national parks are located in the region - Dartmoor and Exmoor. These are both nationally famous and important landscapes. • Eight Areas of Outstanding National Beauty (AONBs) are located in the region. • 18 of England's Heritage Coasts are located within the SWW region.	• Population rise may put increased demand on greenfield sites, thereby degrading the rural landscapes of the region. • Temporary construction related to the DWMP may have a temporary negative impact on the local landscape. New infrastructure could have permanent negative effects on visual amenity. • Nature based flood prevention measures such as appropriate vegetation planting have the potential to enhance the landscape.
Climate change resilience	• Region is expected to have hotter, drier summers and warmer, wetter winters. • Last 30-year period has been 0.9 degrees hotter than the previous 30 year period, and has been 6% wetter. • Extreme weather events such as heatwaves and thunderstorms are becoming more common due to climate change. • Under a high emissions scenario, rainfall intensity is expected to rise 13% and sea level to rise 0.29m.	• Annual mean temperatures are expected to increase by 1.8C by 2050, with mean summer temperatures increasing by 2.4C. • DWMP options should appreciate the infrastructure's long-term resilience to climate change. • DWMP provides an opportunity to design for increased surface water flows and climactic changes. • DWMP optioneering should look to promote nature-based solutions, offering the potential to increase resilience to climate change (such as through habitat connectivity and reduce urban heat island effect).

SEA Assessment Methodology and Reporting

SEA Objectives

As proposed in the Scoping Report, this SEA adopts an objective-led approach, in line with the ODPM Practical Guide to the SEA Directive. The purpose of the SEA objectives is to:

- State the direction and priorities of the SEA
- Give a structure to assess the DWMP against, ensuring a comprehensive and robust appraisal
- Provide the basis for the identification of relevant indicators

The scope of the objectives has been carefully considered to reflect the:

- requirements of the SEA Regulations
- Water UK framework on undertaking a DWMP
- regional information
- the context of drainage and wastewater
- key policy messages and environmental protection objectives identified in the review of policies, other plans, and programmes
- environmental baseline conditions and their likely evolution

The nine SEA objectives are set out in **Table 5**. Use of these objectives in the assessment of the DWMP is supported by guiding questions **(Table 6**).

Table 5: SEA topics and 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
Climate change resilience	Adapt, and improve resilience to climate change

SEA Objectives: Guiding Questions

Table 6: SEA Objectives and their guiding questions

SEA topic	Overarching SEA objective	Guiding questions
Biodiversity and geodiversity	Protect, conserve, restore and enhance biodiversity and geodiversity, including soils	Will it affect the conservation status of any internationally designated sites (Special Protection Areas, Special Areas of Conservation (SACs), Ramsar sites)? Will it affect the conservation status of any nationally designated sites (Sites of Special Scientific Interest (SSSIs)? Will it affect the conservation status of any other designated sites (local wildlife sites)? Will it contribute to biodiversity loss/ gain? Will it affect habitat connectivity/ fragmentation? Will it affect the freshwater or coastal environment, habitats, and species? Will it affect irreplaceable habitat such as ancient woodland? Will it affect the introduction or spread of INNS? Will it affect natural capital and ecosystem services? Will it avoid damage to geologically important sites (e.g., geological SSSIs)? Will it protect and enhance the quality of soils? Will it protect, conserve, and enhance resources, such as high-quality agricultural land, sterilisation of mineral resources, soil erosion and nutrient loading of waterbodies? Will it promote the sustainable use of land, such as using previously developed land? Will it create contamination or contribute to remediation?
Human health	Protect, conserve, and enhance human health and well-being, including resilient communities	Will it affect access to nature, particularly for those living within urban or deprived areas? Will it achieve legislative & policy targets for biodiversity protection & enhancement Will it affect the environment for other users including for recreation, tourism and navigation? Will it affect human health and well-being through access to resilient, high quality, sustainable and affordable wastewater systems? Will it affect human health and well-being through access to a resilient, high quality, sustainable and affordable supply of water? Will it address specific customer concerns?
Socio-economics	Protect, conserve, and enhance social and economic prosperity	Will it affect opportunities for recreation and tourist activities? Will it affect economic development/ prosperity? Will it affect social deprivation and inequality? Will it affect important infrastructure (such as hospitals, roads, rail)?

SEA topic	Overarching SEA objective	Guiding questions
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	Will it contribute towards net zero targets? Will it use natural rather than built solutions where appropriate? Will it make efficient use of existing infrastructure? Will it minimise the demand for resources during construction (such as through the use of soft engineering solutions rather than hard engineering solutions)? Will it minimise the demand for resources during operation (such as through avoiding pumping requirements)? Will it affect emissions of pollutants to air, including in sensitive locations (e.g., in proximity to an AQMA/ an ecologically sensitive site)? Will it affect waste generation, including hazardous wastes?
Water resources	Protect, conserve, and enhance water resources	Will it enable better management of surface water before entering sewers? Will it affect coastal water quality (including bathing waters, shellfish waters)? Will it affect surface water quality or quantity? Will it affect groundwater quality or groundwater recharge? Will it affect drinking water or water abstraction zones? Will it contribute to or conflict with the achievement of WFD objectives (e.g., Good Ecological Status)? Will it affect contaminants entering the receiving environment? Will it achieve legislative & policy targets for water resources protection & enhancement
Flood risk	Reduce and manage flood risk, increasing flood resilience	Will it promote catchment-based, and Sustainable Drainage Systems (SuDS) based solutions? Will it affect the resilience of water and wastewater systems? Will it affect flood risk elsewhere? Will it affect sewer flooding events? Will it be vulnerable to flood risk itself?
Heritage	Protect, conserve, and enhance the historic environment, including archaeology	Will it affect archaeology, including unknown archaeology? Will it affect an historic designation/ feature? Will it affect the setting, the buffer, or significance of a historic designation/ feature? Will it affect access to important heritage assets within the region?
Landscape	Conserve, protect and enhance the landscape, townscape, and visual amenity	Will it affect designated landscapes and features, including National Parks and Areas of Outstanding National Beauty (AONBs)? Will it affect landscape character, including tranquillity and visual impact? Will it affect the townscape? Will it affect the seascape?
Climate change resilience	Adapt, and improve resilience to climate change	Will it help to restore the natural ecosystem function and promote resilience to climate change? Will it affect the environmental resilience of the water environment to climate change, flood risk and drought? Will it affect vulnerability to risks associated with climate change effects (e.g., reduce the adverse effects of droughts and floods, reduce the heat island effect)? Is it vulnerable to climate change?

Methodology

The DWMP has been assessed using the SEA objectives and guiding questions above. The assessment considers 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.

The SEA process is concerned with 'the likely significant effects on the environment'. Consideration has been given to the likely significance of identified effects in accordance with Schedule I to the SEA Regulations:

> *Criteria for determining the Likely Significance of Effects on the Environment (SEA Regulations, Schedule 1)*
>
> *1) The characteristics of plans and programmes, having regard, in particular, to:*
>
> > *a) the degree to which the plan or programme sets a framework for projects and other activities, either with regard to the location, nature, size and operating conditions or by allocating resources;*
> >
> > *b) the degree to which the plan or programme influences other plans and programmes including those in a hierarchy;*
> >
> > *c) the relevance of the plan or programme for the integration of environmental considerations in particular with a view to promoting sustainable development;*
> >
> > *d) environmental problems relevant to the plan or programme; and*
> >
> > *e) the relevance of the plan or programme for the implementation of Community legislation on the environment (for example, plans and programmes linked to waste management or water protection).*
>
> *2) Characteristics of the effects and of the area likely to be affected, having regard, in particular to:*
>
> > *a) the probability, duration, frequency and reversibility of the effects;*
> >
> > *b) the cumulative nature of the effects;*
> >
> > *c) the transboundary nature of the effects;*
> >
> > *d) the risks to human health or the environment (for example, due to accidents);*
> >
> > *e) the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected);*
> >
> > *f) the value and vulnerability of the area likely to be affected due to — i) special natural characteristics or cultural heritage; ii) exceeded environmental quality standards or limit values; or iii) intensive land-use; and*
> >
> > *g) the effects on areas or landscapes which have a recognised national, Community or international protection status.*

Appraisal findings are presented in matrices, using the following key:

Major positive	+ + +	Moderate positive	+ +	Minor positive	+	Neutral	0
Major negative	- - -	Moderate negative	- -	Minor negative	-	No relationship	

Commentary accompanies the matrices to:

- Explain the assessment scoring for each assessed policy;
- Identify areas of uncertainty;
- Identify any likely significant environmental effects;
- Identify any mitigation or enhancement measures considered necessary to avoid significant adverse environmental effects or to enhance the performance of the proposed measures; and,
- Identify implications for the plan.

For the purposes of the appraisal, a major negative, or a major positive finding (indicated by a 'red' or 'dark green' score within the appraisal matrix) is considered to be a 'significant'. Where elements of the selected plan have significant adverse effects on the environment, measures are subsequently presented to prevent, reduce, and offset these effects of implementing the DWMP. Opportunities to implement and enhance positive environmental effects are also be identified.

An initial informal appraisal of the draft DWMP was undertaken, with findings used as a basis of discussion with the DWMP team in Autumn/Winter 2022 to enable the initial findings to be taken into account (along with other considerations, such as recent guidance and consultee comments) when developing the final DWMP.

The following terms are used in the appraisal:

- Likely future without the plan: if the plan is not adopted, the likely future based on the effects of other expected plans, projects, and underlying trends.
- Secondary or indirect effects: effects that are not the direct result of the plan but occur away from the original effect or as a result of a complex pathway.
- Cumulative effects: for instance, where several options each have insignificant effects but together have a significant effect; or where more than one policy in the plan has a combined effect.
- Synergistic effects: individual effects interact to produce a total effect greater than (or less than) the sum of their total effects.
- Total effects of the plan: the combined effects of all the polices within the plan.
- Cumulative effects of the plan: the total effects of the plan together with the likely future without the plan.
- Cross border effects: effects outside of the area.
- Temporary effects: effects that are not permanent, such as occur during construction. These may be short- to longer-term temporary effects.
- Short term (0-5 years, i.e., the next AMP cycle), medium term (up to 2050), long term (beyond 2050).
- Certainty: the level of surety of an effect.

Elements of the DWMP Assessed

The SEA has considered all proposed substantive components of the DWMP, together with any identified reasonable alternatives to these components. This includes:

- The overall DWMP assessment process (as set out within the Water UK framework and applied by SWW) has been reviewed to identify where the SEA topics have been considered through the development of the plan, to identify any opportunities to enhance their coverage and compatibility with the SEA objectives when developing the final DWMP.
- The 'long-list' of individual options considered within the DWMP and their reasonable alternatives.
- The alternative scenarios considered for the overall DWMP, including the selected scenario (which comprises a selection of the options considered in long-list of options considered earlier).
- The final DWMP.

The assessment is undertaken at the strategic level (Level 1), reflecting the nature of SEA and DWMP, and in line with the Water UK framework. 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.

Assessment of the DWMP Components

Compatibility of the DWMP Development Process with the SEA

The development of the DWMP adopted the risk management framework set out in the Water UK framework, where risks and vulnerabilities to assets and service level agreements, from the impact of future change drivers (climate change, population growth, urban creep, and changing customer and government expectations), are assessed across spatial (catchments) and time-based horizons. A schematic of the DWMP risk process steps is shown in **Figure** below:

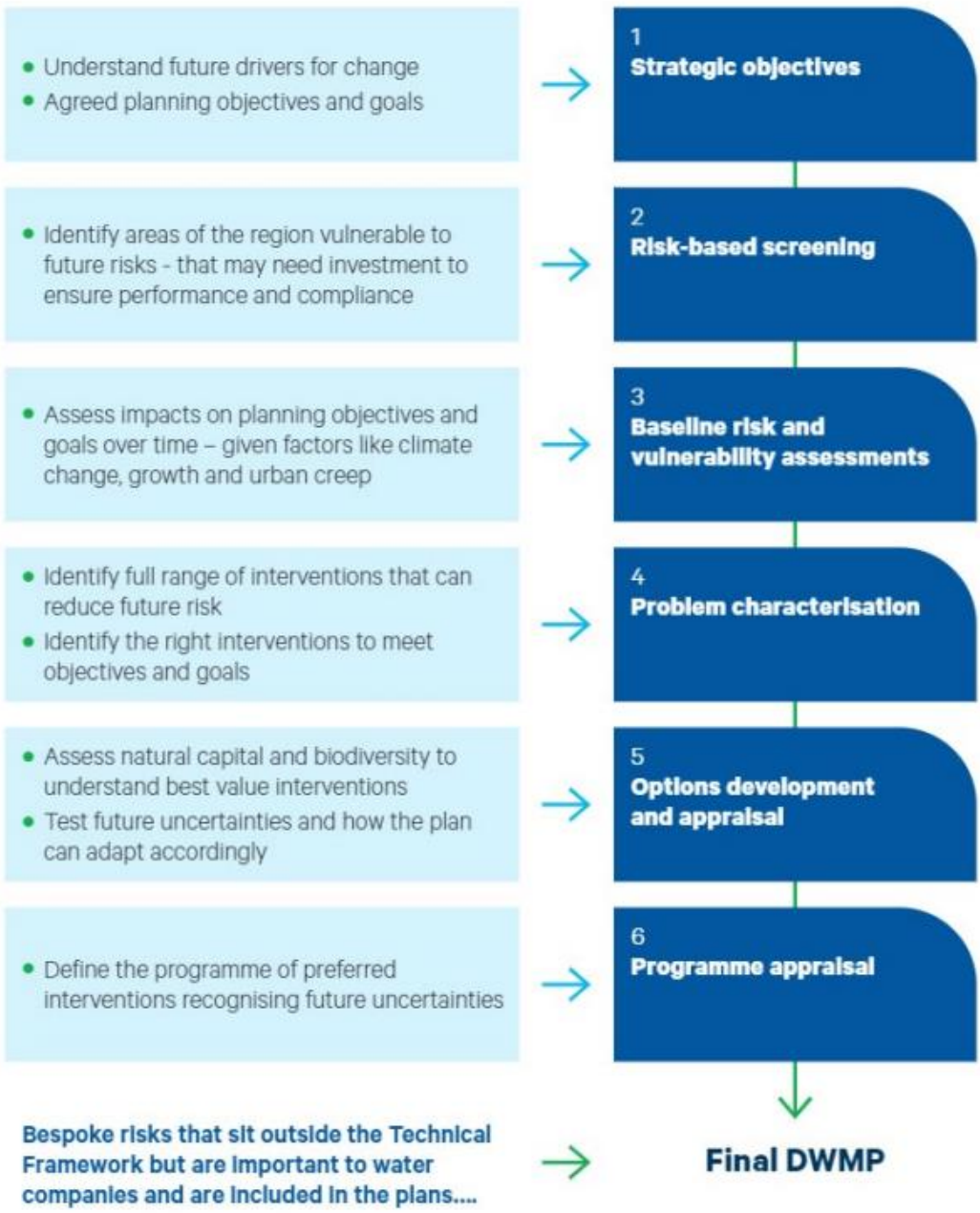

Figure 7: DWMP risk process

This process is expanded upon in **Table 7** below, including setting out the factors considered in the development of the DWMP.

Table 7: DWMP Framework Process

DWMP Stage	Overview
Risk Based Catchment Screening (RBCS)	In applying the risk management framework, the South West region is broken down into Level 3 drainage catchments. There are 653 Level 3 catchments throughout the region, each has a WwTW, and they are the basic building block of the plan. In this initial (RBCS) stage, every catchment is risk assessed against a broad range of performance and data planning indicators (17 in total). Many of these data planning indicators are annually audited to check accuracy and robustness. Using the number and nature of indicators breeched, it was shown that 280 catchments were performing well or being managed in a way that did not warrant further investigation. For those catchments that were considered resilient, and did not progress, any change will be picked up as part of the annual RBCS review process.
Baseline Risk and Vulnerability Assessment (BRAVA)	The 373 catchments identified as needing further investigation were subjected to a further risk review. For each of these catchments, a risk rating against six core planning and performance metrics were used to provide the baseline position of system performance (2020 used as baseline year). The modelling for future risk was conducted using the future change assumptions including climate change, population growth, urban creep, per capita consumption, tourism and solution costs.
Problem Characterisation	Using the levels of risk category assigned to the planning objectives in the previous BRAVA stage, the risk matrix was used to assign a letter from A to G to show the likely timing as to when these risks would compromise each of the planning objectives, in each catchment. A further three bespoke planning objectives were used, to help SWW to better understand the nature and complexity of the problems arising, how they relate to one another, and what interventions could be put in place to mitigate them. A weighting score was then applied to generate a risk magnitude assessment. Risk category A scored 1, B scored 2, through to G which scored 7. This scoring assessment was used to develop a problem characterisation score and help categorise catchments into Standard, Extended or Complex. The BRAVA process has also been used to identify /capture wider bespoke risks and or resilience issues that are related to DWMPs.
Option Development and Appraisal (ODA)	The DWMP team began by asking the local operations teams for their input on option development within each catchment, backed up by further analysis. For those catchments where the earlier stages had identified measures are needed, a further review was undertaken to identify which catchments are at risk of exceeding the following thresholds: • Sewer collapses of greater than 10 collapses per 1000 km per year • Pollution & flooding risk incidents greater than 0.1% catchment total, external issues, hydraulic issues, hotspots present. • Future flood risk (FFR) greater than 5% properties at risk of internal flooding in a 1 in 50 storm event • Storm overflow (SO) greater than 10 spills per year from any SO • WwTW Compliance. Of the 373 Level 3 catchments entering the BRAVA process, a further 142 catchments did not proceed to ODA. The remaining 231 catchments that proceeded to ODA were then categorised as 'Standard', 'Extended' or 'Complex' based on their characterisation problem score and quality of hydraulic models, to determine the ODA approach taken. Each catchment was then reviewed by SWW's catchment area teams. Preferred interventions from the DWMP guidance table were quantified using modelling and extrapolation. (See the next section of this report for further details of this options appraisal process)

DWMP Stage	Overview
Programme Appraisal	Followed the DWMP technical framework, SWW adopted a modelled optimised plan approach to achieve outcomes by 2050, which had been manually reviewed and overlaid with estimated and standardised solutions to ensure that the plan avoids duplication, is realistic, and reflects current risks as identified through operational review and investigations and reflects the views of stakeholders.

Referring to both the table above, and further details of the option appraisal process in the next section, the DWMP 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.

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 DWMP development process, demonstrating integrated consideration of the SEA themes throughout the plan production.

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 (listed for completeness below). The DWMP Option Development and Appraisal stage identified the generic options available to address the identified issues, as set out below.

- Integrated construction wetland downstream of a wastewater treatment works (Wetlands)works
- Disinfection of storm water overflows (i.e., UV)
- Source control SuDS, upstream thinking
- Combined sewer separation. Construct new surface water sewers.
- Disconnect existing surface water systems from combined sewers & discharge to watercourse
- Pass forward more flow into the downstream network or WwTW
- "Intelligent" sewer network to control flows
- Increase network capacity by installing larger sewers / Increasing capacity of wastewater sewer system
- Storage tanks
- Transfer flow between catchments via new connections / Pumping discharge away to another WwTW
- Screening in the network
- Infiltration reduction
- Flow and overflow operation monitoring / Intelligent monitoring and control

Other potential alternative options suggested by the SEA team at the draft plan stage, and discounted were:

- The options assume a 'business as usual' case, where for example drains are cleaned as necessary and sewers are repaired; as such these are not considered within the DWMP options.

- Catchment management in relation to nutrient load is beyond the scope for the first DWMP as it is typically considered by water companies in relation to drinking water quality. However, this issue has increased in profile recently in relation to the need to demonstrate 'nutrient neutrality' within plans and projects to demonstrate there is no net increase in nutrients so that they do not add to existing nutrient burdens at certain sites. Applications for land uses which might impact upon the wastewater system are affected, including applications for new homes. At this stage this is considered outside of the scope of the DWMP, however this situation will need to be kept under review. Consideration will be given to inclusion of this issue within later DWMP cycles. Catchment management in relation to flows is however within the scope, as is nutrient neutrality in relation to driving reduced nutrient discharges from WwTWs in the Camel, Allen and Axe catchments

- Tankering wastewater to WwTW since it is unacceptable as a permanent solution due to carbon and impact on local residents.

- Greywater and blackwater treatment and reuse domestically will be addressed through influencing planning policy at this stage and considered further within subsequent DWMP cycles; further understanding is required as to its acceptability to customers.

- Property level flood resilience can provide property owners with practical steps to lower the risk of sewer flooding entering properties, through the use of adaptable products. For example, barriers that can be fitted to openings such as doors and windows, providing a seal to limit floodwater entry; non-return valves (NRVs) fitted to drains around the home to prevent sewage backing-up into the property; and/or airbricks can be replaced with automatically closing airbricks to create a seal against floodwater. Such measures are not typically used to manage flood risk from sewers, which are typically localised in nature and are not predicted in the same way as fluvial flood risk, providing early warnings to implement the measures. The DWMP focuses on addressing the causes of sewer flooding, thus this option is not included as a costed measure within the draft DWMP. However, such measures could be considered further where localised flood risk remains after consideration of measures to reduce risk.

- The options to achieve WwTW compliance were developed and taken forward through the WINEP submission and its associated environmental assessment process. Hence, they are not re-assessed in this SEA.

In developing the DWMP, unconstrained options have been 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 **(Figure 8)** to obtain a final weighted score for each option.

Figure 8: PR24 WINEP SWW options screening tool primary, secondary and tertiary criterion

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 results of the multi-criteria analysis for Storm Overflows are shown in **Table 8**, including reasons or the progression or rejection of options.

Table 8: Multi-Criteria Analysis Results – Storm Overflows

OP ID	Description	Progression / Rejection Justification
E4	Integrated construction wetland downstream of a wastewater treatment works	Progressed due to wider benefits associated to scheme if needed at wastewater treatments
E9	Disinfection of storm water overflows (i.e., UV)	Progressed due to benefit to water quality of residual spills (This solution is used for schemes that are also driven by the Bathing or Shellfish drivers)
J1	Source control SuDS measures	Progressed due to wider benefits of SuDS in addressing risk in a more sustainable and mitigating future risk
K2	Combined sewer separation. Construct new surface water sewers.	Progressed due to benefits associated with removing surface water from the network and requiring less treatment at the wastewater treatment works
K3	Disconnect existing surface water systems from combined sewers & discharge to watercourse	Progressed due to the need that decoupling Combine Sewer Storm Schemes and working with other agencies to treat new storm water surface flows, will be a required intervention
K12	Pass forward more flow into the downstream network or WwTW	Progressed due to the fact that increases in network storage will pass more flows to WwTWs
L1	"Intelligent" sewer network to control flows	Rejected due to technology availability and would not resolve spill counts as a standalone solution
N1	Increase network capacity by installing larger sewers / Increasing capacity of wastewater sewer system	Progressed due to utilising and capitalising on available capacity within the catchment before flows arrive at the wastewater treatment works
O2	Storage tanks	Progressed due to extensive use in resolving spills in past projects and availability and reliability of the technology
R1	Transfer flow between catchments via new connections / Pumping discharge away to another WwTW	Rejected due to delivery restriction for WINEP and timescales of delivery
U1	Screening in the network	Rejected due to technology availability and would not resolve spill counts as a standalone solution Note this does not include SO screens which will be added under driver IMP 5
Z6	Infiltration reduction	Progressed due to benefits associated with removing surface water from the network and requiring less treatment at the wastewater treatment works. However, further investigation will be needed with these schemes to identify the source of the infiltration
Z7	**Flow and overflow operation monitoring / Intelligent monitoring and control**	Rejected due to technology availability and would not resolve spill counts

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 9**.

Table 9: 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), 1235 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.

SEA Assessment of the Feasible Options

The feasible options have been assessed across the whole Level 1 plan area using the SEA Framework. Results are presented in **Table 10** below, with further details of the options, the assumptions made, and narrative supporting the assessment provided in **Table 11**

KEY:

Major positive	+ + +	Moderate positive	+ +	Minor positive	+	Neutral	0
Major negative	- - -	Moderate negative	- -	Minor negative	-	No relationship	

Table 10: Assessment of feasible options using the SEA framework

Options:	SEA Topic:	Biodiversity and Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
Combined sewer separation. Construct new surface water sewers (Surface Water Separation)		-	0		-	+++	-	-	0	+
Source control SuDS upstream thinking		++	++	++	++	++	++	0	++	++
Inflow reduction /separation			+		+	+	+			+
Storage tanks (Storage)		-	0		-	++	++	-	-	+
Increasing capacity of wastewater system (Increase capacity)		0	0	+	- -	++	+++	0	0	0
Increase network capacity by installing larger sewers		-	-	-	- -	++	++	- -	- -	+
Integrated construction wetland downstream of a wastewater treatment works (Wetlands)		++	+	0	+	+ + +		-	+	+
Disinfection of storm water overflows (i.e., UV at Final Effluent		+	+	0	- -	++			0	0
Provision of coastal flood defences		- -	0		-		++	-	- -	+
Relocation of asset (for coastal flooding and erosion risk)		-	0	0	- -	+ + +	++	- -	- -	++

Table 11: Narrative supporting the assessment of options using SEA framework

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
Separate surface water from combined systems by constructing new surface water networks	This grey option would reduce the total volume of water entering the combined sewer network and requiring treatment by preventing surface water flows entering the sewer. This option reduces flows through the combined sewer network, thus reducing the risk of sewer flooding; and reduces flows to WwTWs, substantially reducing SO discharges by allowing an increased proportion of sewage to be treated within the capacity of WwTWs, thus improving water quality. There is a risk that provision of further surface water systems will increase the conveyance rate to receiving watercourses, potentially increasing the subsequent fluvial flood risk. Moreover, there will be an increased risk of receiving waterbody quality deterioration. Hence vortex separators and oil separators are included as part of design. Where this option is prioritised for further investigation, flood risk will be considered further and a such this is noted as a minor negative. The construction of a new surface water sewer system would be disruptive and would require careful routing, planning and construction to reduce adverse effects to the environment (such as to biodiversity, heritage, nuisance), although it is unlikely there would be direct effect on these topics during operation. It would also require a large volume of resources for construction, although it would require few resources during operation and may reduce resource use at WwTWs where the volume of flow to be treated would be reduced through by the removal of flows. In practice, surface water separation is likely to involve a mix of grey and green solutions as pipes may be required to pick up separated surface water and convey them to and from SuDS features, and SuDS features might be required to slow the rate of flow from SW sewers into receiving water or combined sewers downstream where full separation is not possible
Source control SuDS upstream thinking	This option is assessed on the basis it is a green option and that it can be implemented in all catchment types (rural and urban). Strategic blue green corridors provide multi-functional spaces offering management of surface water flows along with active travel routes (such as footpaths and cycle paths), typically within a planted setting. In terms of drainage, they slow the flow of, and retain surface water, before its infiltration to the ground, discharge into watercourses or if necessary, sewer; they reduce the total flow and peak flows within the sewer network and to WwTWs, reducing the

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
	frequency and extent of SO discharges, thus offering water quality improvements. The volume of wastewater requiring treatment also reduces. Slowing the rate of drainage promotes natural flood risk reduction and thus climate resilience. However, at the current time, blue green corridors provide less certainty of the level of flood risk reduction which can be achieved, when compared to the traditional grey infrastructure options. The multi-functional nature of blue/green corridors provides opportunities in terms of human health and well-being, amenity, and biodiversity. In urban areas they help to counter the urban heat island effect, improving resilience to climate change. Typically, they are not resource intensive to construct, operate or to maintain, providing nature-based solutions. Whilst negative impacts to groundwater and surface water are possible with SuDS features as a result of pollutants in the drainage water, it has been assumed that SuDS would be developed in line with SuDS guidance in relation to water quality. This identifies low risk (e.g., small residential developments), medium risk (e.g., commercial areas) and high-risk areas (e.g., industrial estates), where increasing levels of pollution mitigation are required, such as use of multiple SuDS to provide a series of measures to treat runoff. This may limit the ability to apply such measures within the higher risk areas. This option requires an integrated approach with other land uses and partnership working, such as with landowners, local authorities, and developers and as such requires a longer lead in time.
Inflow reduction / separation	Lining the existing sewer network has a dual purpose: to prevent groundwater ingress/infiltration to the sewer system and also to prevent pipes leaking sewage to ground. This option is assumed to use a “no dig” trenchless process to avoid excavation with the associated disruption, loss of biodiversity and resource use. It is assumed to be less resource intensive than building a new or replacement network, which has benefits for SEA topics such as heritage and carbon & material assets. By reducing infiltration of groundwater to the sewer system, this option will reduce the volume of wastewater requiring treatment and pumping, thus reducing SO and flooding events. It also reduces leaks to the wider environment, benefitting both land and water quality.

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
Storage tanks (Storage)	This option is assessed on the basis that it is a grey option that will be constructed of concrete, clay, plastic / a similar material and require the operation of pumps during operation to empty the storage after high flow events. Through provision of flow storage, it would provide some resilience to climate change, however, it will result in additional wastewater treatment costs and associated resource use. The construction of storage will be disruptive locally on a temporary short-term basis. It will require careful siting, planning and construction to reduce effects to the environment (such as biodiversity, heritage, nuisance). Where storage is located online and thus typically within previously disturbed ground, often in the highway, the potential effect on buried archaeology and biodiversity is lower, although the effect is likely to increase when locating storage elsewhere locally where these issues may have higher sensitivity, such as adjacent to SOs and thus watercourses. From a landscape perspective, storage is assumed to be located below ground or well-designed if above ground so that there are no major negative long-term landscape effects. However, this will depend on the design and reinstatement provided. This option effectively sterilises land from development, however the post-construction reinstatement may be able to provide beneficial uses, such as public access.
Increasing capacity of wastewater system (Increase capacity)	The option is based on upgrade to an existing WwTW to address population growth and the higher wastewater quality standard. This option is assumed to provide greater efficiency during operation (in terms of energy, chemical use etc.) and to be designed with increased resilience to flood risk from climate change. However, it will be resource intensive during construction. It is assumed the upgrade of the WwTW will be undertaken inside the existing footprint. It would not involve loss of greenfield land, with associated ecological, heritage and landscape impacts. Nevertheless, there may be some increases in odour, noise, and visual impact at the works, depending on the local sensitivity and scale of changes. This can be mitigated through proper mitigation measures.

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
	Provision of additional treatment capacity would reduce SO discharges allowing an increased proportion of sewage to be treated prior to discharge. Where this option is combined with an increased flow to the works (e.g., due to rationalisation of another works and/or flow transfer), it would result in increased flows to the receiving watercourse. Given the permitting requirements relating to WwTW discharges, and the intent of this option, it is assumed that this would result in improvements to water quality. However further detailed consideration would be required. Similarly, increased flows to a works may increase the subsequent fluvial flood risk in the receiving watercourse – this requires further consideration. Whilst some upgrades may be able to be accommodated within the existing footprint/disturbed ground within a works, others may involve loss of greenfield land, with associated ecological, heritage and landscape impacts. There may be some increase in odour, noise, and visual impact at the works, depending on the local sensitivity and scale of changes.
Increase network capacity by installing larger sewers	This option assumes increasing the capacity of sewers over a significant length to convey flows forward to the downstream network where there is capacity. This may include upsizing an existing sewer or installing a parallel adjacent sewer. It thus reduces sewer flood risk in the upstream parts of the network. This grey option has been assessed on the basis it will require a large amount of material within construction and that no pumping will be required, given the scale of construction works, this is assessed as negative. Through provision of increased flow capacity, it would provide some resilience to climate change. Given the replacement of existing sewers, or parallel placement of new sewers, this option would typically be constructed in previously disturbed ground and often within the highway, lowering the potential for disturbance such as to buried archaeology and biodiversity in these circumstances. However, this option is likely to involve relatively large-scale works, increasing the potential for issues. From a landscape perspective, it is assumed to be located below ground, with no long-term landscape effects.
Integrated construction wetland downstream of a wastewater treatment works (Wetlands)	This option makes use of reed bed to provide additional treat the final effluent from WwTW prior to discharge.

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
	The reed bed will help to polish the discharge from the WwTW. Hence, it would significantly improve the water quality and will provide a positive permanent benefit for aquatic biodiversity and human health. These measures may increase the uptake of open water swimming, providing further health and well-being benefits. Typically, this option is not resource intensive to construct, operate or to maintain, providing nature-based solutions. The option can lead to substantial habitat creation/restoration/improvement and is likely to benefit soils / mudflat (including their carbon storage and sequestration capacity). The application of this option across large areas provides the opportunity to support a natural landscape, supporting natural ecosystem functions and improving resilience to climate change. This option would not reduce flows through the sewer network, however may help alleviate peak flows and thus reduce flood risk to some extent. The option is unlikely to require significant groundworks, reducing the potential for archaeological impacts. It would be no particular effects in relation socio-economics in the long term (beyond the nuisance issues during construction) which assess as neutral against these SEA objectives.
Disinfection of storm water overflows (i.e., UV at Final Effluent)	This option makes use of UV Light to treat the discharge from WwTW. The UV light will help to remove *E. Coli* / faecal coliform on the overflow from WwTW. However, it cannot deal with nutrient control. Hence, it would moderately improve the water quality and will provide a positive permanent benefit for aquatic biodiversity and human health. These measures may increase the uptake of open water swimming, providing further health and well-being benefits. However, generation of UV light is energy intensive. The UV lamps will also need periodic replacement in the operational stage. This would have moderate impact on carbon and material assets. This option would not reduce flows through the sewer network, thus is not relevant to flooding control. The option will be implemented in the effluent end and no excavation is required. There is no particular effect in relation to heritage. It would be no particular effects in relation socio-economics and landscape in the long term (beyond the nuisance issues during construction) which assess as neutral against these SEA objectives. The option is neutral in terms of climate change resilience.

Specific options	Example of specific options, assumptions made for assessment and narrative supporting the assessment
Provision of coastal flood defences	This option is assessed on the basis that it is a grey option that will be constructed of concrete material, bricks, etc. The construction of flood defence will be disruptive locally on a temporary short-term basis. It will require careful siting, planning and construction to reduce effects to the environment (such as biodiversity, heritage, nuisance). Where the flood defence is located on-site and thus typically within previously disturbed ground, the potential effect on buried archaeology and biodiversity is lower, although the effect is likely to increase when locating along undisturbed coastline, however this will be location specific. From a landscape perspective, it is assumed that the flood defence will be well-designed, however it is likely that landscape (particularly in undisturbed areas) will have a negative landscape effects. However, this will depend on the location and design.
Relocation of Asset (for coastal flooding and erosion risk)	This option is to relocate the asset at higher coastal flooding and/or erosion risk to a more secure location ensuring ability to continue to service local communities. This option will benefit the waterbody, and either maintain or improve water quality as a result through the continued provision of WwTW services. A relocation would allow for greater resilience to climate change, in particular coastal flooding and erosion. The option is likely to involve relatively large-scale works, increasing the potential for biodiversity loss, archaeology and waste & material asset issues however these will be location specific. Most WwTW sites have some negative effect in terms visual, odour and noise. The decommissioned plant would see benefits locally for human health and socio-economics. However, the relocated plant will affect the residents nearby. Hence, the human health and socio-economics are assessed as neutral, whilst landscape is assessed as moderate negative.

Development and Assessment of Combined Options

Development of the 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 11** 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.

DWMP Scenario Considered

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 of the plan, the cost, mature of technology and practicality have been considered.

If invest 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 invest 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 our regulators and increased clarity on the 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 scenario. It 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.

The developed pathways (SC1-6) build on the previous scenarios and their changes are summarized in **Table 12,** including indicative values for the uptake of surface water separation within each scenario.

Table 12: Details of the 6 scenarios

Scenario	Description	Legal Target	Climate Resilience	Uptake of Surface Water Separation[1]	Flood Protection
1a	Least cost plan.	• Address SODRP • Address WwTW discharge compliance	2°C increase	10%	NIL
1b	Preferred scenario – Best Value - as Scenario 1a with investments for storm overflow delivered in AMP8, 9 and 10	• Address SODRP • Address WwTW discharge compliance	2°C increase	10%	NIL
2	Climate Resilient - builds on Scenario 1a - Least Cost.	• Address SODRP • Address WwTW discharge compliance	4°C increase	20%	Maintain flood risk to ensure no deterioration to 2050
3	Reduced Flooding - builds on Scenario 1a - Least Cost	• Address SODRP • Address WwTW discharge compliance	2°C increase	20%	Reduce to 5% level of risk
4	Enhanced Resilience - builds on Scenario 2 - Climate Resilient,	• Address SODRP • Address WwTW discharge compliance	4°C increase	30%	Reduce to 5% level of risk
5	Innovative Technology - builds on Scenario 4 - Enhanced Resilience, new technologies (e.g., monitoring of sewer networks) will be adopted to improve analysis and operation of the sewer network, and monitor the quality of the effluent discharges from the treatment works.	• Address SODRP • Address WwTW discharge compliance	4°C increase	30%	Reduce to 5% level of risk
6	Lowest Risk- the highest cost and lowest risk scenario. It builds on all the elements of the previous scenarios and is based on higher levels of population growth	• Address SODRP • Address WwTW discharge compliance	4°C increase	40%	Reduce to 5% level of risk

Note [1]: Surface water separation assumes 50% blue-green infrastructure, with remaining need met by 50% grey infrastructure.

SEA Assessment of the Adaptive Scenarios

This section assesses the six scenarios for the combined options for the DWMP as a whole (the earlier **Assessment of the DWMP Components Section** assessed the individual options available within the plan). Results are presented in **Table 13** below, with further details of the options, the assumptions made, and narrative supporting the assessment provided in **Table 14**.

KEY:

Major positive	+ + +	Moderate positive	+ +	Minor positive	+	Neutral	0
Major negative	- - -	Moderate negative	- -	Minor negative	-	No relationship	

Table 13: SEA Assessment Matrix of the DWMP Scenarios

	Protect, conserve, and enhance biodiversity & geodiversity, including soils	*Protect, conserve, and enhance Human Health and well-being, including resilient communities*	*Protect, conserve, and enhance social and economic prosperity*	*Address causes of climate change, manage and improve efficient use of resources, inc. carbon, emissions to air & waste generation*	*Protect, conserve, and enhance water resources*	*Reduce and manage flood risk, increasing flood resilience*	*Protect, conserve, and enhance the historic environment, including archaeology*	*Conserve, protect and enhance the landscape, townscape, and visual amenity*	*Adapt, and improve resilience to climate change*
	Biodiversity and Geodiversity	**Human Health**	**Socio-Economic**	**Carbon & Material Assets**	**Water**	**Flood Risk**	**Heritage**	**Landscape**	**Climate Change Resilience**
Scenario 1a (10% surface water separation) - this is the least cost plan. It meets all the legal targets for storm overflows and wastewater discharges in a future world with a 2°C increase to the climate.									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	+	+ -	+ -	- -	++	++ -	+	0	+
Scenario 1b (10% surface water separation) – this is the preferred scenario - Accelerated Delivery - as Scenario 1a with investments for storm overflow delivered by 2040									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	+	+ -	+ -	- -	+++	++ -	+	0	+

Scenario 2: Climate Resilient (20% surface water separation) - this builds on Scenario 1a, meets 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.									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	+	+	+	- -	+++	++	+	+	++
Scenario 3: Reduced Flooding (20% surface water separation) - this builds on Scenario 1a, enabling to meet 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 2025 level of 10% of properties at risk of sewer flooding to a 5% level of risk									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	+	++	+	- -	+++	+++	+	+	+
Scenario 4: Enhanced Resilience (30% surface water collection) - 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.									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	++	++	++	-	+++	+++	+	+	++
Scenario 5: Innovative Technology (30% surface water separation) - builds on Scenario 4 - Enhanced Resilience, ensuring current wastewater targets can be met 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 the sewer network and monitor the quality of the effluent discharges from treatment works.									
Overall DWMP: during construction	- -	0	+	- -	0		-	0	
Overall DWMP: during operation	++	++	++	-	+++	+++	+	+	++

Scenario 6: Lowest Risk (40% surface water separation) - this is the highest cost and lowest risk scenario. It builds on all the elements of the 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.									
Overall DWMP: during construction	- -	0	+	-	0		-	0	
Overall DWMP: during operation	++	++	++	-	+++	+++	+	++	++

Table 14: SEA Assessment Narrative of the DWMP Scenarios

SEA Topic	Description
Biodiversity	Scenarios 1 to 3 have a predominance of storage grey options with very little 'green' and 'blue-green' infrastructure components. The predominant option of below ground storage, outside of any localised reinstatement planting etc., does not provide benefits for terrestrial biodiversity and geodiversity. Relatively, Scenarios 4 - 6 have more 'green' and 'blue-green' infrastructure components which offer the potential for long term positive effects on terrestrial biodiversity and geodiversity such as through habitat creation, habitat retention and linking of habitats.
Human Health	6 scenarios will have improvement to designated bathing waters and environmentally sensitive areas by reducing SOs, providing a permanent positive effect on human health. These measures may increase the uptake of open water swimming, providing health and well-being benefits. Scenarios 1a and 1b do not account for sewer flooding. As the population grows, more properties will be affected. Scenario 2 maintains the flood risk at the 2025 level. Hence, there is no additional improvement in human health due to the reduction of internal flood risk. For scenarios 3 - 6, SWW set a higher flooding target to reduce the risk of sewer flooding to a 5% level of risk by 2050. This option delivers the SODRP and higher flooding target together by 2050. These provide immediate permanent human health benefits in relation to health (exposure to sewage) and well-being (stress, anxiety).
Socio-Economic	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 for all scenarios. Whilst this will be temporary, it is expected to continue in the long-term until 2005.

SEA Topic	Description
	The additional green and blue green infrastructure provided through Scenarios 4 - 6 provides higher opportunities to create multi-functional nature of blue/green corridors with active travel routes (such as footpaths and cycle paths), increasing low-cost transport options on a permanent basis. Further, improved landscaping can have a positive socio-economic impact. Hence the socio-economic is assessed as moderate positive.
Carbon and Material Assets	Given the scale of infrastructure to be implemented within each of the scenarios, 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. 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, thus reducing the impact of Scenario 6.
Water	There are no substantive differences between the Scenarios.
Flood Risk	Scenarios 1 - 6 deliver the SODRP targets. However, Scenarios 1a and 1b exclude measures to directly address internal flooding risk, whilst scenario 2 maintains the flood risk as that in 2025. Scenarios 3 - 6 also deliver a higher flooding target to reduce the risk of sewer flooding to a 5% level of risk by 2050. Hence, they are considered as major positive.
Heritage	For the 6 scenarios, 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.
Landscape	The additional green and blue green infrastructure provided through Scenario 2 – 6 provides opportunities for a positive benefit in terms of townscape (in urban area) or landscape (in rural area). Scenario 6 has the highest landscape potential. Hence, the landscape is assessed as moderate positive.
Climate Change Resilience	Scenarios 2, 4, 5 and 6 provide more climate resilience against 4°C increase. The additional green and blue green infrastructure provided through Scenarios 2, 4, 5 and 6 provide increased climate change resilience, such as the urban heat island effect. Their climate resilience is assessed as moderate positive.

SEA Assessment of the Preferred Plan and Cumulative Effects

The Preferred Plan

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 and, 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.

SEA Assessment of the Preferred Plan Effects and Cumulative Effects

This section assesses the overarching DWMP, it is informed by the assessment work set out in earlier sections of this report, including the wider assessments such as the HRA.

Table 15 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**.

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 15 – 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. 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).	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
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).
	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.	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.

SEA Objective	Total plan effects	Cumulative effects
	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)	
	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.	
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).

SEA Objective	Total plan effects	Cumulative effects
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.	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.
	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.	
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.	

SEA Objective	Total plan effects	Cumulative effects
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.
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.

Prevent, Reduce, Mitigate, Enhance Effects

The SEA Regulations require the environmental report to include '*The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effect on the environment of implementing the plan or programme' (SEA Regulations, Schedule 2 (7).*

Measures Adopted within the Development of the Plan

This section outlines the key changes made to the plan to prevent, reduce, mitigate, and compensate for adverse effects on the environment, and to maximise 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.

Measures Adopted within the Development of the Plan

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 16** below.

Table 16: 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.

Options	Measures to prevent, reduce, mitigate, compensate
	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[3]) 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. 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.

[3] 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
	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

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 Assessments and Controls During Implementation

SWW is currently developing a project environmental planning process for all stages of projects, which is to provide a comprehensive and systematic way to manage the environment impact arising from different stages of the project from outline design, through to construction.

This will include detailed site-specific environmental screening when implementing the preferred plan at the project level, including identification of local constraints and opportunities, any permitting/consents and consultations with stakeholders required. The findings from the environmental screening will inform their in-house conservation team, which will help to oversee the environmental issues, ensure implementation of measures to protect / conserve the environment.

As part of this process, consideration shall be given to the need to undertake the following project level assessments:

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

Habitat Regulations Assessment

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.

Recommendations for Subsequent DWMP Reviews

The following measures are recommended for further consideration during subsequent DWMP cycles:

- Review and analysis of the outcomes of the surface water separation and removal schemes, compared to the predicted costs, benefits and hydraulic performance, thus increasing certainty in future cycles as experience grows.

- SWW and wider partners should continue joint working with momentum, which is essential to implement the surface water separation and removal schemes which can achieve wider social and environmental benefits beyond those directly associated with overflows, flood risk and WwTW compliance.

- 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 (through adaptive planning - the percentage of SWS / SuDS can be increase over time as confidence grows. This helps to reduce the storage volume and subsequent water treatment as well as providing wider benefits).

- Information developed through the plan making stage and implementation 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.

- Within subsequent DWMP cycles, consideration should be given to the potential to include consideration of catchment level nutrient management considering the impact of drainage changes on habitats and land uses, including:
    - the social and economic implications, such as to farming practices
    - habitat impacts (both positive and negative), particularly for the most important habitats within Special Protection Areas, SACs, Ramsar sites and SSSIs
    - landscape impact (refer to the locally prepared Landscape Character Assessments for local landscape features, quality, forces for change and strategy)

- 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.

Monitoring the Significant Effects of the Plan

The SEA Regulations require the environmental report to include *"A description of the measures envisaged concerning monitoring in accordance with regulation 17". SEA Regulations, Schedule 2 (9).*

A final stage of the SEA process is Stage E - Monitoring the significant effects of the implementation of the plan with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action. In line with regulation 17 of the SEA Regulations, monitoring is only required for significant environmental effects and may comprise or include monitoring undertaken for other purposes.

Proposed Monitoring

At this stage, it is only necessary (and appropriate) to set out the measures envisaged concerning monitoring. **Table 17** below provides a summary of the proposed monitoring parameters for the implementation of the preferred plan across the plan area and the plan period. This is based on the current understanding of the DWMP context within the region at present, with consideration of future baseline trends. The monitoring will also inform the adaptive planning. These proposals will be kept under review and developed further as the DWMP progresses and in consultation with the statutory consultees, and other applicable stakeholders. This may include expansion of the proposals to agree the appropriate scale and duration of any monitoring activities proportional to the plan and the environmental risks; and further development to link the monitoring to SWW's targets and Environmental Performance Assessment (EPA) rating.

On an option specific scale, further monitoring requirements may arise, such as any requirements set out within any planning permissions.

Given the current scale of monitoring around the key topic areas, it is proposed that full use is made of existing monitoring arrangements, many of which are regulatory requirements. These are undertaken both by SWW and other organisations such as the Environment Agency (e.g., water quality) and Natural England (e.g., SSSI condition status).

Table 17: Proposed Monitoring Parameters

Proposed Monitoring Parameters	Source of Information (organisation undertaking monitoring or holding the data)
• **Water Quality Monitoring Data**	• SWW – DWMP includes provision for the installation of continuous water quality monitoring to assess any impact from storm overflows and wastewater treatment works discharge outlets by 2035 • EA – water quality monitoring of waterbodies
• **Flood Event Duration Monitoring**	• SWW – event duration monitors on all SOs where feasible by the end of 2023
• **Biodiversity**	• SWW – DWMP includes provision for the installation of continuous water quality monitoring to assess any impact from storm overflows and wastewater treatment works

Proposed Monitoring Parameters	Source of Information (organisation undertaking monitoring or holding the data)
	discharge outlets by 2035, which must include the ability to assess ecological harm • SWW - Biodiversity Net Gain for schemes requiring planning permission
• **Carbon emissions (Including the quantity of greenhouse gas emission per megalitre of water supplied, Energy use used in the operation of options, Renewable energy generated or purchased)**	• SWW reporting to Ofwat in line with Ofwat requirements

Assessment of monitoring results and any remedial action required should be undertaken by SWW through the DWMP implementation and collated for use within the SEA for adaptive planning process in subsequent DWMP cycles.

Appendices

Appendix A - Consultee Comments

Date: 28 November 2022
Our ref: 410648
Your ref: South West Water Drainage and Wastewater Management Plan – Consultation on Strategic Environmental Assessment (SEA) Scoping Report

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Dear Keir Ramsay

Thank you for your consultation on the above dated 25 October 2022.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

Thank you for the opportunity to comment on the scope for the South West Water (SWW) Drainage and Wastewater Management Plan (DWMP) Strategic Environmental Assessment (SEA). We recognise that strategic drainage and wastewater management planning plays an essential role in bringing partners together to inform the water resource capital investment programmes and interventions which not only deliver water quality improvement to the natural environment, but which can also help deliver on the government's 25 Year Environment Plan (25YEP).

At the heart of DWMP should be planning to optimise environmental outcomes. Please find below our comments on the scoping report, we hope they are helpful in progressing the SEA for the DWMP.

SEA Objectives: We advise that where the SEA objective for Biodiversity and Geodiversity seeks to 'Protect, conserve and enhance biodiversity and geodiversity, including soils', it also seeks to 'restore'.

For the proposed objectives for 'Biodiversity, Flora and Fauna' & 'Water Resources' an objective which recognises the need to ensure legislative & policy targets for biodiversity protection & enhancement are achieved should be included. This will strengthen the objective to 'protect, conserve and enhance biodiversity and geodiversity, including soils' and 'protect, conserve and enhance water resources' by having an outcome orientated objective which can be measured against.

Using specific targets or indicators within the objective setting allows collecting data, making predictions, and monitoring the impact of the plan more effective. Objectives should follow the SMART principle – Specific, Measurable, Achievable, Realistic, and Time bound, and should relate to the state of the environment that is intended to be reached through the plan. Additionally, input indicators could be used in the objective setting, these inputs should clearly lay out which actions will be taken and should be linked to clear outcomes.

In *'Appendix A: Review of Relevant environmental Protection Objectives – Regional and Local',* reference could be made to Site Improvement Plans (SIPs) for relevant impacted protected sites – for example, Natural England - Site Improvement Plan: River Camel (SIP187). These plans should feed into the SEA Objectives: Guiding Questions for the assessment of Biodiversity and Geodiversity.

Please note that Natural England reserves the right to provide further comments on the environmental assessment of the plan beyond this SEA screening stage, should the responsible authority seek our views on the scoping or environmental report stages.

For any queries relating to the specific advice in this letter only please contact Naomi-Beth Dixon at naomi.dixon@naturalengland.org.uk.

Yours sincerely

Naomi-Beth Dixon

Freshwater Lead Adviser
Devon, Cornwall and Isles of Scilly

Appendix B - Review of Relevant Plans, Programmes and Environmental Protection Objectives

Policy or Plan	Summary of objectives
International	
Biodiversity and geodiversity	
Bern Convention - Conservation of European Wildlife and Natural Habitats (1979)	Aims to conserve wild flora and fauna and natural habitats. Importance is placed on the need to protect endangered natural habitats and endangered vulnerable species.
Bonn Convention - Conservation of Migratory Species of Wild Animals (1983)	Aims to conserve terrestrial, aquatic, and avian migratory species through their range noting that species do not recognise borders.
Ramsar Convention - Wetlands of International Importance (1971)	Aims to conserve and wisely utilise wetlands through local and national actions to international cooperation. The Convention uses a broad definition for wetland: "lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fishponds, rice paddies, reservoirs, and salt pans".
United Nations (1992) Convention on Biological Diversity (1992)	The main objectives are conservation of biological diversity; sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.
Climate Change	
UN Framework Convention on Climate Change (1992)	The stated objective is to: "achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".
UN Framework Convention on Climate Change/ Cancun Agreement (2011) Kyoto Protocol (1997)	The Cancun Agreements were a set of significant decisions by the international community to address the long-term challenge of climate change collectively and comprehensively over time, and to take concrete action immediately to speed up the global response to it. Kyoto commits its parties to limit climate change by setting internationally binding targets for emission reductions. It was adopted in 1997 and ratified in 2005.
World Summit on Sustainable Development (2002)	Commits nations to take a collective responsibility to build a human, equitable, and caring global society. The Declaration also reinforces the three pillars of sustainable development: environmental, economic, and social development at various levels.
The UNFCCC (United Nations Framework Convention on Climate Change) Glasgow/ COP26 Agreement (2021) Paris Agreement/ COP 21 (2015)	Mitigating and adapting to climate change is a critical policy consideration at an international level with multiple agreements in place to address the climate emergency. The UNFCCC is the forum for international action on climate change with the aim of stabilising GhG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The UNFCCC focuses on mitigating (reducing) GhG emissions, adapting to climate change, reporting of national emissions, and financing of climate action in developing countries. Agreed at COP 21, the Paris Agreement commits signatories to reducing global greenhouse gas emissions with the long-term goal of withholding a temperature increase by no more than 2°C. The recent COP26 gathering in Glasgow led to the Glasgow Climate Pact, reaffirming the Paris Agreement goal of limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5 °C. The pact recognises that GHG emissions need to fall by 45% by 2030 if the world is to stay on track to reach net zero by 2050 and requests countries revisit their 2030 targets by the end of 2022. In addition, the Cancun Adaptation Framework recognises that adaptation is required to be given the same priority as mitigation including reducing vulnerability and increasing resilience. Any major transport infrastructure development set out in the emerging RTS should contribute to meeting the requirements and targets set out in international climate change policies and agreements.
Heritage	
Charter for the Protection and Management of Archaeological Heritage (1990)	The Charter states that policies for the protection of archaeological heritage should constitute an integral component of policies relating to land use, development, and planning as well as of cultural, environmental, and educational policies. The charter should be supplemented at regional and national levels by guidelines for need.

Policy or Plan	Summary of objectives
The World Heritage Convention (1972)	The Convention defines what type of natural or cultural sites can be considered for the World Heritage List. It sets out the duties of countries in identifying potential sites and preserving them for the benefit of the world.
Overarching	
Aarhus Convention (1998)	The Aarhus Convention was created to give empowerment to citizens and civil society organisations in relation to environmental matters and is founded on the principles of participative democracy. It provides for access to environmental information; public participation in environmental decision making; and access to justice.
UN Agenda 2030	The Sustainable Development Goals (SDGs) are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs were set up in 2015 by the UN General Assembly and are intended to be achieved by the year 2030. They are included in a UN Resolution called Agenda 2030. The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals which ended in 2015.
European	
Biodiversity and geodiversity	
Council Regulation No. 1100/2007: Establishing measures for the recovery of the stock of European eel (2007)	This EU Regulation was transposed into UK law under The Eels (England and Wales) Regulations 2009. Eleven Eel Management Plans have been prepared, one for each River Basin identified in England and Wales.
The Habitats Directive; also known as the Directive for the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC) (1992)	The Habitats Directive promotes the maintenance of biodiversity. While the Directive contributes to sustainable development; it focusses to ensure the conservation of around 450 species of fauna and 500 species of flora. The Habitats Directive also establishes the EU wide Natura 2000 ecological network of protected areas, providing a high level of safeguards against potentially negative developments. Together with the Birds Directive, the Habitats Directive forms the backbone of European nature protection legislation.
Birds Directive (2009/147/EC) (2009) (79/409/EEC - as amended) (1979)	This Directive adds to the Habitats Directive and provides a framework for the conservation and management of, and human interactions with, wild birds in Europe.
EU Biodiversity Strategy for 2030 (2020)	The strategy aims to put Europe's biodiversity on a path to recovery by 2030 and contains specific actions and commitments. It is the proposal for the EU's contribution to the upcoming international negotiations on the global post-2020 biodiversity framework. A core part of the European Green Deal, it will also support a green recovery following the Covid-19 pandemic.
Soil Thematic Strategy (2006)	The Strategy aims to protect soil and promote sustainable use. It aims to prevent further soil degradation and restore degraded soils to a level of functionality consistent at least with current and intended use.
Defra - Safeguarding our Soils - A strategy for England (2009)	The primary aim is that by 2030, all England's soils will be managed sustainably, and degradation threats tackled successfully.
Climate Change	
Promotion of the use of energy and renewable sources Directive (2009/28/EC) (2009)	Directive 2009/28/EC on the promotion of the use of energy from renewable sources set binding targets for the share of renewable energy sources in the final energy consumption for each EU country.
Air Quality	
Ambient Air Quality Directive (2008/50/EC) (2008)	Sets limits for key pollutants in the air we breathe outdoors. These legally binding limit values are for concentrations of major air pollutants that impact public health.
Heritage	

Policy or Plan	Summary of objectives
The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985)	The Valletta Convention is an international legally binding treaty within Europe. It places the revised Convention in the framework of activities concerning the cultural heritage since the European Cultural Convention came into force.
Revised European Convention on the Protection of Archaeological Heritage (Valletta Convention/ Malta Treaty) (1992)	It deals with the protection, preservation, and scientific research of archaeological heritage. In particular, the revised Convention focuses on the problem of conservation of archaeological heritage in the face of development projects.
Landscape	
The European Landscape Convention (Florence Convention) (2004)	Aims to promote the protection, management and planning of all European landscapes and organises co-operation on landscape issues and raises awareness of living landscapes. The UK Government signed the European Landscape Convention becoming binding from March 2007.
Water Resources	
The Nitrates Directive (91/676/EEC) (1991)	Aims to protect water quality by preventing nitrates from agricultural sources polluting ground and surface waters. Also, to promote the use of good farming practices. This Directive forms integral part of the WFD and is one of the key instruments to protect waters from agricultural pressures.
Directive on Bathing Water (2006/7/EC)	The overall objective of the Directive remains the protection of public health whilst bathing. The revised Directive also offers an opportunity to improve management practices at bathing waters; to standardise the information provided to bathers; aims to set more stringent water quality standards; and also puts a stronger emphasis on beach management.
Groundwater Directive (2006/118/EC) (2006)	Establishes a regime which sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater, including assessments on chemical status and the reversal of significant pollutant concentrations. The directive accompanies the WFD which requires pollution trend studies to be carried out and for trends to be reversed so that environmental objectives are achieved by 2015. It also requires reviews of technical provisions to be carried out from 2013 and every six years after.
The Water Framework Directive (WFD) (2000/60/EC) (2000)	The WFD introduces a planning process to manage, protect and improve the water environment. It applies to all rivers (including drains and ditches), lakes, estuaries, coastal waters, and groundwater. All surface waters (including rivers, lakes, estuaries and stretches of coastal water) and groundwaters have been divided up into discrete units called water bodies. Water bodies are the basic unit that are used to assess the quality of the water environment and to establish targets for environmental improvement.
The Floods Directive (2007/60/EC) (2007)	This Directive provides an approach to managing flood risk on a catchment-wide scale. It is used in conjunction with the WFD.
Urban Wastewater Treatment Directive (91/271/EEC) (1991)	The objective of this Directive is to protect the environment from the adverse effects of urban wastewater discharges and discharges from certain industrial sectors, and concerns the collection, treatment, and discharge of wastewater.
Revised Drinking Water Directive (2020/2184) (2020) Drinking Water Directive (98/83/EC) (1998)	In 2020, the European Parliament formally adopted the revised Drinking Water Directive. The Directive will enter in force on 12 January 2021, and Member States will have two years to transpose it into national legislation. The Drinking Water Directive (Council Directive 98/83/EC) concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.
Marine Strategy Framework Directive (2008/56/EEC) (2008)	The aim is to protect the marine environment across Europe. It aims to achieve good Environmental Status of EU marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend.

Policy or Plan	Summary of objectives
Directive on the Assessment and Management of Flood Risks (2007/60/EC) (2007)	This Directive now requires an assessment of all watercourses and coastlines at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Directive applies to inland waters as well as all coastal waters.
National	
Overarching	
Environmental Liability Directive (2004/35/EC) (2004)	This Directive focusses on enforcement of claims against occupational activities which damage the environment. Its objective is to create "a more uniform regime for the prevention and remediation of environmental damage".
Directive on the Assessment of the certain effects of plans and programmes on the environment (SEA) (2001/42/EC) (2001)	The SEA Directive sets out the requirements for assessment of certain plans and programmes on the environment. An SEA is mandatory for plans/programmes which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, telecommunications, tourism, town and country planning or land use and which set the framework for future developmental consent of certain projects found in the EIA Directive.
Biodiversity and geodiversity	
Salmon and Freshwater Fisheries Act 1975	The Act sets out the legal framework in which salmon and freshwater fisheries are regulated. Aims include attempting to protect salmon and trout from commercial poaching, protecting migration routes, prevent wilful vandalism and neglect of fisheries, ensure correct licensing, and water authority approval.
JNCC and Defra - UK Post-2010 Biodiversity Framework (2012)	The development of the Framework reflects a revised direction for nature conservation, towards an approach which aims to consider the management of the environment, and to acknowledge and consider the value of nature in decision-making. The Framework sets out the common purpose and shared priorities of the UK and the four countries, and, as such, is a hugely important document, which is to be owned, governed, and implemented by the four countries.
Making Space for Nature - A review of England's Wildlife Sites (2010)	The report makes key points for establishing a strong and connected natural environment: 1) that we better protect and manage our designated wildlife sites; 2) that we establish new Ecological Restoration Zones; and 3) that we better protect our non-designated wildlife sites. That Society's need to maintain water-quality, manage inland flooding, deal with coastal erosion, and enhance carbon storage, if thought about creatively, could help deliver a more effective ecological network.
Biodiversity 2020: A strategy for England's wildlife and ecosystem services (2011)	The Strategy sets out how the UK is implementing its commitments. The aim is to halt the decline of wildlife and ecosystems for the benefit of this and future generations.
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations (2019)	The 2019 amendment provides changes to the Habitats and Species Regulations which would no longer work when the UK leaves the EU.
The Conservation of Habitats and Species Regulations (2017) and (2010) (as amended)	The Conservation of Habitats and Species Regulations 2010 apply in the terrestrial environment and in territorial waters out to 12 nautical miles. The objective of the Habitats Directive is to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora. It lays down rules for the protection, management and exploitation of such habitats and species. The EU Habitats and Wild Birds Directives are transposed in UK offshore waters by separate regulations.
The Invasive Alien Species (Enforcement and Permitting) Order (2019)	Aims include to prevent and manage invasive alien fauna and flora in England and Wales only.
The Great Britain Invasive Non-Native Species Strategy, Defra (2015)	The aim of the Strategy is to address INNS issues in Great Britain by minimising the risk they pose and reducing their negative impacts.
Conservation 21: Natural England's Conservation Strategy for the 21st Century (2016)	The strategy's three guiding principles are to: create resilient landscapes and seas; put people at the heart of the environment; and grow natural capital.
Climate Change	
Energy Act (2013)	The Act focuses on setting decarbonisation targets for the UK and reforming the electricity market. It aims to maintain a stable electricity supply as coal-fired power stations are retired. This includes facilitating the building of a new set of nuclear power stations and the establishment of a new regulator, the Office for Nuclear Regulation.

Policy or Plan	Summary of objectives
Defra - UK Climate Change Risk Assessment 2017 (2017)	Highlights the key climate change risks/ opportunities for the UK. These are: flooding and coastal change; risks to health, well-being, and productivity from high temperatures; shortages in the public water supply for agriculture, energy generation and industry; risks to natural capital, soils and biodiversity; risks to domestic and international food production and trade; and pests, diseases, and invasive non-native species affecting people and the environment.
UK Climate Projections (UKCP) (2018)	The UKCP18 Projections provide a basis for studies of impacts and vulnerability and decisions on adaptation to climate change in the UK over the 21st century. The Projections will allow planners and decision-makers to make adaptations to climate change.
Climate Change Act (2008) 2050 Target Amended Order (2019)	Sets a legal framework to commit towards tackling climate change and adaptation. The Act sets a target of net zero by 2050 based upon 1990 levels.
Heritage	
The Ancient Monuments and Archaeological Areas Act (1979)	An Act to consolidate and amend the law relating to ancient monuments; to make provision for the investigation, preservation and recording of matters of archaeological or historical interest and (in connection therewith) for the regulation of operations or activities affecting such matters.
Planning (Listed Buildings and Conservation Areas) Act (1990)	An Act of Parliament that altered the laws on granting of planning permission for building works, notably including those of the listed building system in England and Wales
Historic England - Strategic Environmental Assessment, Sustainability Appraisal, and the Historic Environment (2016)	Guidance for addressing the historic environment in Strategic Environmental Assessment or Sustainability Appraisal. It identifies the recommended list of plans, programmes and policies for review, approach to baseline review, potential sustainability issues.
Historic England - The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3, 2nd Edition (2017)	This sets out guidance, against the background of NPPF and the related guidance given in the PPG, on managing change within the settings of heritage assets, including archaeological remains and historic buildings, sites, areas, and landscapes.
Resource Use	
Our Waste, Our Resources: A Strategy for England (2018)	Sets out how to preserve the stock of material resources by moving towards a circular economy. Aims to minimise damage to the natural environment and is aligned to the Government's 25 Year Environment Plan. Includes a blueprint for eliminating avoidable plastic waste, doubling resource productivity, and eliminating avoidable waste of all types by 2050.
Water Resources	
Water UK - DWMP Framework (2021)	Drainage and Wastewater Management Plans are the new way for organisations to work together to improve drainage and environmental water quality. The framework was commissioned by Water UK in collaboration with Defra, Welsh Government, Ofwat, Environment Agency, Natural Resources Wales, Consumer Council for Water, ADEPT, and Blueprint for Water.
Marine and Coastal Access Act (2009)	The Act sets out to protect marine functions, activities, and wildlife. It sets out the provisions for Marine Conservation Zones, planning decisions, and more.
National Flood and Coastal Erosion Risk Management Strategy for England (2020)	The strategy sets out a vision of a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100. It sets out the long-term goal for resilience to future flood and coastal erosion, and therefore protects people, the environment, and the economy.
Flood and Coastal Erosion Risk Management Policy Statement (2020)	The National Flood and Coastal Erosion Strategy informs this policy statement. Five key areas for action include: upgrading and expanding our national flood defences and infrastructure; managing the flow of water more effectively; harnessing the power of nature to reduce flood and coastal erosion risk and achieve multiple benefits; better preparing our communities; and enabling more resilient places through a catchment-based approach.
Flood risk assessments: climate change allowances (2016, updated 2021)	The guidance is for developers and their agents preparing flood risk assessments for planning applications, amongst others. Making allowances for climate change in Flood Risk Assessment will help minimise vulnerability and provide resilience to flooding and coastal change.

Policy or Plan	Summary of objectives
Water Resources Act (WRA) (2009) Amended from WRA (1991)	The Act sets out the functions the Environment Agency and introduced water quality classifications and objectives for the first time. An Act of the Parliament that regulates water resources, water quality and pollution, and flood defence.
Water Industry Act (1991)	This Act sets out the main powers and duties of the water and sewerage companies and defined the powers of the Water Services Regulation Authority (Ofwat). Note this was amended by Section 36 of the Flood and Water Management Act 2010.
Water Act (2003) (as amended) Water Act (1991) (amended from)	The 2003 Act amends the Water Resources Act and Regulations 1991 and the Water Industry Act 1991. The Act has the following four broad aims: the sustainable use of water resources; strengthening the voice of consumers; and a measured increase in competition; and the promotion of water conservation.
Preparing for a drier future: England's water infrastructure needs (2018)	This document sets out the National Infrastructure Commission's advice on how to address England's water supply challenges and deliver the appropriate level of resilience for the long term.
Draft National Policy Statement for Water Resources Infrastructure (2018)	The draft National Policy Statement for Water Resources Infrastructure sets out the need and government's policies for the development of nationally significant infrastructure projects relevant to water resources in England.
Protect groundwater and prevent groundwater pollution (2017)	This guidance helps with permit or licence applications You must not cause groundwater pollution.
The Water Environment (Water Framework Directive) Regulations (2003) WFD implementation in England and Wales: new and updated standards to protect the water environment (2014)	The Water Environment Regulations transpose the WFD into UK law. They aim to protect and enhance the quality of surface fresh water (including lakes, streams, and rivers); groundwaters; groundwater dependant ecosystems; estuaries; and coastal waters (out to one mile). The UK Technical Advisory Group (UKTAG) is responsible for developing environmental standards and conditions for achieving WFD requirements for rivers and lakes.
The Environment Agency's approach to groundwater protection (2018)	This guidance is for planners, applicants for environmental permits and abstraction licences, and landowners concerned with the quality and quantity of groundwater.
CIRIA – SuDS Manual (2015)	The SuDS manual incorporates the latest technical advice and adaptable processes to assist in the planning, design, construction, management and maintenance of good SuDS. In delivering SuDS there is a requirement to meet the framework set out by the Government's 'non statutory technical standards' and the revised SuDS Manual complements these but goes further to support.
Water UK - Net Zero 2030 Roadmap (2020)	In 2020, water companies unveiled a plan to deliver a net zero water supply for customers by 2030 in the world's first sector-wide commitment of its kind. The Net Zero 2030 Route map has been developed using over a decade's worth of detailed data and provides water companies with a framework on which to develop and cost their own net zero action plans.
The Groundwater Regulations (2009)	The Groundwater Regulations transpose the European Union Groundwater Directive (2006/118/EC) into UK law. The Regulations set out how to protect groundwater from pollution by detrimental substances.
Flood and Water Management Act (2010)	Relates to the management of flooding and coastal erosion. The Act aims to reduce the flood risk associated with extreme weather, compounded by climate change. It created the role of Lead Local Flood Authority, which is the local government authority responsible for managing flood risk in the local government area. The Flood and Water Management Act was preceded by The Pitt Review of 2007.
The Water Resources Management Plan Regulations (2007)	Sets out the statutory duty for water companies to prepare and issue a Water Resources Management Plan. The duty to prepare and maintain a WRMP is set out in sections 37A to 37D of the Water Industry Act 1991. They must be prepared at least every five years and reviewed annually.
Water UK - Water Resources long term Planning Framework 2015-2065 (2016)	The primary aim of the project is to develop a high-level strategy and framework for the long-term planning of water resources for Public Water Supply in England and Wales.
Water Supply (Water Quality) Regulations (2016) (as amended)	This statutory instrument concerns water quality supplies for human consumption.
National Policy Statement for Wastewater (2012)	A framework document for planning decisions on nationally significant wastewater infrastructure.

Policy or Plan	Summary of objectives
Environment Agency - Water Resources Planning Guideline (2021)	Water companies in England or Wales must prepare and maintain a water resources management plan (WRMP). This sets out how you intend to achieve a secure supply of water for your customers and a protected and enhanced environment. The duty to prepare and maintain a WRMP is set out in sections 37A to 37D of the Water Industry Act 1991.
Urban Waste Water Treatment (England and Wales) Regulations (1994)	The Regulations transpose the EU Urban Waste Water Treatment Directive (91/271/EEC). The aim is to set out to the regulation of sewage disposal.
The Nitrate Pollution Prevention Regulations (2015)	The Regulations transpose EU Nitrates Directive (91/676/EEC) into UK law. The aim is to reduce nitrate related pollution in the water environment.
UK Marine Policy Statement (2011)	Provides the framework for preparing marine plans and the marine planning system. Marine plans put into practice the objectives for the marine environment alongside the National Planning Policy Framework (NPPF).
Defra - Catchment Based Approach: Improving the quality of our water environment (2013)	A policy framework to encourage the wider adoption of an integrated Catchment Based Approach to improve the quality of our water environment. This is important when trying to address the significant pressures placed on the water environment by diffuse pollution from both agricultural and urban sources, and widespread, historical alterations to the natural form of channels.
National Chalk Stream Strategy, (CaBA Chalk Stream Strategy) (2021)	Chalk streams are a rare and valuable habitat, often referred to as the equivalent of England's rain forests or Great Barrier Reef. 85% of all chalk streams are found in England, mainly in the south and east of the country, as well as dozens of smaller chalk springs, rills and flushes. They stretch from Yorkshire through East Anglia, the Chilterns, Kent, Hampshire, and Dorset, and are important for biodiversity. This new chalk stream strategy is for everyone who has responsibility for, or uses, chalk streams. It sets out actions and recommendations for government, regulators and the water industry on water resources, water quality and habitat restoration and management.
Environment Agency - Drought response: our framework for England (2017)	This framework tells you how drought affects England and how the Environment Agency works with government, water companies and others to manage the effects on people, business, and the environment. It aims to ensure consistency in the way we co-ordinate drought management across England.
Government's Storm Overflow Discharge Reduction Plan (2022)	This aims to eliminate all harm from storm overflows in the long-term. It proposes the introduction of overflow targets which focus on high priority sites in the short-term and notes that 'Water companies must clearly set out how they will meet their storm overflow targets in their Drainage and Wastewater Management Plans'.
Overarching	
Environment Act (2021)	The Legislation will improve air and water quality, tackle waste, increase recycling, halt the decline of species, and improve our natural environment through a series of legally binding targets and guiding policy.
National Planning Policy Framework (NPPF) (2021)	The updated NPPF sets out government's planning policies for England and how these are expected to be applied. A key aim is to achieve sustainable development.

Policy or Plan	Summary of objectives
A Green Future: Our 25 Year Plan to Improve the Environment (2018)	25 Year Environment Plan was published by the Government in January 2018. It sets out sets out government action to help the natural world regain and retain good health. It aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species and provide richer wildlife habitats. It calls for an approach to agriculture, forestry, land use and fishing that puts the environment first. The Plan looks forward to delivering a Green Brexit. Measures to implement the plan include consulting on setting up a new independent body to hold government to account; a new set of environmental principles to underpin policymaking; and strengthening leadership and delivery through better local planning. Policies include • 'Embedding an 'environmental net gain' principle for development, including housing and infrastructure'; • 'Supporting larger scale woodland creation'; • 'Expanding the use of natural flood management solutions'; • 'Publishing a strategy for nature'; • 'Developing a Nature Recovery Network'; • 'Increasing water supply and incentivising greater water efficiency and less personal use'; • 'Promoting health and wellbeing through the natural environment'; • 'Creating more green infrastructure'; • 'Planting more trees in and around our towns and cities'; • 'Reducing the impact of wastewater'; • 'Publishing Clean Air Strategy'; and • 'Tackling climate change'.
The Environmental Damage (Prevention and Remediation) (England) Regulations (2015)	Provides additional protection to habitats and species identified on Annexes one and two of the EC Habitats Directive (92/43/EEC), SSSIs and, in some cases, classified waterbodies from environmental damage where an operator has intended to cause damage or been negligent to the potential for damage.
The Wildlife and Countryside Act (1981) (as amended)	The Wildlife and Countryside Act is a major driver in the protection of animals, plans and habitats in the UK. It implements the Bern Convention and the Birds Directive and contains details of designated sites/species.
Environment Protection Act (1990)	The fundamental structure and authority for waste management and control of emissions into the environment.
Countryside and Rights of Way Act (2000)	Aims to give greater freedom for people to explore open countryside. It also includes a power to extend the right to coastal land.
The Natural Environment and Communities Act (2006)	NERC is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. It is about conserving and enhancing places and nature and helping people to enjoy them.
Environmental Assessment of Plans and Programmes Regulations (2004)	This regulation transposes the SEA Directive into UK law which requires an assessment of the effects of certain plans and programmes on the environment.
National Infrastructure Strategy (2020)	The National Infrastructure Strategy sets out plans to transform UK infrastructure to level up the country, strengthen the Union and achieve net zero emissions by 2050.
Ancient Woodland and Veteran Trees: Protecting them from development (2014)	Standing advice is a 'material planning consideration'. This means you should take it into account when making decisions on planning applications. Ancient woodland is defined as an irreplaceable habitat which is important for wildlife, soils, recreational value and cultural, historical and landscape value. The advice relates to both conserving and enhancing biodiversity and reducing the level of impact of the proposed development on areas of ancient woodland and ancient/ veteran trees.
Climate change approaches in water resources planning – overview of new methods (2013)	The aim of the project was to examine how climate change has been built into water resource management plans (WRMPs) to date, and to recommend best and appropriate practice for the future, with particular reference to the use of the detailed tools and probabilistic climate data in UKCP09.
Regional and Local	
Biodiversity	
Local Nature Recovery Strategies	The Environment Act 2021 introduced Local Nature Recovery Strategies for areas in England. Public authorities will have duties in relation to these.

Policy or Plan	Summary of objectives
Biodiversity Action Plans	Local biodiversity action plan objectives include those associated with maintaining and safeguarding the current extent of protected designations and recognised habitats and achieving favourable status for these areas. Each National Park has a Biodiversity Action Plan, and some local authorities have their own or a combined one with neighbouring authorities.
Common Standards Monitoring Guidelines (CSMGs)	Common Standards Monitoring was developed to provide an agreed approach to the assessment of condition on statutory sites designated through UK legislation and international agreements. CSMGs can be found via the Designated Sites View System Site Search.
Landscape	
Natural England, AONB Management Plans (2016 – 2022)	These plans include an assessment of the special quality of the AONB, such as a landscape character assessment that includes its condition and vulnerability to change and a monitoring plan to show how you'll measure the AONB's condition and effectiveness of management. Please note the Yorkshire Wolds AONB is likely to be designated during the DWMP Process.
Natural England National Character Area (NCA) Profiles (2012 - 2015)	The profiles summarize the characteristics which are unique to that local area and gives it a distinctive sense of place.
Water Resources	
Environment Agency River Basin Management Plans (2022)	River basin management plans (RBMPs) set the legally binding locally specific environmental objectives that underpin water regulation (such as permitting) and planning activities. They provide a stable planning base for economic development.
Environment Agency - Catchment Flood Management Plans (CFMPs)	CFMPs set out the risk for each catchment in relation to flooding from rivers, tidal, surface water, groundwater, and reservoirs, but not directly from sea/coastal flooding which is under the remit of a Shoreline Management Plan. The role of the CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term.
Environment Agency - Abstraction licensing strategies (CAMS process) (2014, as updated)	These Licensing Strategies set out how water resources are managed. It provides information about where water is available for further abstraction and an indication of how reliable a new abstraction licence may be.
Local and District Flood Risk Management Strategies	These set out useful local information and identifies objectives to manage local/ district flood risk to local communities. They consider all sources of flood risk such as surface water, groundwater, and ordinary watercourses.
West Country Water Resources Emerging Regional Plan (2022) Resource Position Statement Update (2021)	SWW, Wessex Water and Bristol Water are West Country Water Resource Group's core members. The group is one of five regional water resources groups working under the National Framework for Water Resources (the 'National Framework'). The draft Regional Plan was produced for consultation in early 2022, accompanied by the associated assessment reports.
Local LLFA Sustainable Drainage Standards	These set out guidance/ best practice on sustainable drainage matters and are commonly used by developers with the aim to meet/ exceed the requirements for submission of planning applications such as flood risk assessments, drainage strategies, and SuDS design, amongst others.
Shoreline Management Plans	Shoreline management plans are developed by Coastal Groups with members mainly from local councils and the Environment Agency. They identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short-term (0 to 20 years); medium term (20 to 50 years); and long term (50 to 100 years).
Local and Regional River Restoration Plans	These set out a plan for restoring rivers, predominantly in a 'natural' context through rewilding, improving natural flood management, wetlands, de-channelising, and more. Some may focus on water quality and others may focus more on flood risk depending on their needs and public interests. Across the region there are many plans predominantly authored by Local authorities, local river trusts, National Parks, and wildlife organisations.
Local and Regional Diffuse Water Pollution Strategies	These set out a plan for investigating/ reducing sources of diffuse pollution into waterbodies. Many in urban areas are heavily modified water bodies that have suspected/known urban pollution sources negatively impacting water quality, including waterbodies under WFD. In more rural areas, especially National Parks, there are catchment sensitive farming strategies/ schemes such as those in the Yorkshire Dales Catchment Partnership.
Heritage	

Policy or Plan	Summary of objectives
Heritage Coast Management Plans	Heritage coasts are 'defined' rather than designated, so there isn't a statutory designation process like that associated with national parks and areas of outstanding natural beauty (AONB). They were established to conserve the best stretches of undeveloped coast in England. A heritage coast is defined by agreement between the relevant maritime local authorities and Natural England.
World Heritage Site Management Plans	According to the "Operational Guidelines for the Implementation of the World Heritage Convention" every site inscribed on the World Heritage List must have a management plan explaining how the outstanding universal value of the site can be preserved. Management plans are the central planning instrument for the protection, use, conservation, and the successful development of World Heritage sites.
Overarching	
Local Development Plans and Green Infrastructure Plans /Strategies.	Local Development Plans are the main framework for planning in local authorities and set out the long-term spatial concept. They include policies for sustainable development including environmental, social, and economic. In some instances, LDP are supported by green infrastructure plans/strategies which set out the details on the provision and access to quality multifunctional green spaces. The following local authorities are located within the Study Area and therefore their Local Plans are relevant: Cornwall, West Devon, East Devon, Plymouth, Torridge, Exeter, South Hams, North Devon, West Somerset, Torbay, Mid Devon, South Somerset, Taunton Dean, Teignbridge, West Dorset, Isles of Scilly.
Defra, Public Rights of Way Improvement Plans (ROWIPs)	ROWIPs outline how local authorities aim to enhance public rights of way to ensure improved accessibility, connectivity, and quality of the network.
National Park Management Plans	Every National Park has a National Park Management Plan. It's the most important document for the National Park, setting out how the National Park and partners will work together to achieve shared objectives for the future management of the National Park. The Plans aim to achieve the long-standing vision for the respective parks.

Appendix C- Environmental Baseline and Future Trends

Biodiversity and Geodiversity

Biodiversity

Biodiversity is the variety of plants (flora) and animal life (fauna) within an area/ habitat. The importance of maintaining and improving biodiversity is recognised from a local scale up to the international scale, and the UK is one of the world's most nature-depleted countries[4].

Data for this SEA topic at this strategic level mostly relates to internationally and nationally designated sites which have the highest level of protection within the UK and are home to some of the highest value biodiversity; more local datasets will be identified in later stages of the plan implementation. It is recognised that biodiversity value extends beyond designated sites, not only to other designated and undesignated sites, but also to the connectivity between habitats. This is considered through the Habitat Network. Please note, all sites listed in this baseline are intersecting sites, i.e., the boundary of the site overlaps the boundary of the Level 1 area. The HRA Screening Assessment will consider European sites beyond the boundary based on their sensitivities and the likely effects of the plan.

Ramsar Sites are wetlands of international importance designated under the Ramsar Convention. One Ramsar Sites intersect the Level 1 Region and is shown in Figure 1.

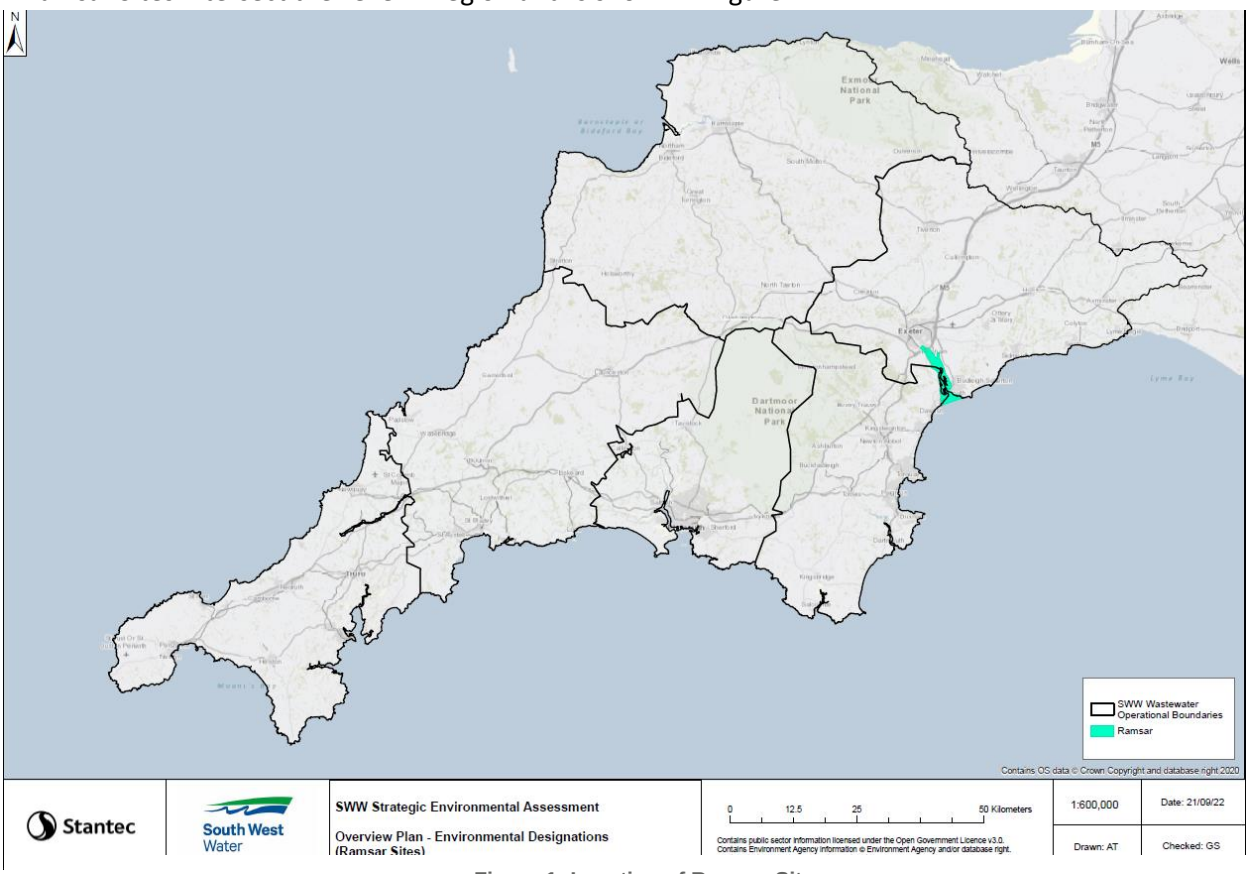


Figure 1: Location of Ramsar Site

[4] BBC News (2021) Biodiversity: UK is one of the world's most nature-depleted countries, available from: https://www.bbc.co.uk/newsround/58863097, accessed April 2022

Special Areas of Conservation (SAC) are protected areas under the Conservation of Habitats and Species Regulations 2017 (as amended) which require establishment of a network of important high- quality conservation sites that will make a significant contribution to conserving the habitats and species. There are 35 SACs are located within the Level 1 Region and are shown in Figure 2. SACs can include marine

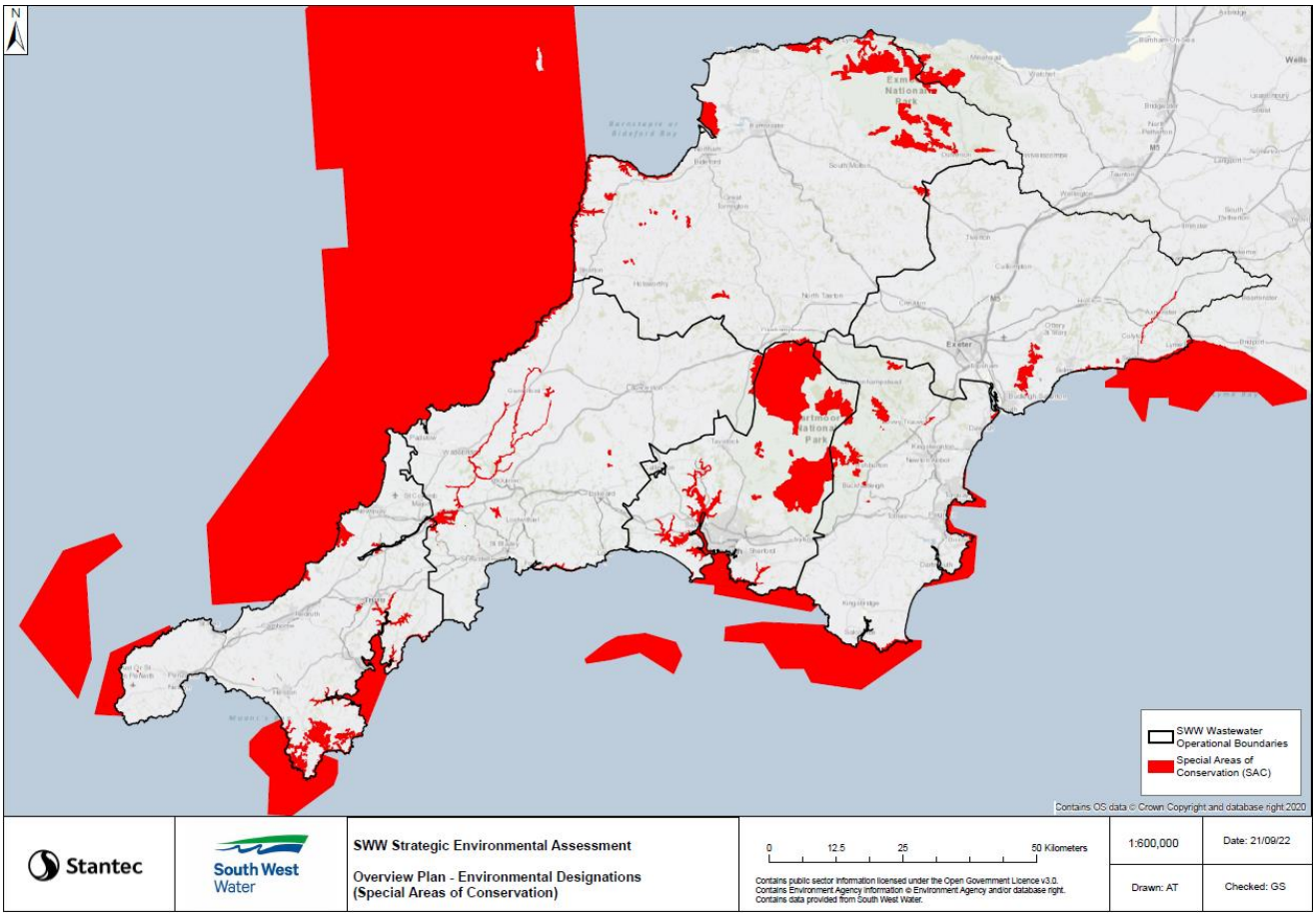


Figure 2: Location of Special Areas of Conservation

components to protect habitat and/ or species associated with the marine environment.

Special Protection Areas are protected areas for birds under the Conservation (Natural Habitats) Regulations 2010 (as amended). Five Special Protection Areas are located within the Level 1 Region and are shown in Figure 3. These can include marine components to protect bird species that are dependent on the marine environment for all or part of their lifecycle.

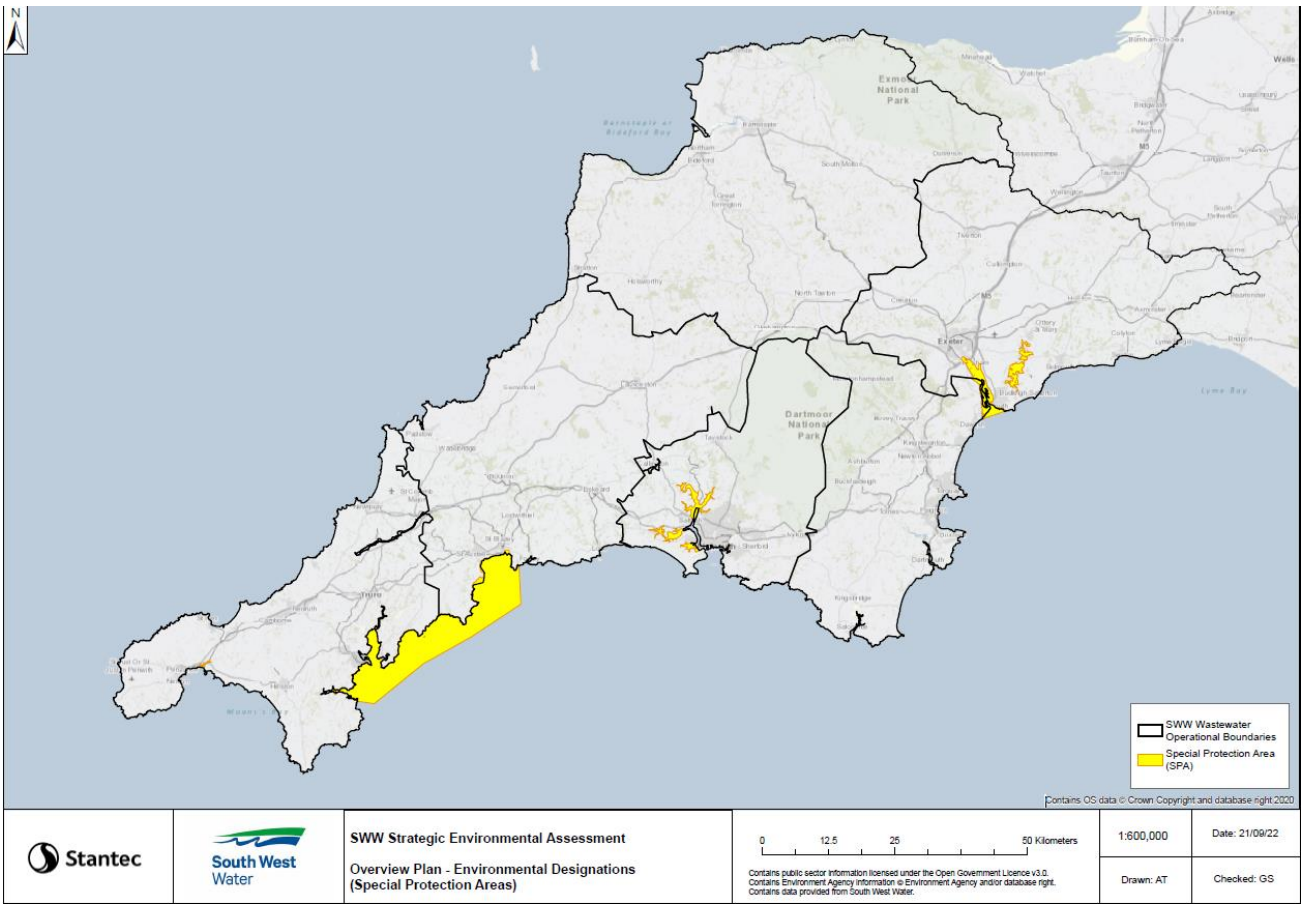


Figure 3: Location of Special Protection Areas

A Site of Special Scientific Interest (SSSI) describes an area that is of particular interest to science due to the rare species of fauna or flora it contains or important geological or physiological features that may lie within its boundaries. Within the Level 1 Region there are 357 SSSIs, shown in Figure 4.

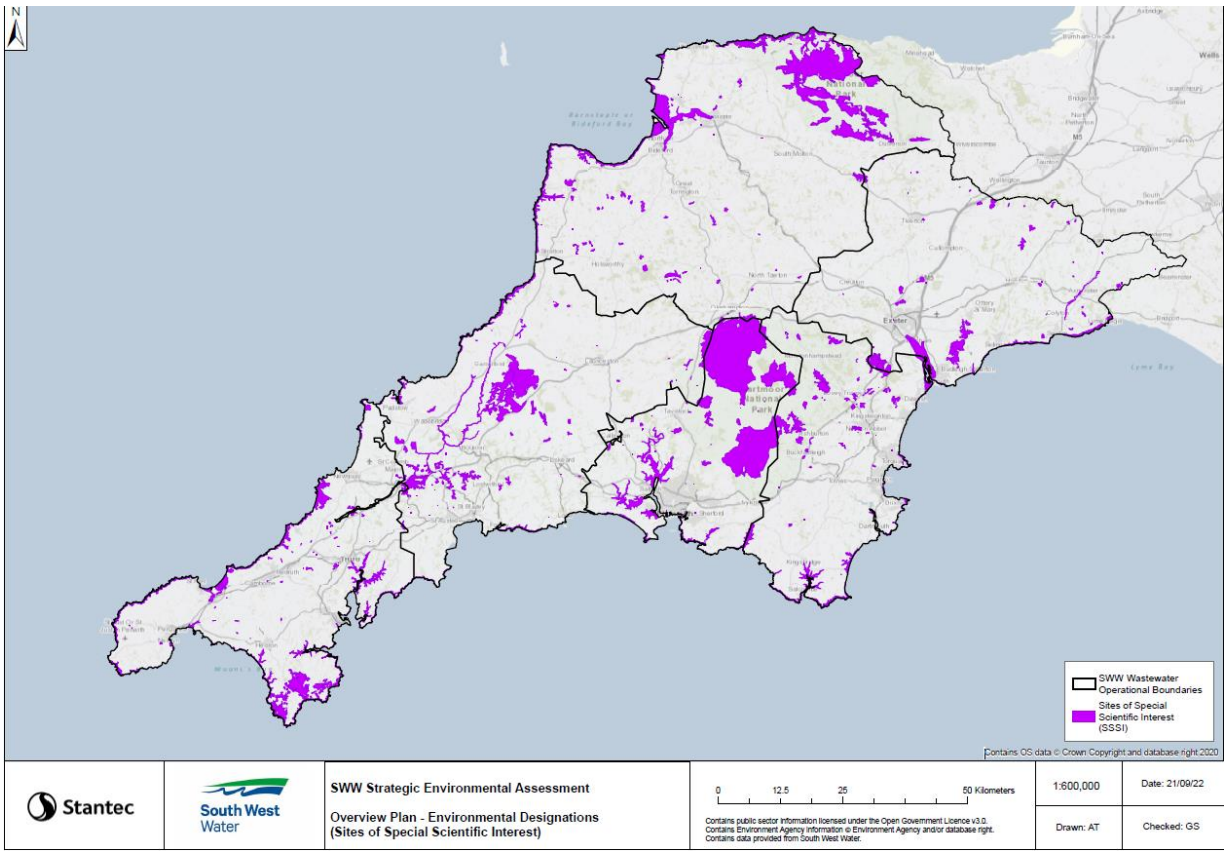


Figure 4: Location of SSSIs

National Nature Reserves (NNRs) were established to protect some of the most important habitats, species, and geology, and to provide 'outdoor laboratories' for research. There are 15 NNRs intersecting the Level 1 Region, as shown in Figure 5.

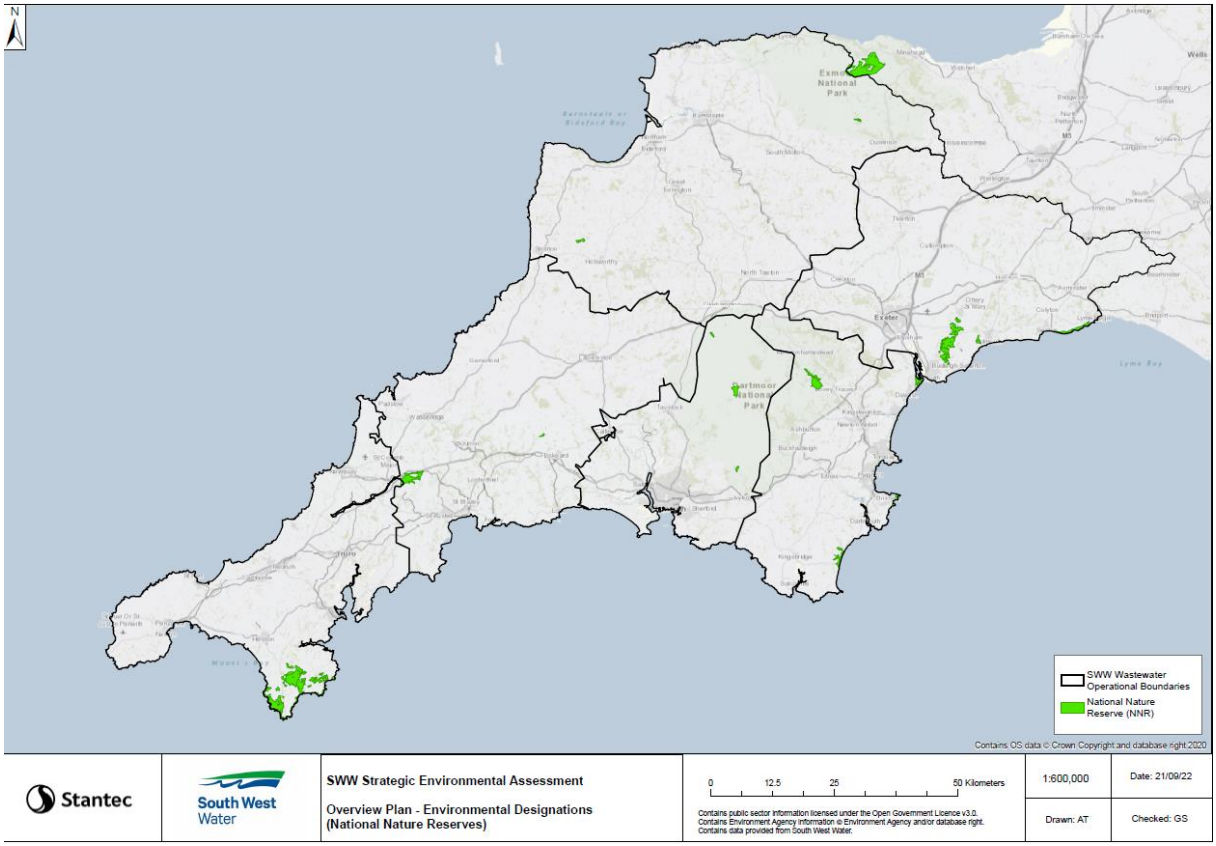


Figure 5: Location of National Nature Reserves

Marine Conservation Zones (MCZs) are areas designated by Ministerial Orders to protect a range of nationally important, rare, or threatened marine habitats and species. There are 48 Marine Conservation Zones (MCZs) associated with the South West Water area, including 12 offshore MCZs off the coasts of Cornwall and Devon (Figure 6) and ten MCZs along the shores of the Isles of Scilly[5]. The waters in the South West host a rich mix of marine habitats, such as kelp beds and seagrass, hosting diverse species from large migratory fish to jellyfish, basking sharks, and large mammals such as seals and dolphins. The coastal habitats around the South West, particularly around Cornwall[6] and Devon[7], are threatened by overfishing, damaging fishing practices, climate change and pollution. The SWW region also includes Shellfish Waters Protected Areas, which are areas designated to protect the growth and production of shellfish. The key concern for these areas is the protection of water quality through the reduction of pollution in order to produce high quality shellfish. One biosphere reserve, the North Devon Biosphere Reserve, is present in the region.

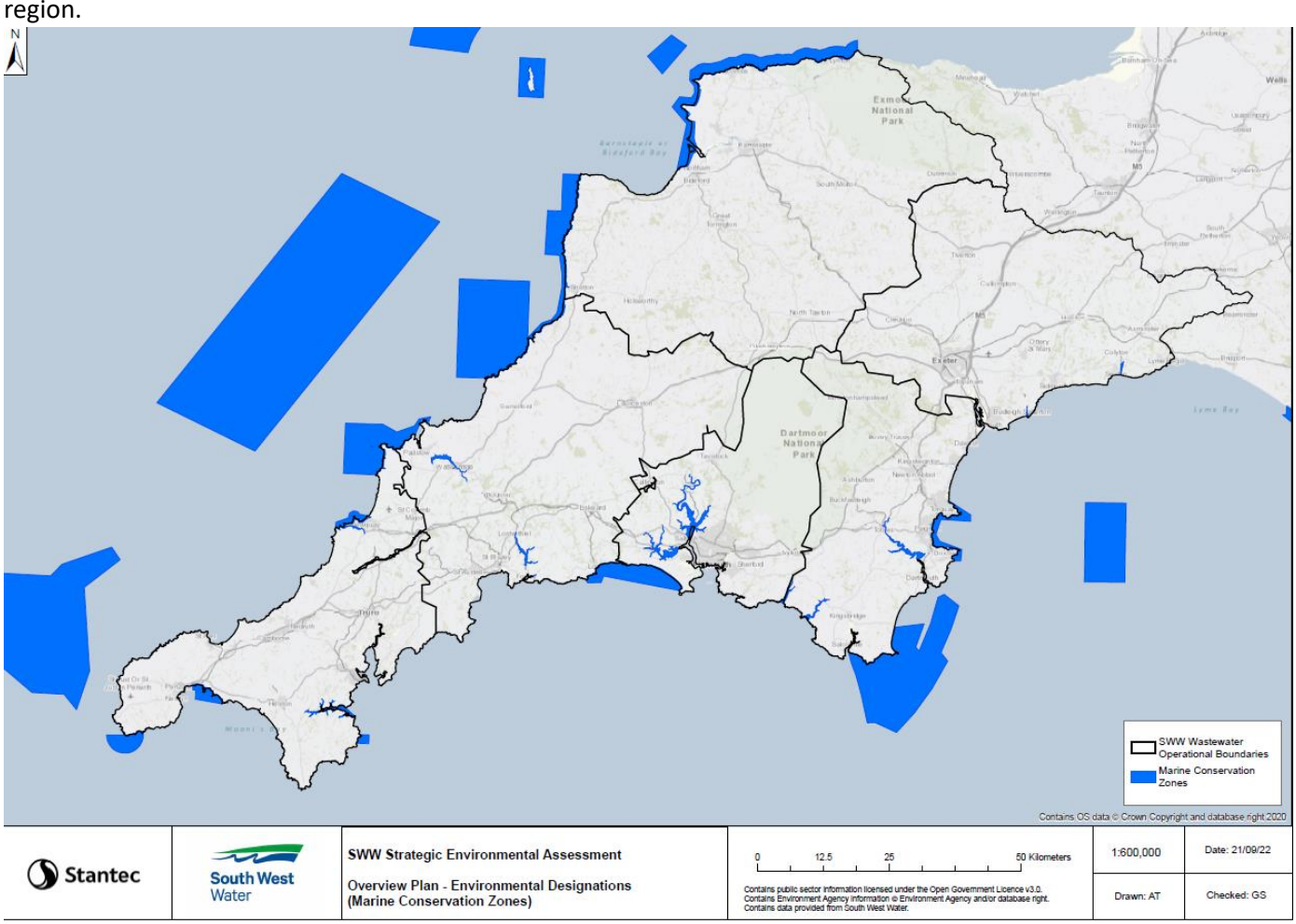


Figure 6: Location of Marine Conservation Zones

[5] JNCC (2020) *Marine Protected Area Mapper.* Available at: https://jncc.gov.uk/our-work/marine-protected-area-mapper/

[6] Cornwall Wildlife Trust (2020) State of Nature: Cornwall 2020. Available at: https://www.cornwallwildlifetrust.org.uk/what-we-do/about-us/state-nature-cornwall-2020-report

[7] Devon Local Nature Partnership (2018) State of Environment Report. Available at: https://www.devonlnp.org.uk/devons-environment/state-of-environment-report/

Due to the strategic nature of SEA, local sites are not directly referred to in this report, including Sites of Importance for Nature Conservation; Local/County Wildlife Sites; and Local Nature Reserves (LNRs).

The 2021 Environment Act has introduced a statutory requirement to produce locally led Nature Recovery Strategies every five years, with the overall goal of creating a Nature Recovery Network (NRN) of 500,000 hectares of additional habitat in England. Cornwall Council has been assigned as one of five test pilots to test the preparation of a Local Nature Recover Strategy[8], to determine areas with the greatest potential for nature to recover.

Geodiversity

Soil is a limited resource under pressure from climate change, population growth, urban development, waste, pollution, and the demand for more (and cheaper) food. Soil also stores more carbon than the atmosphere, is an important habitat, and can help reduce flood risk and prevent drought through holding water.

Provisional Agricultural Land Classification groups land within the region into five grades. Grade one is the best quality and grade five is poorest. Several criteria are used for assessment and include climate, site (gradient, micro-relief, flood risk) and soil. The agricultural land classification of the SWW region is predominately of Grade 3 and Grade 4, with smaller areas of urban and non-agricultural land.

The South West's bedrock geology can broad be split into two types: sedimentary bedrock and basement rocks. The sedimentary bedrock is predominantly found in the east of the region, and consist of groups deposited in shallow seas, deserts and river systems, from 25-300 million years ago, when Britain was located closer to the equator. The basement rocks were deposited in deep to shallow seas 315-400 million years ago.

In wetter, higher parts of the region where drainage is poor, peat blankets up to a few metres thick can been found. These areas of peatland are significant on the moors of Bodmin, Dartmoor and Exmoor. These peat bogs help prevent flooding, along with storing, then releasing clean water into reservoirs and rivers; further they are significant carbon stores, playing a key role in nature-based climate mitigation. Human activity has resulted in extensive damage (drainage, erosion, cutting), resulting in detrimental effects to moorland ecology, water retention and carbon storage. SWW is currently leading peatland recovery projects within the South West through the South West Peatland Partnership, aiming to restore more than 1,600 ha of peatland.

The Dorset & East Devon coast are part of the Jurassic Coast UNESCO World Heritage Site. This has been designated for having outstanding universal value and global importance due to its geology, geomorphology and fossil interest.

Soils across the SWW region can be described as follows:

[8] Natural England (2020) Priority Habitat Inventory. Available at: https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england

- The northern extent of the area is dominated by freely draining, slightly acidic loamy soils, and permeable seasonally wet acidic loamy and clayey soils. The freely draining acidic loamy soils are low fertility as are the loamy and clayey soils. The drainage here is impeded, with potential for fairly wet ground conditions in winter.
- The south-western edge of the area is mainly made up of freely draining acidic loamy soils over rock.
- The southern edge of the region is made up of freely draining acidic loamy soils and freely draining acidic loamy soils over rock.
- Further east, there are multiple areas of loamy and clayey soils with impeded drainage. Centrally, there are areas of acid loamy upland soils with a wet peaty surface, and also areas of blanket bog peat soils. Both of these areas are of very low fertility, with surface wetness across the area.

LIKELY FUTURE WITHOUT THE PLAN
Biodiversity- UK legislation is likely to continue to protect habitats and species. Declines in the provisions of some ecosystem services and species populations are likely due to increasing fragmentation of England's habitats, direct habitat loss, and climate change. Climate change and biodiversity can be viewed as twin crises. The pressures on biodiversity can arise through population growth, economic growth, demographic change, climate change, societal preferences, new technologies and changes in policy and regulatory environments. The State of Nature 2019 report highlights the continued decline of biodiversity from intensification of land management and the impacts of overfishing in marine ecosystems. The Environment Act 2021 should continue to protect biodiversity via the legally binding target of biodiversity net gain within the planning system. This includes the implementation of the locally-led Nature Recovery Network throughout England, with the goal of supporting nature regeneration. Geodiversity- More brownfield land is likely to be remediated and redeveloped as the population increases. Development pressures may cause a loss of agricultural land. Degradation of soils through intensifying agricultural practices, poor soil management and climate change, may result in the loss of further productive land. Peatlands are increasingly being seen as key resources and are likely to see continued protection and restoration, with associated benefits for carbon storage, biodiversity and the hydrogeological processes.

Human Health

South West Water provide water and sewage service to 1.7 million people in Devon, Cornwall and small parts of Dorset and Somerset. The region has seen a 20% growth in population in the past 30 years, with population growth expected to continue with increased numbers of people wanting to live and work in the region post-pandemic. This is in line with national population growth estimates.

Life expectancy at birth is higher in the south west (80.2 for men, 83.9 for women) than the UK as a whole (79.5 for men, 83.2 for women)[9]. People in the region also have a higher 'disability-free life expectancy' (DFLE) than the country as a whole, meaning they have fewer expected years with a disability.
The south west is a popular national location for bathing, both in the ocean and in fresh water. Water quality in the region is therefore central to protecting public health in designated bathing areas. Storm overflow and other discharges must have significantly reduced pathogens via various methods, to meet Environment Agency spill standards by 2035.

Health profiles are published by Public Health England and record multiple indicators which collectively provide a summary for human health on a local authority scale. Data such as mortality rates, rates of cardiovascular diseases, suicide rates, and more can all be reviewed.

There are numerous Public Rights of Way (PRoW) and cycle network routes across the region and access is an important part of policy for many designated sites. Any temporary or permanent closures or diversions to PRoW will need to be considered by the respective Local Planning Authority.

LIKELY FUTURE WITHOUT THE PLAN
An expected growth in population will bring opportunities and challenges to the region. 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. Water availability for consumption may be reduced due to the effects of climate change in the form of more extremes of weather, including droughts. Long-standing legislation and policy such as the National Planning Policy Framework (NPPF) promote housing needs being met through increased provision of housing, with an emphasis on sustainably locating development in proximity to services and facilities, regeneration of previously developed land, increased development densities, sustainable transport, green infrastructure, etc.

Socio-Economic

Table 1 shows the proportion of the population of the south west aged between 18-64, and the level of employment (NOMIS & Office for National Statistics data). It should be recognised that this data includes areas in the south west region outside of South West Water's sewerage services zone, and is therefore presented for indicative purposes only.

[9] Office for National Statistics (2021) Life Expectancy for Local Areas of the UK. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/bulletins/lifeexpectancyforlocalareasoftheuk/between2001to2003and2018to2020

	South West (population)	South West (%)	UK (population)	UK (%)
Population aged 16 – 64 (2020)				
All	3,394,600	60	41,845,000	62.4
Males	1,692,100	60.8	20,896,600	63
Females	1,702,500	59.2	20,948,500	61.7
Economic Activity – all people (seasonally adjusted Oct 2021 – Dec 2021)				
Economically Active	2,855,000	81.2	33,860,000	78.8
In Employment	2,773,000	78.8	32,485,000	75.5
Unemployed	82,000	2.9	1,374,000	4.1
Economically Inactive	625,000	18.8	8,764,000	21.2

Table 1: Population age & economic activity in the south west region.

The south west region has a lower percentage of people in the 18-64 age range than the national average, but has a greater proportion of people economically active. There has also been a notable shift towards home working in the South West, with 45.1% of individuals in the region moving towards home working during the pandemic[10].

The Index of Multiple Deprivation (IMD) indicates the level of deprivation in an area or region. Whilst Figure 7 indicates the region does not host the most deprived areas of the country, there are extended areas of deprivation, despite the higher proportion of economically active residents.

[10] Office for National Statistics. Coronavirus and homeworking in the UK: April 2020. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/coronavirusandhomeworkingintheuk/april2020

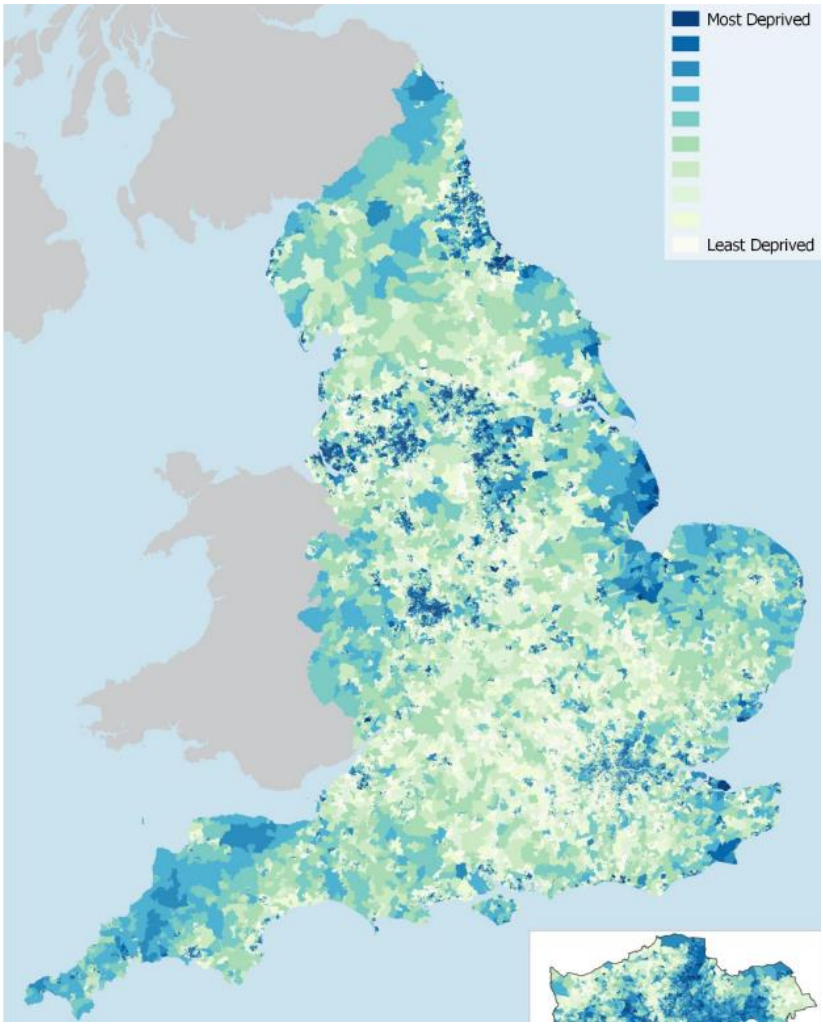


Figure 7: Infographic showing indexes of multiple deprivation in England

Tourism is a key driver of economic activity in the region. In 2019 there were 2.6 million visits from international visitors to the region[11]. Approximately one third of these visits took place in the winter and autumn, with the majority taking place in spring/summer. There were 18.9 million overnight visits from domestic tourists in 2019, greater than any other region in England. The majority of tourists in the summer months are concentrated heavily in the coastal areas of Cornwall and Devon, as well as lakes and reservoirs that offer recreational and sporting activities.

Surfing and watersports are culturally and economically important to the region. North Devon has been designated a 'World Surfing Reserve' by the Save the Waves Coalition. Water pollution and sewage are therefore very important issues to the culture and economy of the region.

Exeter and Newquay airports are the international airports in the region. For Exeter airport, it had an estimated average of 1 million passengers per year passing through it, before a significant drop off in 2020 due to pandemic travel restrictions. The airport had around 382k passenger in 2022. For Newquay airport, it had around 245k passengers in 2022.

[11] Visit Britain (2019) Great British Tourist Report. Available at: https://www.visitbritain.org/sites/default/files/vb-corporate/gb_tourist_annual_report_2019_final.pdf

LIKELY FUTURE WITHOUT THE PLAN
An expected growth in population will bring opportunities and challenges to the region. The age profile across the whole UK is ageing and this also puts additional pressures on public finance and services. Long-standing legislation and policy such as the National Planning Policy Framework (NPPF) promote economic development needs being met through increased provision of economic development, with an emphasis on sustainably locating development in proximity to services and facilities, regeneration of previously developed land, increased development densities, sustainable transport, green infrastructure, etc. Tourism is likely to remain a strong economic activity within the area.

Water Resources

Of the areas covered by SWW's sewerage services, Cornwall and Devon are not considered to be seriously water stressed, with the Isle of Scilly being the only area assessed to be seriously water stressed[12]. Devon and Cornwall still experience pressure on their water resources, however. Climate change, coupled with an anticipated increase in population and economic growth, are expected to place additional stress upon the water availability in the region. This makes appropriate management of water resources essential.

The SWW region is contained within the South West River Basin District (RBD). The south west RBD covers an area of over 21,000km^2, and is made up of 12 management catchments.

SWW's region has 860 miles of coastline and 150 designated coastal bathing waters. Investments in 2021 meant that 100% of the regions bathing waters meet the designated standard, with 98% achieving good or excellent quality.

The River Basin Management Plan (RBMP) for the South West RBD highlight the significant management issues that prevent the sustainable management of water within the river basin. Pollution from rural areas affects the highest proportion of waterbodies, followed by pollution from wastewater and physical modifications. This can be seen in Table 2, though it should be noted that SWW's area only comprises a section of the South West RBD, therefore figures presented should be taken as indicative only.

[12] Environment Agency (2021) Water Stressed Areas – Final Classification. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/998237/Water_stressed_areas___final_classification_2021.odt

Water Management Issue	Percentage of water bodies affected
Physical modifications	22%
Pollution form wastewater	33%
Pollution from towns, cities & transport	4%
Changes to the natural flow and level of water	3%
Negative effects of invasive non-native species	1%
Pollution from rural areas	44%
Pollution from abandoned mines	5%

Table 2: Water management issues affecting South West River Basin District

SWW operate 653 sewage treatment works and maintain over 19,000km of sewers. Around 21% of the yearly average of 8500 blockages in these sewers are cause by the flushing of unsuitable materials such as baby wipes and sanitary products.

SWW Pollution Incidents

In South West Water, incidents that cause the most serious harm (category 1) are infrequent and have only occurred once in the past 4 years. Category 2 incidents that are less serious but may result in the closing of bathing waters, or cause some harm to the environment, occur a few times per year. More common are category 3 incidents that cause little to no harm but are often visible to the public. The gradual reduction in pollution incidents can be seen in Figure 88.

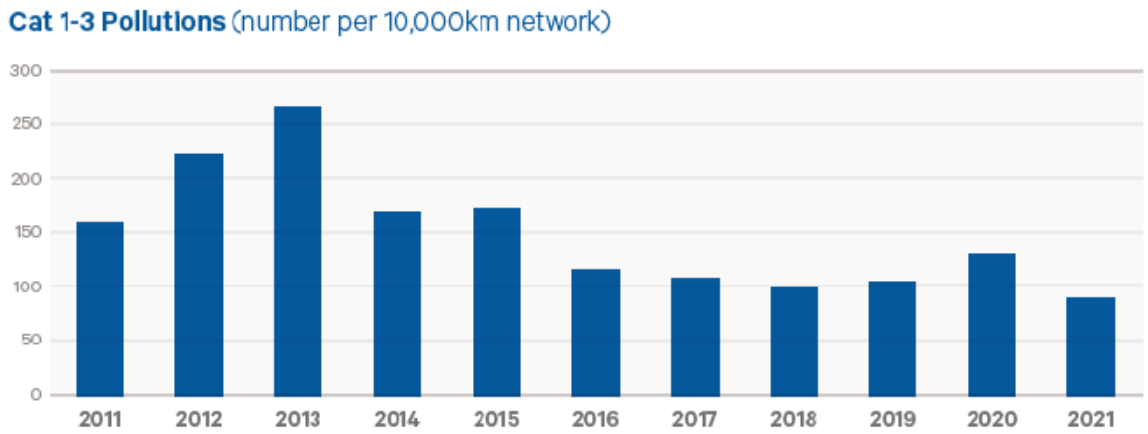


Figure 8: SWW pollution incidents over time

LIKELY FUTURE WITHOUT THE PLAN

The collective effects of climate change, urbanisation and population growth, will result in increased rain intensity, greater storm water run-off and wastewater. By 2050, modelling shows that without further investment:

- An additional 17,600 properties will face an increased risk of sewer flooding during a 1 in 50 year storm event
- As a result of growth and development an additional 112 wastewater treatment works could be at risk of exceeding their design capacity, potentially causing partially treated flows to enter our rivers and waterways.
- Increased storm water overflows that will spill into the environment.

Performance measures are set out in the table below:

Core Metrics	2024/25	2050 Modelled	Commentary
Internal sewer flooding Unit number per year Number per 10,000 connections	 109 1.37		This is an operational metric concerned with current performance. It is used in the risk-based screening process to identify catchments of future concern and as an early flood indicator if more frequent storms begin to reverse the downward trend.
Sewer Flooding risk 1 in 50-year storm event % Population at risk	 9.4	 5.0	This is a key metric used for modelling future impacts. DWMPs expect to maintain 2050 risk of flooding around the stated 5% figure, despite upward pressures.
Cat 1-3 pollution incidents Number Number per 10,000 km sewer	 33 19	 n/a	This is a key operational metric, concerned with current performance. This is used in the risk-based screening process to identify catchments of future concern and as an early indicator, if storm water overflows and flooding mitigation measures are not delivered.
Storm overflows Average spills	 20	 <=10	This is a regulatory target, and we have modelled the impacts and interventions to meet the target.
WwTWs numeric compliance Permit compliance %	 100	 100	This is a key metric for modelling future impacts. 100% compliance is a statutory metric.
Sewer Collapses Unit number per year Number per 1,000 km sewer	 249 13.99	 n/a	This is an operational metric, concerned with performance today. This is used in the risk-based screening process to identify catchments of future concern.

Flood Risk

The Flood and Water Management Act 2010 is a UK act of parliament related to the management of risk related to flooding and coastal erosion, and highlights the need for DWMPs to help identify problems, engage stakeholders collaboratively and clarify responsibilities of agencies related to flood risk.

Flood risk across the Level 1 Region differs and can occur from a wide range of sources including fluvial, coastal, groundwater, reservoir, sewer, and surface water. Notable areas for flood risk from rivers, sea and surface water include areas near to the Rivers Exe and Axe (see Figure 13).

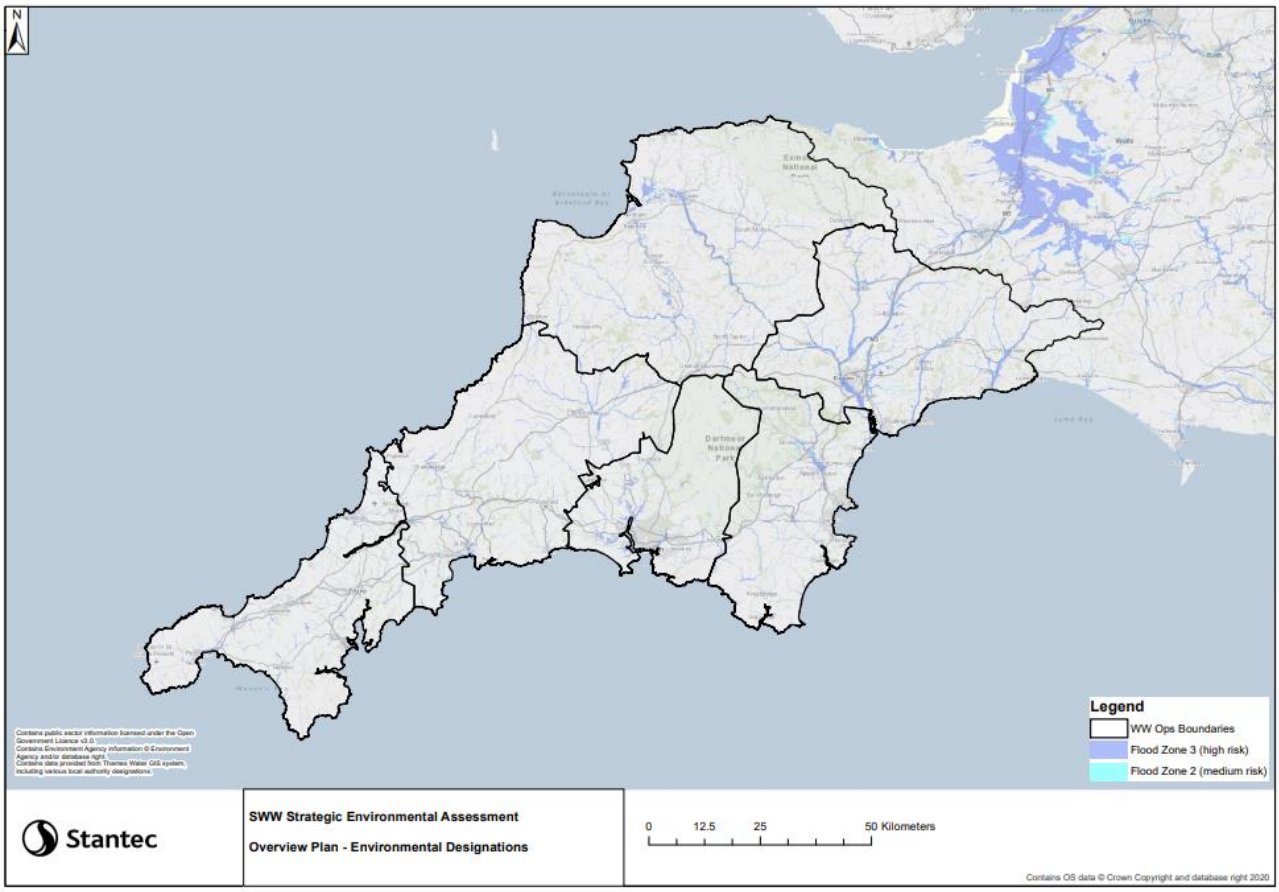


Figure 8 Location of flood risk

Climate change is expected to result in more extreme weather events; increased sea levels; and changes to rainfall and temperature which could all impact on the future flood risk which makes assessing flood risk against historical data more difficult. It should be noted that raised sea levels not only increase the risk of flooding on the coast and in estuaries but also accelerate coastal erosion through larger more powerful waves. Devon and Cornwall are areas have higher coastal erosion risk (i.e., higher coastal flooding risk) and are more susceptible to sea level rise due to climate change (see Figure 14). Hence, resilience works against fluvial flood, and coastal flood / erosion risk are required to protect the asset and property.

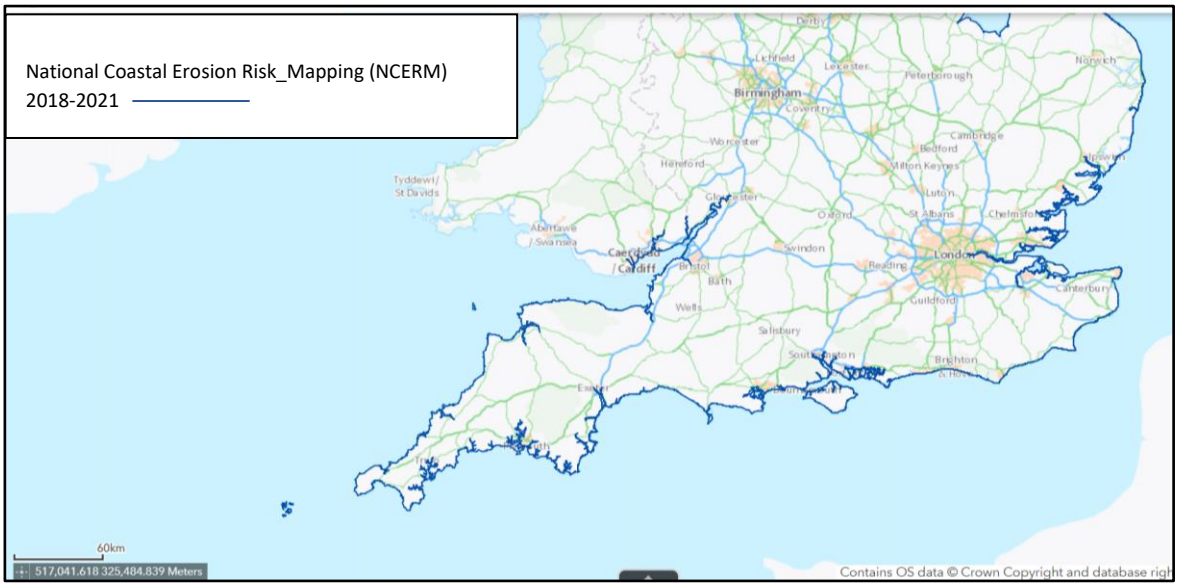


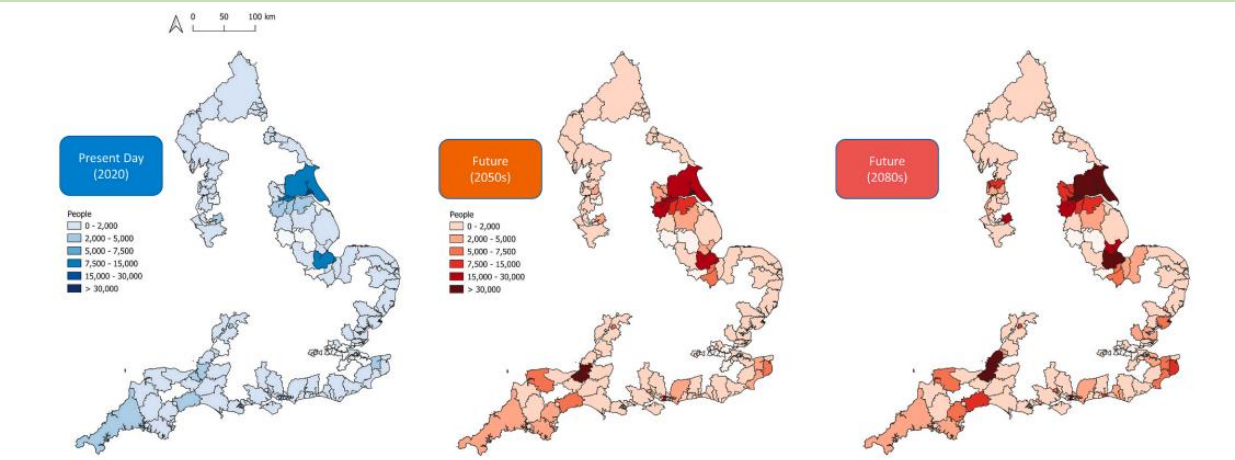
Figure 9 National Coastal Erosion Risk13 (accessed Jan 2023)

Peat bogs on the moors of Exmoor, Dartmoor and Bodmin have an important role in the prevention of flooding in the region, and continued damage to these will exacerbate flood risk.

The Environment Agency and local councils/ LLFA (Lead Local Flood Authorities) also manage and reduce flood risk through the planning system. There are multiple Environment Agency Main Rivers and some ordinary watercourses within the Level 1 Region which have flood zones with planning guidance on development and the requirements for further study such as Flood Risk Assessments.

LIKELY FUTURE WITHOUT THE PLAN
Climate change is likely to result in changing rainfall patterns in terms of volume and intensity. Flood risk can be affected by either factor, or in-combination. Climate change makes it more difficult to accurately predict flood events as historical data becomes less relevant, although modelling technique improvements will mitigate this to some extent. Estimates show that a global mean surface temperature increase of 2 degrees by 2050 will result in an increase in intense rainfall (<6 hours) of 15%.

13 https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=9cef4a084bbb4954b970cd35b099d94c



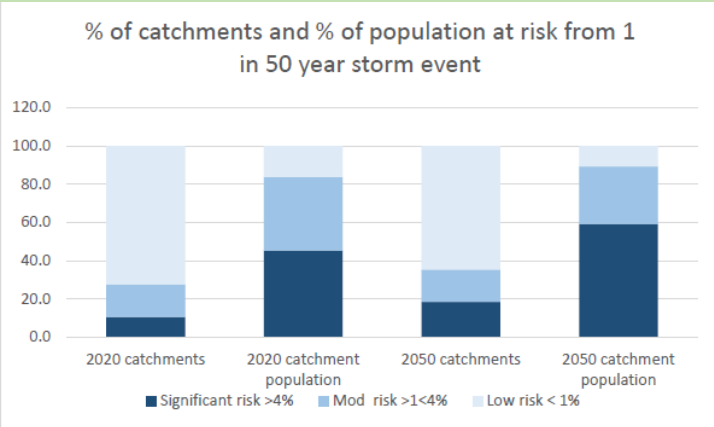
Projected changes in people exposed to significant coastal flooding in England (1in75 year return period or more frequent)
Left: Present Day
Middle: 2050s assuming a 2 °C rise in Global Mean Surface Temperature (by the end of the Century from pre-industrial levels), low population growth and little additional adaptation action (defined as Reduced Whole System adaptation in Sayers et al., 2020)
Right: 2080s assuming a 4 °C rise in Global Mean Surface Temperature (by the end of the Century from pre-industrial levels), high population growth and little additional adaptation action (defined as Reduced Whole System adaptation in Sayers et al., 2020).

Sayers *et al.*[14] predicted that the number of residential properties in UK exposed to a significant flooding risk increases six-fold to ~290,000 by the 2080s on assuming a 2˚C rise in Global Mean Surface Temperature (GMST) by the end of the century (compared to pre-industrial times), with low population growth and limited adaptation (with present day protection standards reducing in all but major urban conurbations). If assuming a 4 ˚C rise in GMST, coastal risk is projected to increase tenfold to ~470,000 by the 2080s given the same limited adaptation effort and high population growth.

The Government's 25-year Environment Plan looks to strengthen policy including National Planning Policy Framework (NPPF) guidance regarding development in relation to flood risk. Sustainable solutions and those with multifunctional green benefits (such as green infrastructure) are promoted, and these also fit with the strategic direction of SWW policy.

[14] Sayers, P. *et. al* . Responding to climate change around England's coast - The scale of the transformational challenge, Ocean and Coastal Management 225 (2022).

In regards sewer flooding, modelling undertaken for the DWMP predicts that without the adoption of mitigation interventions, the catchment population at significant risk of exposure to flooding (>4% of the population a risk) during a 1 in 50-year storm event, increases from 69 catchments in 2020, to 121 catchments in 2050.



Heritage

The SWW region is abundant in archaeological and heritage assets. The DWMP options have the potential to impact heritage assets, including built heritage and its setting, archaeology, and the historic landscape character, particularly where these are related to the water environment or may be affected by drainage measures. Archaeological remains are sensitive to changes relating to land use, water quality and water levels.

A World Heritage Site (WHS) is a natural or man-made site, area, or structure recognized as being of outstanding international importance. Two WHS are within the Level 1 Region: Dorset and East Devon Coast, and Cornwall and West Devon Mining Landscape (see Figure 15). The Dorset and East Devon Coast WHS comprises eight sections along the south coast that are globally important for the study of palaeontology and geomorphology and contain some of the best studied beaches and fossil sites in the world. The Cornwall and West Devon Mining Landscape WHS contains the remains of mines and mining infrastructure dating principally between 1700-1914, comprising a culturally important landscape for the history of the industrial revolution.

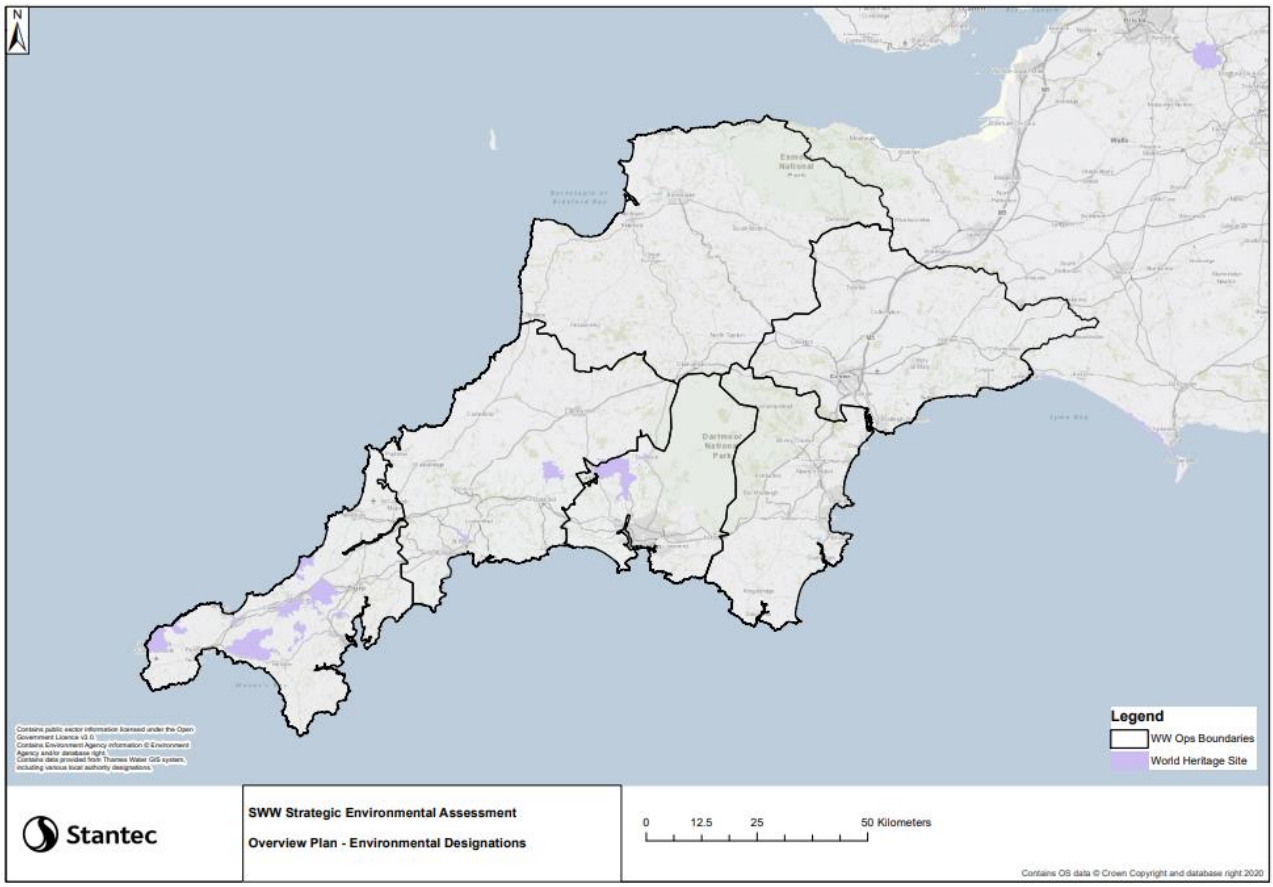


Figure 10 Location of World Heritage Sites

A Scheduled Monument is a nationally important archaeological site or historic building, given protection against unauthorised change. Scheduled monuments are often in a ruinous or semi-ruinous condition and can take the form of earthworks. There are 3177 Scheduled Monuments in the Level 1 Region, distributed widely across the region, with a high concentration being found within the Dartmoor and Bodmin Moor regions (see Figure 16).

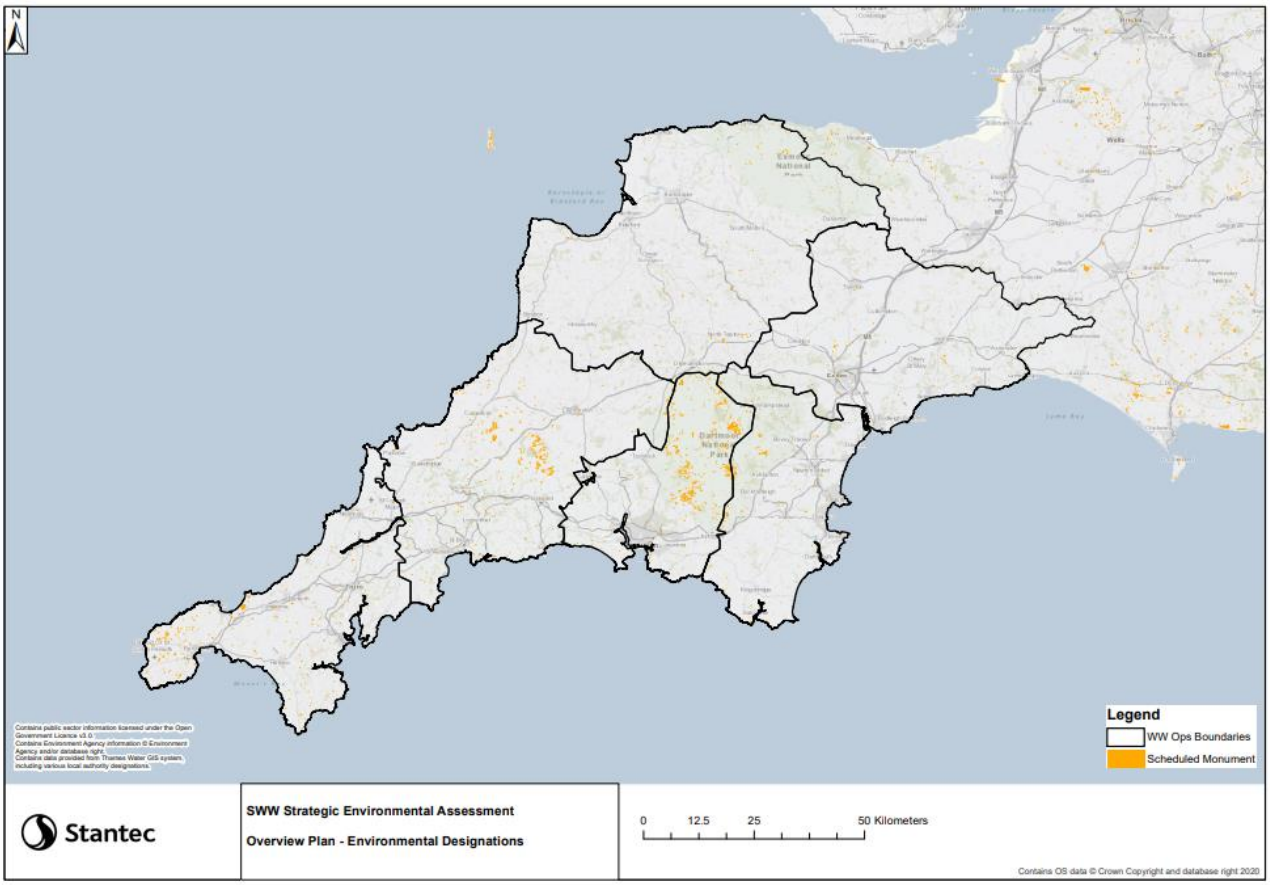


Figure 11 Location of Scheduled Monuments

There are four Registered Battlefields within the Level 1 Region. These are:

- Battle of Stratton 1643
- Battle of Braddock Down 1643
- Battle of Lostwithiel 21 August 1644
- Battle of Lostwithiel 31 August 1319

There are 34,164 listed buildings within the Level 1 Region. Of these, 659 (1.93%) are Grade I listed, which is for a building or structure of exceptional interest. The remaining 33,505 are Grade II or II* listed. Nationally, only 2.5% of listed buildings are Grade I. Listing is not a preservation order, preventing change; however, it means that listed building consent must be applied for to make any changes to that building which might affect its special interest or setting.

There are 95 Registered Parks & Gardens within the Level 1 Region, of which 7 are Grade I listed with the remainder either Grade II or II* (see Figure 17). These sites are a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the landscapes' special character, though unlike listed buildings and conservation areas, they are not afforded legal protection in the UK.

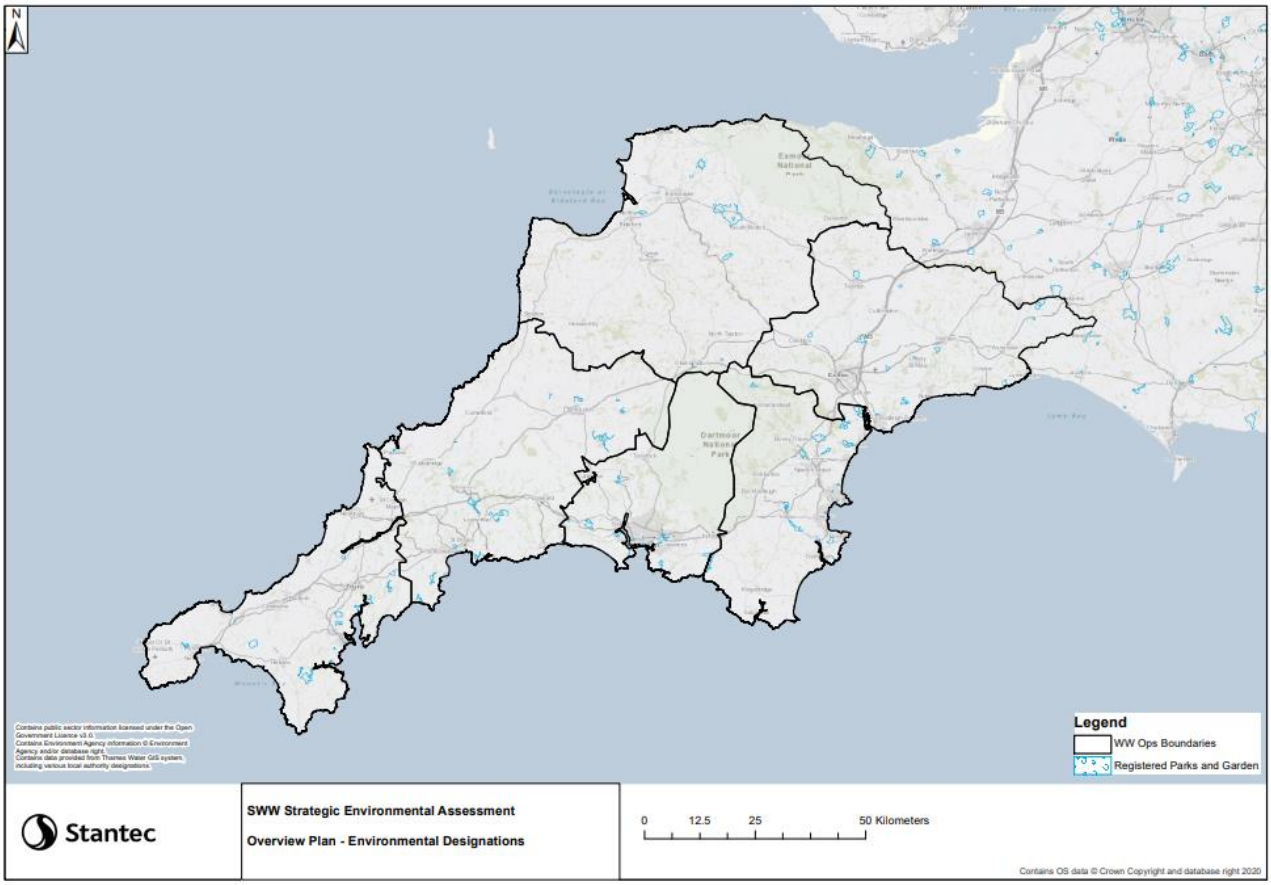


Figure 12 Location of Registered Parks and Gardens

Other historical sites may be designated under categories not included in the Scoping Report, and likewise some sites may be undesignated, but locally or regionally important, such as castles or museums.

LIKELY FUTURE WITHOUT THE PLAN
Some heritage assets have faced and survived significant climatic changes from the past and are likely to demonstrate resilience to climate change impacts. Historic England have reported that heritage assets at risk are decreasing in number, due to successes in buildings structure and archaeology[15]. However, other historic assets may be at greater risk from the direct impacts of future climate change, through flooding, sea level change, coastal erosion, storms, and other factors. Future development may also put pressure on heritage assets and their setting.

[15] Historic England (2020) Heritage at Risk. Available at: https://historicengland.org.uk/advice/heritage-at-risk/findings/

Landscape

The landscape of the South West Water region has a unique character and is known for its open, remote nature and its tranquillity. The typical nature of the landscape consists of uninterrupted views, mixed agriculture and scattered settlements. The landscape offers a rich habitat for flora, fauna and geology, with a number of contrasting landscapes such as chalk ridges, granite hills, plateaus and rugged coastlines with sandy coves and beaches.

Natural England divide England into 159 National Character Areas (NCAs), which are defined by various aspects such as their landscape, bio and geodiversity, and their economic activity. Within the SWW region, there are 14 NCAs specified. These can be seen in Table 3.

National Character Area	Description
158 – Isles of Scilly (NE507)	Comprises of over 200 granite islands scattered over 200 km2 within the Atlantic Ocean, situated 45km off the south-west of England. The majority of islands are low outcrops of granite with maritime heathland and grassland.
156 – West Penwith (NE371)	A sparsely populated peninsula, of high cliffs and rocky moorland. The NCA is surrounded on three sides by the Atlantic Ocean and is separated from the mainland (Cornwall) by a low-lying isthmus.
157 – Lizard (NE434)	Forms the southern-most point of mainland Britain consisting of gently undulating exposed heathland plateau cur by narrow river valleys. The coastline is defined as geologically complex and rugged with long uninterrupted views over the plateau out to sea.
155 – Carnmenellis (NE528)	Consists predominantly of agricultural landscape, with rolling hills divided by regular fields bound by hedges.
152 – Cornish Killas (NE547)	Forms the main body of Cornish landmass situated around the granite outcrops. The northern section consists of an open character with long views across Cornwall and out to sea whilst the southern section has a gently rolling scenery with sheltered coves, headlands and estuaries and rocky coastline.
154 – Hensbarrow (NE486)	The NCA has an open and wild landscape with granite hills which are home to the old china clay industry. The landscape consists of biodiverse heath and willow carr, and an idyllic pattern of fields bounded by Cornish hedges and woodlands.
153 – Bodmin Moor (NE415)	Described as a remote, stark, open upland moorland, fringed with deciduous damp wooded valleys and dispersed farmsteads linking larger areas of common land on the higher granite strewn moors.
151 – South Devon (NE338)	The majority of the NCA consists of mixed farming with fields bonded by hedge banks. The landscape is predominantly a plateau, dissected by steep valleys and rivers.
150 – Dartmoor (NE519)	Granite unites characterises the upland moorland with distinctive tors creating key landscape features, overlaid with thick deposits of peat surrounded by heathland and grass moorland. The NCA is home to isolated farms, scattered villages, semi natural broadleaved and coniferous plantations and fast flowing rivers.
149 – The Culm (NE389)	Comprises of a remote and sparse landscape with rolling ridges and plateaux extending. The NCA consists of cliffs and sandy beaches to west outlooking the Atlantic Ocean and open, treeless ridges separated by small valleys.
148 – Devon Redlands (NE425)	Has a strong a unified character with underlying red sandstone with farms and villages scattered throughout. The landscape consists of gently rolling hills, network of hedgerows with flat bottomed and open valleys creating extensive flood plains.
147- Blackdowns (NE566)	Consists of long, dark ridges creating prominent backdrops with far reaching views, deep valleys and dynamic cliffs. The NCA has flat plateaux with large regular fields, lowland heath and scrub. Additionally, there are areas of semi-natural woodland along the steep valley tops.
145 – Exmoor (NE342)	Predominantly a landscape of upland plateaux of Devonian sandstones and slates extending to the Bristol Channel in the north. The Exmoor NCA contains sparse settlements.
146 – Vale of Taunton and Quantock Fringes (NE550)	The southern tip of the NCA is situated within the study area and consists of the Blackdown Hills AONB and is characterised with steep, moorland with open character of clay, contrast with areas of lush pastoral character.

Table 3: NCAs in the SWW region

National Parks are landscapes that have been designated by the national government due to their relatively undeveloped and scenic beauty, along with wildlife and cultural heritage. Water companies have a statutory duty to have regard to the protection of national parks in carrying out their functions as water undertaker. Two national parks are located within the SWW region (see Figure 13):

- Dartmoor: Known for its wild, open moorland and deep river valleys rich with wildlife and history. Situated in southern Devon, the park is 954 square kilometres in size and consists predominantly of moorland granite uplands.
- Exmoor: An area of open hilly moorland providing a sense of tranquillity and remoteness, with coastal views, high sea cliffs, deep woodland valleys and streams.

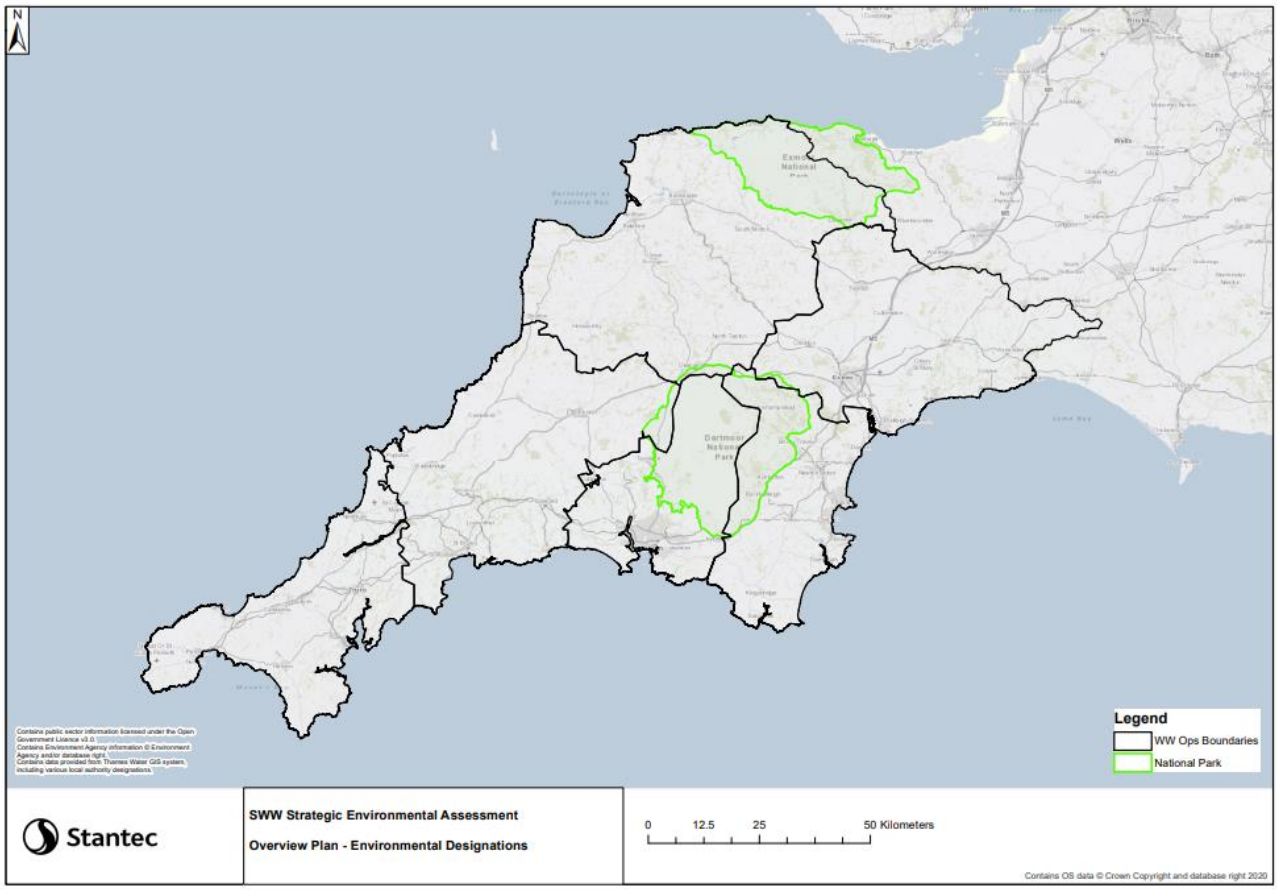


Figure 13 Location of National Parks

An Area of Outstanding Natural Beauty (AONB) is a designated exceptional landscape whose distinctive character and natural beauty are precious enough to be safeguarded in the national interest. AONB are protected and enhanced for nature, people, business, and culture. Eight AONB are located within the Level 1 Region. These are listed in Table 4.

AONB	Description
Blackdown Hills	Blackdown Hills AONB situated in East Devon is recognised for its tranquil and relatively isolated landscape. Situated on the border of Devon and Somerset spanning less than 15 miles in each direction, the Blackdown Hills AONB offers a diverse and unique habitat consisting of steep ridges, high plateaux, river valleys and springs as well as being home to small farms and villages.

Cornwall	Made up of 12 separate geological areas, this AONB makes up around a third of Cornwall. Contains rugged upland and tranquil estuaries.
Dorset	Only the western corner is located within the SWW region. An area of complex geology resulting in chalk downland, limestone, clay vales and greensand ridges. Has a sense of tranquillity and remoteness.
East Devon	Unique landscape, full of diverse and rich wildlife, shaped by centuries of farming, characterised by heathland, river valleys, hills & cliffs, woodland.
North Devon	Heavily undeveloped, sandy beaches, dunes, agriculture & sheltered woodland combes.
South Devon	Rugged coastline running from Torbay to outskirts of Plymouth. Pastoral landscapes of hedgerows, ancient lanes, wooded valleys of the Avon and Dart. Encompasses the South Harris Peninsula which is known for mixed farming, and rich in birds, reed beds and freshwater lakes.
Tamar Valley	Situated on the Devon/Cornwall border, rare valley and water landscape. An area of unspoilt drowned estuary, steep gorges, wooded valleys and unique wildlife with ancient woodland and wetlands.

Table 4: AONBs in South West Water region

Heritage Coasts are designated to protect stretches of undeveloped coastline across England. There are 32 heritage coasts within the UK, of which 18 are located in the SWW region.

LIKELY FUTURE WITHOUT THE PLAN
Climate change has the potential to impact high value landscapes through changing patterns of rainfall or sea level rise. Climate change can also impact species and habitats that can often play vital roles in helping shape, or bring value, to the highest value, protected landscapes. Population is expected to increase in the region, this alongside trends observed in Covid-19, such as increased home working, could put increased demand on greenfield development, which in turn will lead to loss of agricultural land.

Carbon & Material Assets

In line with national trends, the local authorities in the SWW region have declared their intentions to achieve net zero carbon. The carbon emissions per sector for Cornwall can be seen in Figure 14. Cornwall Council has stated its intent to reduce carbon emissions to 'safe levels' by 2050, whereas Exeter City Council has committed to be carbon net zero by 2030, as has Plymouth's council. South West Water have also committed to being net zero by 2030.

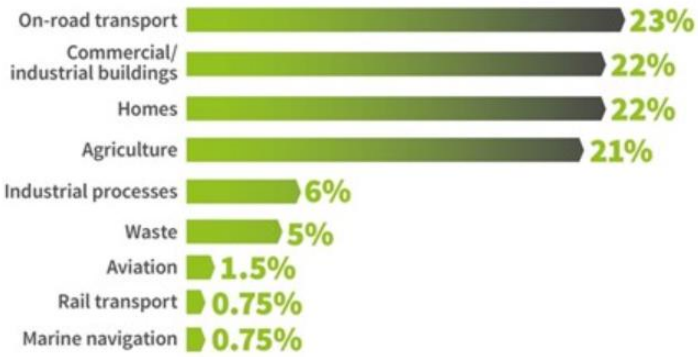


Figure 14: Carbon emissions by sector- Cornwall

Air Quality in the SWW region is varied and there are certain areas with higher concentrations of air pollutants, usually caused by transport or business activities. Air Quality Management Areas (AQMAs) are declared where the national air quality objectives are not being met. There are nine local authorities within the SWW region that contain at least one AQMA and are predominately designated for nitrogen dioxide (NO_2), with one AQMA (Crediton AQMA) designated for both NO_2 and particulate matter. In total there are 27 AQMAs designated within the SWW region.

Population growth is likely to increase pressure on land use as development is required to meet this anticipated growth. Nationally there is a preference within policy for sustainable use of land through reuse and intensification of previously developed land, i.e., brownfield development; as well as sustainably locating development close to services, facilities and sustainable transport. The urban areas in the SWW region do not have a green belt to reduce urban sprawl.

Waste is a serious issue for all regions of the UK both in the short and long term. Use of waste hierarchy principles, such as reuse and recycle, has improved greatly in recent decades with still much work to be done. Resource use refers to what assets will be built from, considering raw material scarcity, recycling, and embodied carbon. It also refers to where assets will be built factoring in promotion of site reuse where practicable.

The total amount of local authority managed waste in England was 25.6 million tonnes in the year 2019/20. Of this, 2.6 million tonnes were managed in the south west region of England. Recycling and composting were the most common methods of waste disposal in the region, accounting for 49% of this waste. The second most common waste disposal method was incineration, comprising 34% of locally managed waste.

Plymouth port supports extensive defence related maritime and commercial activities. Nearly 60,000 vessel movements were recorded within the port limits in 2009, 75% of which were defence related[16]. Road routes are limited within the SWW region, the most notable of which being the M5 motorway connecting Exeter to the north of England. The A30 runs from the end of Cornwall to Somerset, and the A38 links Plymouth with Exeter. Rail links in the region are limited, consisting primarily of railway lines between the main urban areas in the region.

LIKELY FUTURE WITHOUT THE PLAN
The Government's National Infrastructure Strategy (2020) outlines a legal commitment to decarbonise the economy by 2050, strategies to rebuild the economy following the COVID-19 pandemic and plans to 'level-up' UK cities and regional powerhouses. Population growth is likely to drive future investment and increased demand is likely to increase the number and quality of material assets such as housing, waste facilities, transport infrastructure and community facilities. Many local, regional, and national polices and plans have ambitious targets to improve air quality, particularly in urban areas.

Climate Change Resilience

Current scientific data indicates that the UK is continuing to warm because of anthropogenic causes. "The last 30-year period (1991-2020) has been 0.9°C warmer than the preceding 30 years (1961-1990) and the warming trend is evident across all months and all countries in the UK". "As well as increased temperatures, the UK has been on average 6% wetter over the last 30 years (1991-2020) than the preceding 30 years (1961-1990)" [17]. Rainfall is projected to vary seasonally and at a regional scale, however the UK is predicted overall to have drier

[16] Plymouth City Council (2010) Port of Plymouth Evidence Base Study. Available at: https://www.plymouth.gov.uk/sites/default/files/PortOfPlymouthStudy.pdf

[17] Met Office (2021) Climate change continues to be evident across UK. Available from: Climate change continues to be evident across UK - Met Office, accessed February 2022.

South West Water

Bournemouth Water

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