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DRAINAGE & WASTEWATER MANAGEMENT PLAN (DWMP) 331001729-01-03

**FINAL STRATEGIC ENVIRONMENTAL ASSESSMENT –
ENVIRONMENTAL REPORT**

May 2023



Client: Northumbrian Water Group

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TABLE OF CONTENTS

1	INTRODUCTION	6
1.1	Introduction and Background	6
1.2	Overview of Northumbrian Water’s DWMP	6
1.3	Relevant DWMP Guidance	9
1.4	Strategic Environmental Assessment Process	11
1.5	Consultation and Partnership Working	14
1.6	Difficulties Faced and Limitations	16
2	POLICY CONTEXT	18
2.1	Review of Relevant Plans, Programmes and Objectives	18
2.2	Key Requirements of SODRP	18
2.3	Key Themes of Applicable Plans, Programmes and Objectives	19
3	BASELINE ENVIRONMENT	21
3.1	Baseline Review	21
3.2	Key Issues and Opportunities	21
3.3	Spatial Baseline Context	27
3.4	How are Options to be Assessed?	29
4	SEA ASSESSMENT METHODOLOGY	30
4.1	SEA Framework, including SEA Objectives	30
4.2	SEA Assessment Methodology	33
5	DEVELOPMENT AND ASSESSMENT OF INDIVIDUAL OPTIONS	35
5.1	DWMP Process and Compatibility with the SEA	35
5.2	Option Development and Consideration of Reasonable Alternatives	37
5.3	SEA Assessment of Options (Level 1)	48
5.4	SEA Assessment of Options (Level 2)	58

6	DEVELOPMENT AND ASSESSMENT OF COMBINED OPTIONS	61
6.1	Development of Combined Options	61
6.2	Calculation of Costs and Benefits	62
6.3	DWMP Scenarios Considered	63
6.4	SEA Assessment of the Combined Options	64
6.5	Other Related Assessments, including HRA	67
7	SEA ASSESSMENT OF THE PREFERRED PLAN AND CUMULATIVE EFFECTS	69
7.1	The Preferred Plan	69
7.2	SEA Assessment of the Preferred Plan Effects and Cumulative Effects	70
8	PREVENT, REDUCE, MITIGATE, ENHANCE EFFECTS	76
8.1	Measures Adopted within the Development of the Plan	76
8.2	Recommendations as the Plan is Implemented	78
8.3	Adaptive Planning	80
8.4	Project Stage Assessments and Controls During Implementation	81
8.5	Recommendations for Subsequent DWMP Cycles	82
9	MONITORING THE SIGNIFICANT EFFECTS OF THE PLAN	84
9.1	Proposed Monitoring	84
APPENDIX A: CONSULTATION RESPONSES		86
APPENDIX B: REVIEW OF RELEVANT PLANS, PROGRAMMES AND ENVIRONMENTAL PROTECTION OBJECTIVES		87
APPENDIX C: BASELINE ENVIRONMENT REVIEW		88
APPENDIX D: LEVEL 2 SEA ASSESSMENT MATRICES		89

ABBREVIATIONS

Abbreviations used:	
AMP	Asset Management Plan (AMP7 period is 2020-2025)
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BNG	Biodiversity Net Gain
BRAVA	Baseline Risk and Vulnerability Assessment
CU	Coastal Urban
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
HU	Historic Urban
INNS	Invasive non-native species risk assessment
IU	Industrial/ Economic Urban
L1/ L2/ L3	Level 1/ Level 2/ Level 3
LLFA	Lead Local Flood Authority
LR	Lowlands Rural
MCZ	Marine Conservation Zone
NCA	National Character Area
NIDP	Northumbria Integrated Drainage Partnership
NNR	National Nature Reserve
NWG	Northumbrian Water Group
ODA	Option Development and Appraisal
OFWAT	Water Services Regulation Authority

Abbreviations used:	
PO	Planning Objective
PR24	2024 Price Review
PRoW	Public Rights of Way
RBCS	Risk Based Catchment Screening
RBD	River Basin District
RNAGS	Reason for Not Achieving Good (Ecological) Status
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SF	Suburban Fringe
SO	Storm Overflow
SOAF	Storm Overflow Assessment Framework
SODRP	Storm Overflow Discharge Reduction Plan
SPA	Strategic Planning Area (note SPA sometimes also refers to a 'Special Protection Area', but in this report we have not abbreviated the term Special Protection Area)
SPG	Strategic Planning Group
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
TPU	Tactical Planning Unit
uFMfSW	updated Flood Map for Surface Water
UK	United Kingdom
UKCP	UK Climate Projections
UR	Uplands Rural
WFD	Water Framework Directive
WHS	World Heritage Site
WwTW	Wastewater Treatment Works

1 INTRODUCTION

1.1 Introduction and Background

This Environmental Report sets out the findings of Stages B and C of the Strategic Environmental Assessment (SEA) process, for Northumbrian Water Group's (NWG) new Drainage and Wastewater Management Plan (DWMP). DWMPs are guided by Water UK's: 'A framework for the production of Drainage and Wastewater Management Plans'¹ (subsequently referred to as the 'Water UK framework'). The content within this report allows stakeholders to understand the likely environmental and social impacts of the DWMP.

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; however, it is best practice to undertake SEA on the final optimised plan. DWMPs will become a statutory requirement under the Environment Act 2021 which introduces Drainage and Sewerage Management Plans (DSMPs) (otherwise known as a DWMP) however this section is not enacted by yet, probably becoming statutory after the DWMP is published. Nonetheless, NWG plans to fulfil the requirements of the SEA Regulations. In order that the SEA process is effective in influencing the plan, NWG chose to integrate SEA into the earlier option definition and appraisal stages in addition to the final optimised plan.

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

1.2 Overview of Northumbrian Water's DWMP

The DWMP takes a long-term view to set out how NWG intends to extend, improve, and maintain a robust and resilient drainage and wastewater system over a planning period of 40 years. It will inform the company business plan submission for PR24 (Price Review 2024) ahead of Asset Management Plan (AMP) 8 for the period 2025 – 2030. PR24 will also be informed by NWG's Water Industry National Environment Programme (WINEP) submission, which sits alongside the DWMP.

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.

¹ Water UK (2021) DWMP Framework Guidance, available from: https://www.water.org.uk/wp-content/uploads/2021/10/DWMP_Framework_Report_Main_Report_September_2021.pdf, accessed March 2022.

- by 2050, this will apply to all remaining storm overflows, regardless of location

See Section 2.1 for further details of these targets. Interventions to meet the SODRP targets form the majority of the interventions identified in the DWMP. In addition, NWG have established additional targets:

- reduce internal sewer flooding by 60% between 2030 and 2050; and
- ensure that all wastewater treatment works (WwTWs) are compliant with their Dry Weather Flow (DWF) treated effluent consent values.

The DWMP provides a strategic plan to drive investment where it is needed in the short- and long-term planning horizons to ensure robust and resilient drainage and wastewater services are provided. An adaptive planning approach is adopted from 2030 using nature based solutions and 'green' options where possible as a means to maintain the current performance (i.e., not to allow storm overflows to increase) .

In addition to these measures, the WINEP provides Water Framework Directive (WFD) nutrient schemes to six catchments (including 30 WwTWs) for improvements in the period 2025-2030 and continuous river water monitoring. Measures proposed through WINEP have been assessed through the associated programme.

The scope of the DWMP includes wastewater and drainage networks (foul, combined and surface water sewers), interconnecting drainage systems (such as highway drains and culverted watercourses), wastewater pumping stations, and wastewater treatment works systems looking at a combination of flooding and environmental impact.

NWG recognises that to get the best outcomes for all in the region, it needs to work collaboratively with customers and all organisations who have an interest in the issues – including stakeholders with an interest in planning, development, risk management and the environment.

The DWMP Study Area aligns with the operational boundary for NWG's provision of wastewater services², as shown in **Figure 1.2.1**. The overall Study Area (as shown by the red boundary) (Level 1) is split into seven Strategic Planning Areas (SPA) (Level 2); and subsequently into Tactical Planning Units (TPU) (Level 3) (depicted by green shading). The TPUs are further split into Drainage Communities (Level 4). The latter are at a local catchment scale predominantly for WwTWs. Whilst not all catchments are covered by the DWMP, it does cover 99% of the population.

² Note the area of water supply by NWG is slightly different from the area of wastewater services. In part of the study area, Hartlepool Water is responsible for the water supply.

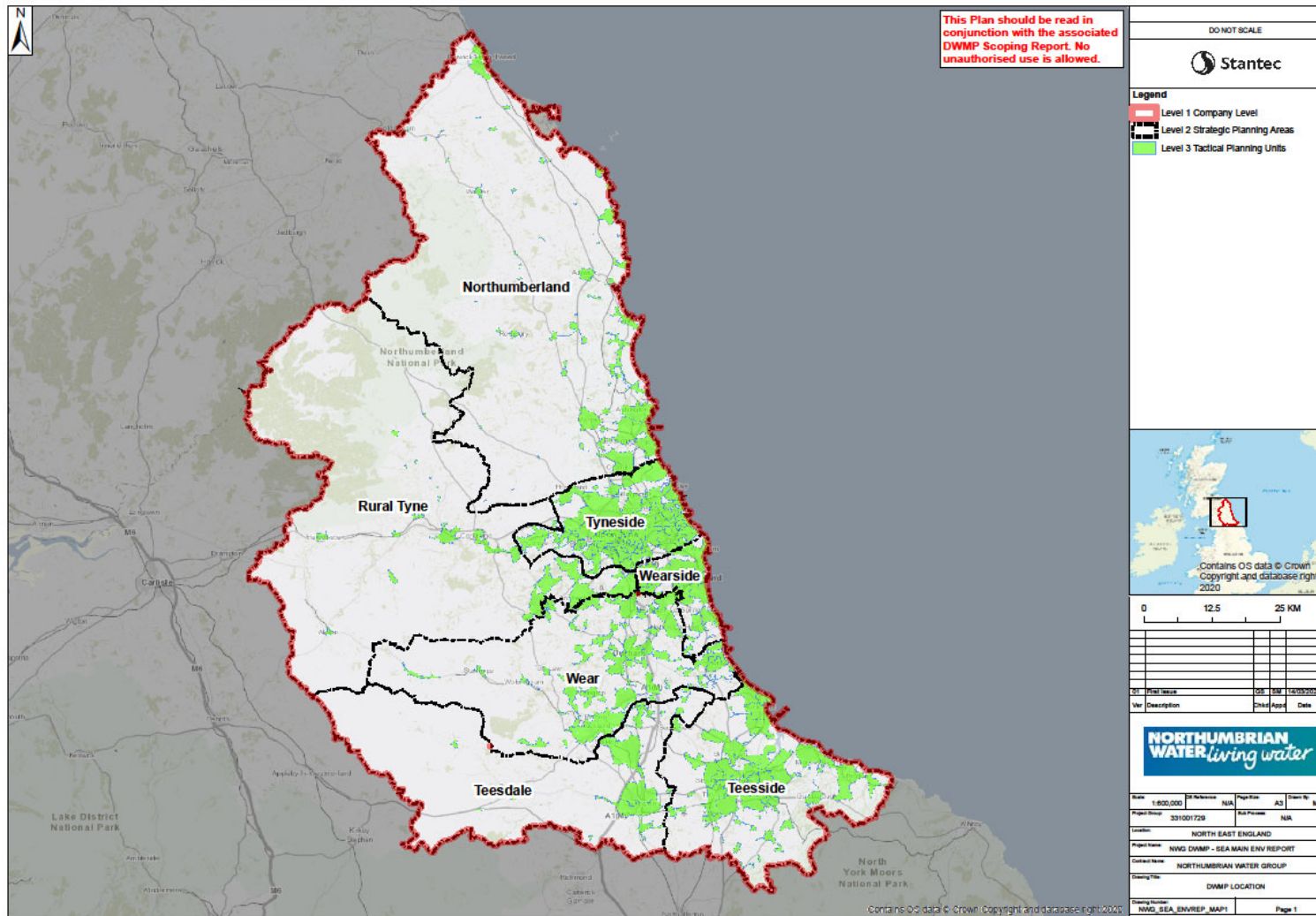


Figure 1.2.1 – Study Area

1.3 Relevant DWMP Guidance

The eleven 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 Defra; the Welsh Government; Ofwat; the Environment Agency; Natural Resources Wales; Consumer Council for Water; the Association of Directors of Environment, Economy, Planning and Transport; Blueprint for Water; and water companies.

The Water UK framework establishes the steps for developing a DWMP, as shown in **Figure 1.3.1**. The SEA Process has been completed on the overall plan and has also fed into its creation as is good industry practice. That means that SEA is not a standalone activity within a stage of the DWMP process and aligns to many of the stages shown in dark blue within **Figure 1.3.1**. Further details on the alignment of the SEA to the DWMP process are set out in **Table 1.4.1** in the section below. The DWMP and SEA have been developed following the guidance provided in the DWMP Framework and modified to meet the needs of the SODRP.

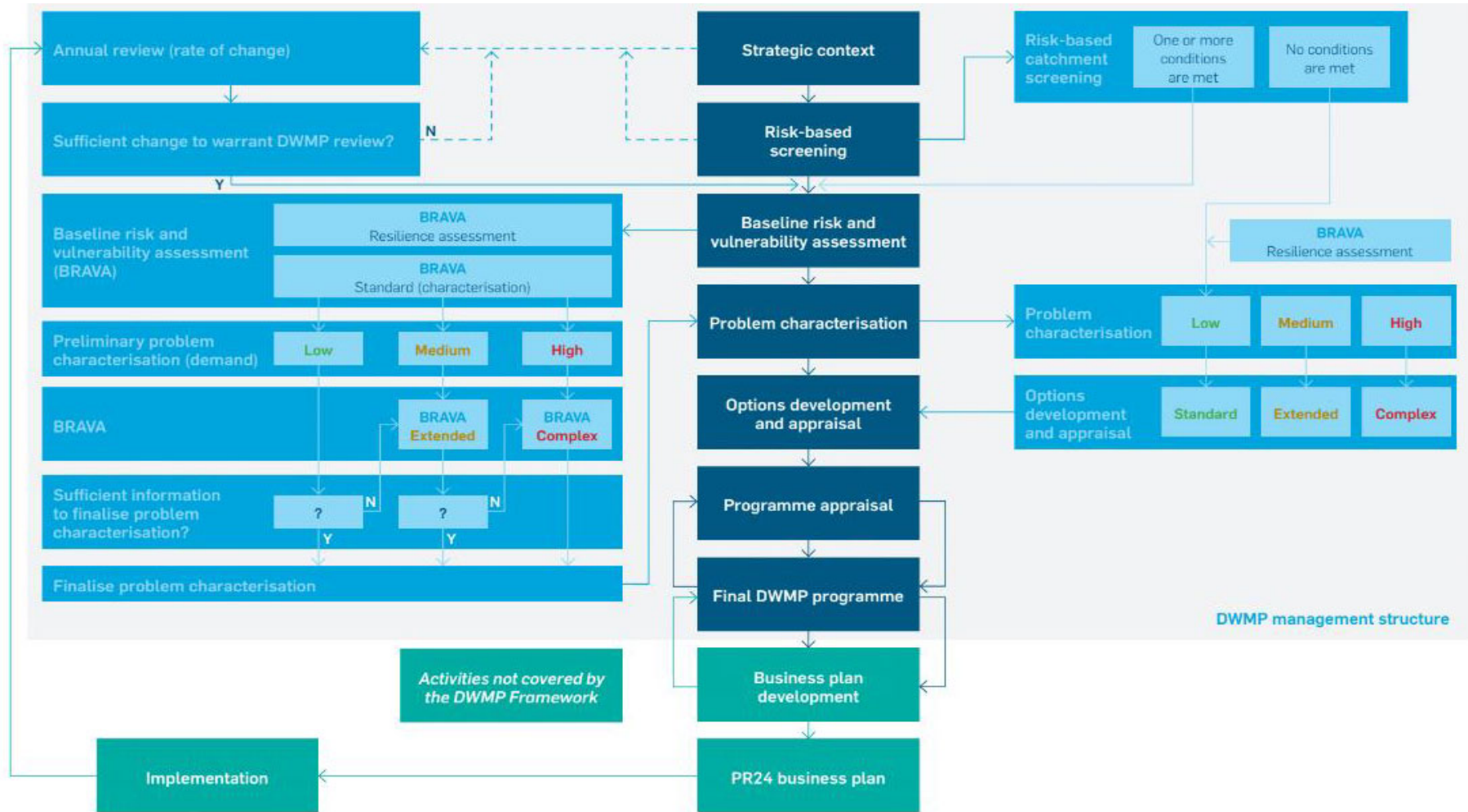


Figure 1.3.1 – DWMP Framework

1.4 Strategic Environmental Assessment 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 (as amended) (‘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”.

Schedule 2 of the SEA Regulations sets out what information environmental reports should contain. This is replicated in **Table 1.4.1**, which also identifies where the information is provided in this report.

Table 1.4.1 – Environmental report information requirements and where this is provided in the report

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.	Chapter 1.
2. The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme.	Chapter 3 and Appendix C.
3. The environmental characteristics of areas likely to be significantly affected.	Chapter 3 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.	Chapters 2, 3 and 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.	Chapter 2 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)	Chapter 5 and Chapter 6

SEA Regulations, Schedule 2 Information for Environmental Reports	Where the information is provided in this SEA Environmental Report
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 subparagraphs (a) to (l).	
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.	Chapter 7
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.	Chapter 6
9. A description of the measures envisaged concerning monitoring in accordance with regulation 17.	Chapter 8
10. A non-technical summary of the information provided under paragraphs 1 to 9.	Non-Technical Summary

The UK Government Practical Guide to SEA, the ‘Practical Guide’³, establishes the following stages of the SEA process:

- 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.

A key aim of the SEA process is to ensure the appraisal is proportionate, relevant and informative to the Plan being assessed.

Figure 1.4.1 is taken from the ‘Practical Guide’ and illustrates the stages in the SEA process and their iterative nature.

³ Office of the Deputy PM (2005) A Practical Guide to the Strategic Environmental Assessment Directive, available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf, accessed May 2022.

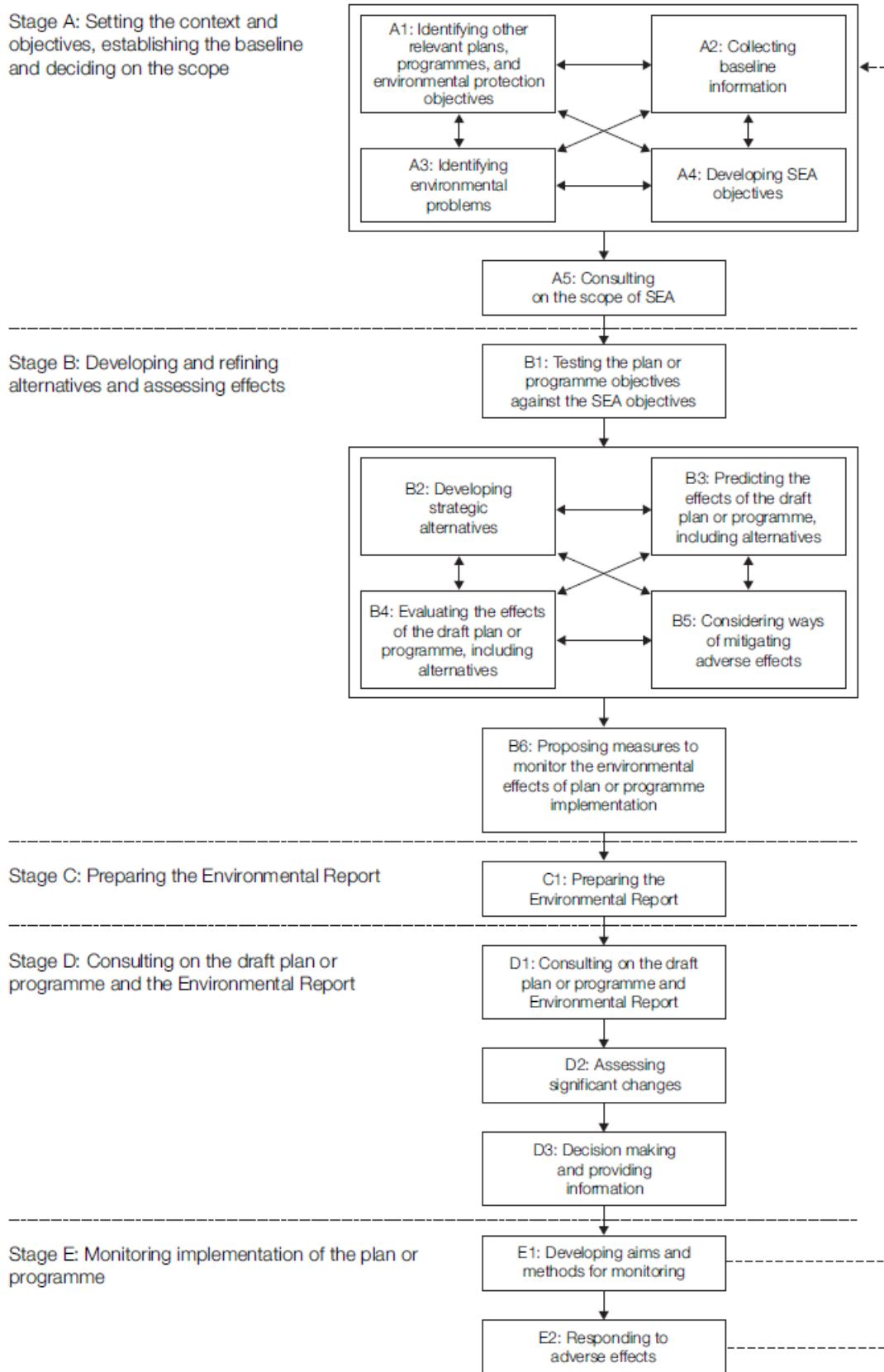


Figure 1.4.1 – SEA Process (Source: ODPM, 2005)

Stage A was completed through preparation and consultation on an SEA Scoping Report in January 2022. The Scoping Report ‘scoped in’ all the ‘SEA topics’ identified in item 6 in the table above. The relevant sections of this report are structured around these topics.

The draft Environmental Report (Stage C1) was published in June 2022 for consultation, with the draft DWMP (Stage D1). This Environmental Report represents the output from Stage D3.

The relationship between the DWMP process and SEA process is set out in **Table 1.4.2**.

Table 1.4.2. – Relationship between DWMP Process and SEA

DWMP Stage	SEA Stage
Strategic Context	SEA scoping phase, documented in Scoping Report.
Risk Based Catchment Screening (RBCS)	
Baseline Risk and Vulnerability Assessment (BRAVA)	
Problem Characterisation	
Option Development and Appraisal (ODA)	Assessed in Chapter 5 of this report.
Programme Appraisal	Assessed in Chapter 6 of this report.
Draft DWMP	The draft DWMP was assessed through the SEA process to inform the development of the plan.
Final DWMP	Following consultation feedback, the final DWMP was assessed through the SEA to inform the development of the plan. This final SEA Environmental Report is being published in parallel with the plan.

1.5 Consultation and Partnership Working

1.5.1 Consultation on Stage A of the SEA Process (the Scoping Report)

The consultation bodies (Natural England, the Environment Agency, and English Heritage), along with wider consultees, were consulted on the Scoping Report for a period of five weeks from 17th January 2022 to 21st February 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 - Consultation responses**.

1.5.2 Consultation on Stage D of the SEA Process (the Environmental Report)

The draft SEA Environmental Report was issued for consultation along with the draft DWMP, for **12 weeks** until **23rd September**, including to the SEA consultation bodies. Responses from different parties were received and have been taken into account in formulating the final DWMP. A summary of the feedback received, and how comments have been addressed, is also included in **Appendix A - Consultation responses**.

1.5.3 Partnership Working and Wider DWMP Consultation

It is widely recognised and acknowledged that drainage systems are complex and have a number of interactions, both known and unknown. It is therefore important that the DWMP is not created solely by NWG. Whilst NWG has been tasked with the delivery of the DWMP, it is critical that relevant stakeholders actively participate and provide support in its creation.

NWG has worked with relevant stakeholders in the production of the DWMP, including the Environment Agency, Lead Local Flood Authorities, Local Planning Authorities and housing developers, and environmental partners. The responsibilities and functions of different parties are briefly described below:

- **Environment Agency (EA)** – Are responsible for many activities such as improving the environment and reducing the risk of flooding and coastal erosion to properties and businesses, among others. In the North East region, Northumbrian Water's operating boundaries aligns with the EA North East Area.
- **Lead Local Flood Authorities (LLFAs)** – Are responsible for developing, maintaining and applying a local flood risk strategy. This clarifies who is responsible for local flood risk and enables effective partnerships to be formed between the lead local flood authority and the other relevant authorities. There are currently fourteen LLFAs in the NWG operating area.
- **Local Planning Authorities (LPAs) and Developers** – Are usually the planning departments of the district or borough council. The National Planning Policy Framework (NPPF) defines a local planning authority as, 'the public authority whose duty it is to carry out specific planning functions for a particular area'. In supporting growth, the regional developers and landowners are actively engaged through NWG Developer Services team who provides guidance through the planning process to the adoption of assets.
- **Environmental Partners** – NWG works within the Catchment Based Approach (CaBA), playing a leading role within the North East to work collaboratively to improve the environment in the North East. At regional level, NWG represents and supports the North East Natural Environment Leaders Network, Cross-Catchment Host Group, and North East Urban Water Group. NWG engages strongly with the five North East Catchment Partnerships (Tweed Forum, Northumberland Rivers, Tyne, Wear and Tees), and the two urban-focused Local Nature Partnerships (North East England Nature Partnership and Tees Valley Nature Partnership). Furthermore, the new Improving the Water Environment Performance Commitment and Outcome Delivery Incentive (ODI) will drive to go above and beyond regulatory commitments by working with the partners to enhance accessible areas of rivers and beaches for the benefit of the customers and communities.

- **Highway Authorities** – The drainage system is intrinsically linked to the public highway, roads, footpath and other connecting systems. It is therefore important to work closely with partners who are responsible for the provision of components of the transport infrastructure to identify opportunities to reduce and control these contributing flows.
- **Customers** – To raise awareness of their role in the DWMP, NWG aims to raise the profile of the DWMP process with elected members of the Regional Flood and Coastal Committee, with representatives of the Consumer Council for Water and also with customer focus groups.
- **Partnership Groups** – Through different partnerships and strategies, NWG plays an active role within the region to work collaboratively with stakeholders on a number of projects. The DWMP builds on the strong foundation of the Northumbria Integrated Drainage Partnership (NIDP), which consists of fourteen Lead Local Flood Authorities, the Environment Agency and NWG. The award-winning partnership approach, which is formulated on a collaborative approach of identifying priority investment areas with multi-stakeholder benefits, provides an excellent platform for the DWMP. The NIDP approach can improve water quality and habitat by managing flood risk from all sources and partners. It allows partners to develop projects that are unviable as single-stakeholder projects to reduce customer flood risk.

NWG created a single stakeholder Strategic Planning Group (SPG) covering all of the seven SPAs. The decision was taken, in line with the DWMP Framework recommendation, to create a single SPG to drive consistency and to optimise the engagement process.

In Autumn 2020, NWG engaged with customers through a series of interactive tasks and activities regarding the DWMP. The results from this research have helped shape the plan. The four broad goals that NWG wanted to achieve through this research were to:

- Understand what customers want the plan to aim for, and which aims are most important to them.
- Understand how customers prefer NWG to improve wastewater services.
- Understand how customers would like NWG to go about prioritising the DWMP.
- Understand how customers think they should be involved in developing the DWMP.

This customer engagement provided an understanding of the views of the NWG customer on the DWMP under informed conditions. The research findings have been used to shape the nature and priority of the options for the areas of the highest risk.

1.6 Difficulties Faced and Limitations

Chapter 3 (Baseline Environment) has used professional judgement to review published datasets. The baseline information is provided at the strategic level, thus it does not identify local issues, as these may not represent wider trends across the region. Post SEA, 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.

Whilst the most up to date information has been considered, datasets are regularly reviewed and therefore could change during the SEA process. The baseline environment appendix 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 **Chapter 5**, options are assessed as stand-alone measures; **Chapter 6** assesses the overall approach taken in the plan based on the combination of options and wider measures within the plan. The plan includes the use of hybrid options (e.g., combining a green/ blue corridor with grey piped infrastructure). There will naturally be some fluidity within the implementation of measures that arise from the strategic level plan, such as the proportion of green and grey options within a catchment based on subsequent more detailed work.

The Storm Overflows Discharge Reduction Plan (SODRP) was published on 26 August 2022, changing the targets to be met by DWMPs (refer to Section 2.2 for more details).

The DWMP prioritises investment over a five years horizon from 2025, however it also reaches towards an ambitious long term horizon to align with Water Resources Management Plans (note, these are different from DWMPs with a context on clean water and resource usage). It is recognised that levels of confidence of the impacts and uncertainty increases in the longer-term planning horizon, noting that the plan is to be reviewed every five years.

As the development of DWMPs is a new evolving area, some iterations in the DWMP and SEA process is expected as the DWMP is developed, including in future DWMP reporting cycles. The five years review cycle provides an opportunity to review the current findings based on the experience gained within the implementation of this first DWMP.

2 POLICY CONTEXT

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 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).

2.1 Review of Relevant Plans, Programmes and Objectives

A full review of the plans, programmes, and environmental protection objectives relevant to the DWMP can be found in **Appendix B** in tabular format. These were reviewed to establish the requirements applicable to the plan to inform the development of the SEA Framework and subsequent assessment. The next two sections identify the key requirements of the SODRP, which is a key driver for the plan, and the key themes and messages from other relevant plans, programmes and objectives.

2.2 Key Requirements of SODRP

The SODRP outlines specific and time-bound targets that water companies will deliver, as a minimum:

1 Protecting the environment

Headline target: Water companies will only be permitted to discharge from a storm overflow where they can demonstrate that there is no local adverse ecological impact.

Sub-targets:

- *The headline target must be achieved for most (at least 75%) of storm overflows discharging in or close to high priority sites by 2035.*
- *It must be achieved for all (100%) storm overflows discharging in or close to high priority sites by 2045.*
- *Water companies must achieve this target for all remaining storm overflows sites by 2050.*

2 Protecting public health in designated bathing waters

Headline target: Water companies must significantly reduce harmful pathogens from storm overflows discharging into and near designated bathing waters, by either: applying disinfection; or reducing the frequency of discharges to meet Environment Agency spill standards by 2035.

3 Ensuring storm overflows operate only in unusually heavy rainfall events

Headline target: Storm overflows will not be permitted to discharge above an average of 10 rainfall events per year by 2050.

Sub-target: Water companies will be required to ensure all storm overflows have screening controls.

2.3 Key Themes of Applicable Plans, Programmes and Objectives

Other plans including the next River Basin Management Plan (RBMP), Water Resource Management Plan (WRMP), Flood and Coastal Erosion Risk Management (FCERM) programme, Flood Risk Management Plan (FRMP), and the Water Industry National Environmental Programme (WINEP) have been well considered in the DWMP Process.

The key themes and messages arising from the applicable plans, programmes, and objectives are summarised in **Table 2.2.1**:

Table 2.2.1. – Key themes and messages of applicable Plans, Programmes and Objectives

SEA Topic	Key theme and messages
Biodiversity and Geodiversity	<ul style="list-style-type: none"> • 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. • Have regard to the requirements of Habitats Directive, including restoring favourable conservation status to sites. • 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. • Promote catchment-wide approach to land management by relevant stakeholders. • Reduce risk of contamination and contribute to remediation.
Human Health	<ul style="list-style-type: none"> • 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 human health. • Ensure communities have secure water supplies and effective wastewater services. • Foster social inclusion and community stakeholder participation.
Socio-economic	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Contribute to net zero carbon targets. • Utilise 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.
Water Resources	<ul style="list-style-type: none"> • Eliminate all harm from SOs in the long-term, focus on high priority sites in the short-term. • Improve water quality in all water bodies to meet Water Framework Directive (WFD) targets and designated site targets (for water quality and flow). • 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).

SEA Topic	Key theme and messages
	<ul style="list-style-type: none"> • Promote efficient use of water. • Ensure high quality drinking water resources. • Contribute to healthy watercourses, seas, and oceans. • Support aquatic biodiversity. • Support improvements that will benefit bathing water quality. • Support a catchment wide approach to water quality.
Flood Risk	<ul style="list-style-type: none"> • Reduce and manage flood risk from all sources. • Increase resilience to flooding from all sources. • Support a catchment wide approach to water management.
Heritage	<ul style="list-style-type: none"> • Assess, and avoid, minimise and/or mitigate as appropriate, any impacts to 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. • Reduce the vulnerability and improve the resilience of heritage assets to flooding where works are proposed. • Promote the conservation and enhancement of the historic environment, including historic landscapes.
Landscape	<ul style="list-style-type: none"> • Protection of landscape, townscape, and seascape (including designated landscapes, defined 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	<ul style="list-style-type: none"> • 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).

3 BASELINE ENVIRONMENT

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).

3.1 Baseline Review

An important element of SEA is to identify the current environmental baseline both to identify existing issues and opportunities, and to inform the assessment of potential impacts of the DWMP. Data informing the baseline has been predominantly sourced from publicly available national datasets and much is associated with the plans, policies, and objectives listed within **Appendix B**.

SEA also requires consideration of the likely future baseline in the absence of the DWMP. This has been considered through review of the available information (such as climate change projections) and consideration of the underlying trends and the likely effects of other plans and projects. Often it is based on professional judgement.

The Baseline Environment Review can be found in **Appendix C** and it is organised into SEA topics. The SEA topics have been selected and organised by considering SEA guidance and the context of the region and the plan being assessed. The future baseline is presented at the end of each SEA topic. The baseline review has been updated in light of feedback received through consultation.

The SEA topics used are:

- Biodiversity and Geodiversity;
- Human Health;
- Socio-economic;
- Carbon & Material Assets;
- Water Resources;
- Flood Risk;
- Heritage;
- Landscape; and
- Climate Change Resilience.

3.2 Key Issues and Opportunities

The key issues and opportunities identified through the baseline environment review and of relevance to the DWMP are identified in **Table 3.2.1**. Crossover is inherent across

some SEA topics, for example resilience to flood risk resulting from climate change. These occurrences have been outlined where applicable.

Issues and opportunities are broad and therefore not aligned to a particular option, such as installing SuDS or a flow transfer. Rather the issues and opportunities are aligned to the scope of the SEA within the context of drainage and wastewater, and ultimately the DWMP.

Table 3.2.1. – Issues and Opportunities Summary Table

SEA Topic	Issues	Opportunities
Biodiversity and Geo-diversity	<ul style="list-style-type: none"> • Loss or fragmentation of ecological habitats. • Loss or fragmentation of habitats leads to the loss or reduction in species biodiversity. • Poor drainage services and wastewater pollution could affect aquatic, marine, and terrestrial ecology. This could further impact food chains and natural capital. • Spread of Invasive Non-Native Species (INNS). • Reduced access for people to utilise or visit important habitats with human health, well-being, social education, and recreation consequences. • Loss of soils and/ or increased soil erosion. • Loss or degradation of good quality agricultural land. • Negative impacts on drinking water sources, including groundwater sources. • Poor soil quality can increase surface runoff with flood risk and erosional impacts. • Contamination risks from operation/ construction. • Intrusion into historical or current landfill sites. 	<ul style="list-style-type: none"> • Reduce loss of biodiversity, support recovery, and reduce fragmentation. • Support objectives for biodiversity net gain where required and seek to achieve it where possible in other instances. • Incorporate a natural capital approach to grow the area’s natural capital. • Use soft engineering techniques for solutions where possible that can improve or create new habitats and/ or sequester carbon. • Support the removal of INNS where future planned options interact with them. • Connect people to nature by improving access to green spaces and biodiversity. • Catchment based land use management, including drainage, can improve soil structure and prevent/reduce soil erosion at the landscape scale. • Ensure soils are protected from contamination, such as during construction and flood events. • Reduce soil erosion, particularly from construction as the effects on soil can quickly become permanent. • Reduce nutrient loads in surface water and groundwater (such as through catchment management) • Protect better quality agricultural land from disturbance.
Human Health	<ul style="list-style-type: none"> • Increased population and associated development will generate additional demand for wastewater and drainage services. • Construction activity can impact human health and amenity for local communities. • Some specific options may impact amenity in negative ways such as odour. • If Public Rights of Way (PRoW) or other public access routes are impacted, this could reduce access to green spaces or exercise opportunities. • Poor drainage impacts environmental receptors such as water bodies which can impact human health through consumption (e.g. shellfish consumption), or recreation (e.g. bathing waters). • Climate change and hotter summers expected to increase heatwave risk to elderly, especially with an ageing population 	<ul style="list-style-type: none"> • Provide a resilient plan for sustainable drainage and wastewater management for customers, one that can handle current and future demand. • Ensure construction activities mitigate/ reduce disturbance to local communities. • Enhance the natural environment for recreation purposes to improve well-being. • Green infrastructure can help to reduce the urban heat island effect. • Reduce the quantity and/ or frequency of discharge events during storms with benefits to natural capital.

SEA Topic	Issues	Opportunities
Socio-economic	<ul style="list-style-type: none"> • Uncertainty over inflation and the rising cost of living may impact the region for the considerable future. • Unemployment rates in the North East are higher than the UK average. • Deprivation is high in parts of the region and is often accompanied by a lack of access to green spaces. • Transport and connectivity within, and to other regions, is limited in places. • Construction work resulting from the implementation of the DWMP has the potential to cause temporary disruption and disturbance to services. 	<ul style="list-style-type: none"> • Economic prosperity and employment opportunities/ stability are likely to be more secure as a result of improving the scale, quality, and resilience of the drainage and wastewater network. • Poor drainage can impact important infrastructure such as transport, especially through flooding. A more resilient network will assist regional connectivity.
Carbon & Material Assets	<ul style="list-style-type: none"> • New built infrastructure is highly likely to generate GhG emissions from embodied carbon, usually contribute negatively towards carbon neutrality objectives. • During operation, some built infrastructure may be carbon/material intensive, such as through significant power and/ or transport requirements. • Siting new wastewater infrastructure can be difficult because of perceptions and local objection. • Globally, resource use is more competitive than ever with increasing prices and dwindling resources available. • Some current wastewater assets are carbon intensive in their operation. • Increased demand from growth in population or the economy is likely to increase overall energy use across the network and the overall waste levels. • Landfills are becoming more difficult to source and more expensive, especially in a region which has historically used a lot of previous quarries. • Assets can be vulnerable to extreme weather events and from excessive heat. • Air Quality Management Areas (AQMAs) are present in certain urban areas and local plans aim to reduce air pollution, particularly from industry and transport. 	<ul style="list-style-type: none"> • Opportunity to consider the whole life GhG emissions and aim to achieve carbon neutrality through construction, embodied carbon, and operation. • Building, or rebuilding, assets in a more sustainable way can contribute to sustainable resource use, including supporting reduced carbon, and promoting a circular economy. • Opportunities for increased usage of renewable energy and potential for electricity generation from assets such as utilising heat or water flow. • Opportunity to reduce waste through design and to increase recycling rates and other higher-level options within the waste hierarchy. • Increased resilience to extreme weather and extreme flows can have significant positive effects on human exposure to pollutants and sewer flooding; and environmental pollution/quality. • Redevelopment of assets can reduce emissions to air. • 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.
Water Resources	<ul style="list-style-type: none"> • Population and economic growth will add pressures on the quantity of drainage and wastewater treatment. • Pollution can affect water quality with subsequent effects to biodiversity, the food chain (such as shellfish) and human health through potable water supplies. 	<ul style="list-style-type: none"> • Provide a resilient plan for sustainable drainage and wastewater management for customers, one that can handle current and future demand. • Promote lower water consumption schemes which will reduce the amount of wastewater needing to be treated. • Ensure the sustainable use of all receiving waterbodies.

SEA Topic	Issues	Opportunities
	<ul style="list-style-type: none"> Contamination can occur, or areas previously contaminated can be subject to increased levels. WFD may fail criteria on achieving Good Ecological Status/ Potential. Drought conditions can negatively impact surface water flows and quality, as well as the treatment of wastewater. 	<ul style="list-style-type: none"> Allow more water to remain in the natural environment. Improve water quality in waterbodies to meet WFD targets. Early integration of climate change resilience measures provides an opportunity for long term benefits to customers and stakeholders. Reduced flood risk through the DWMP would be particularly beneficial in certain zones where there is limited sewer capacity and low permeability glacial drift is present.
Flood Risk	<ul style="list-style-type: none"> Flood risk, including internal and external sewer flooding. Existing infrastructure may be towards the end of its lifetime; have been designed to accommodate lower capacity when population levels were lower; when climate change impacts were not considered; or when soft engineering techniques were infrequent, lowering resilience. Many assets are located close to water bodies, and this ultimately places them at greater flood risk which is anticipated to be increased by climate change. 	<ul style="list-style-type: none"> Reduce flood risk from all sources. Increase resilience to flooding including climate change impacts. Encourage soft engineering techniques both within NWG and wider stakeholders to sustainably manage surface water, thus reducing sewer flood risk (as well as surface water flood risk).
Heritage	<ul style="list-style-type: none"> Potential impacts on designated and non-designated heritage assets (including built heritage and its setting, archaeological remains and its settings and the historic landscape character), particularly where these are related to the water environment or may be affected by drainage arrangements, flood risk and changes to water catchment areas. There is potential for disturbance of known and unknown heritage assets as well as their setting, especially during construction. Organic-rich deposits, both archaeological and 'natural' (alluvium, peat, etc.), can include organic artefacts (wood, leather, etc.) and paleoenvironmental indicators / proxies (macroscopic plant remains, pollen, etc.), generally resulting from waterlogged anoxic conditions, which are particularly sensitive to any hydrological and geochemical changes to their burial environments. The potential impact of water catchment and abstraction measures on heritage assets and their settings, including impacts on water-related or water dependent heritage assets. The potential impact of changes in groundwater flows and chemistry on preserved organic and 	<ul style="list-style-type: none"> Assess, and avoid, minimise and/or mitigate as appropriate, any impacts to heritage assets. Incorporate improved access to heritage assets where possible, especially for communities where this is previously limited or those who are deprived. Opportunities exist to discover and preserve archaeological assets which may be previously unknown. The opportunities for conserving and enhancing heritage assets as part of an integrated approach to flood risk management and catchment-based initiatives, this includes sustaining and enhancing the local character and distinctiveness of historic townscapes and landscapes. The opportunity for increasing public awareness and understanding of appropriate responses for heritage assets in dealing with the effects of flooding as well as the design of measures for managing flood risk and improving resilience. The opportunities for improving access, understanding or enjoyment of the historic environment and heritage assets as part of the design and implementation of flood risk management measures

SEA Topic	Issues	Opportunities
	<p>paleoenvironmental remains: where ground water levels are lowered as a result of measures to reduce flood risk, this may result in the possible degradation of remains through de-watering, whilst increasing groundwater levels and the effects of re-wetting/ changes in salinity brought about by coastline modification could also be harmful.</p> <ul style="list-style-type: none"> • The potential impact of hydro-morphological adaptations on heritage assets: this can include the modification/removal of historic in-channel structures, such as weirs / coastal and estuarine features such as historic sea defences; as well as physical changes to rivers/the coastline with the potential to impact on archaeological and paleoenvironmental remains. • The potential for unrecorded deeply buried and waterlogged archaeology within the 'natural' floodplain/estuarine / coastal deposit sequence. • The potential implications of flood risk on securing a sustainable use for heritage assets, including their repair and maintenance. • Many wastewater options are intrusive into the ground in a region with strong archaeological heritage. • Hadrian's Wall World Heritage Site (WHS) and close proximity designations, plus buffers, cover a large area in the North East which will constrain some option locations. 	
Landscape	<ul style="list-style-type: none"> • The area enjoys a high proportion of designated (and defined) landscapes which could be affected by the plan. • Some option types could affect visual amenity. • Construction can directly impact landscape character and visual amenity. • The region is the most sparsely populated in England and very diverse from a landscape perspective. This means development of any type is likely to be more significant here than in other regions. • Some landowners in the region (predominantly upland areas) control large areas such as whole stream catchments which may present difficulties if they are opposed. 	<ul style="list-style-type: none"> • Opportunity to address historic drainage of blanket bog, grassland, and wetlands to slow the flow of water and support the natural landscape. • Opportunity to develop sustainable solutions that add to National Parks. • Protect and enhance the diverse landscape character across the region, from uplands to coastal areas. • Opportunity to redevelop assets with current landscape impacts. • Promote sustainable land use. • Opportunities to work with large landowners to implement catchment focussed solutions. • Opportunities to work with others such as the Heritage Coast Partnership. • Nature based flood prevention measures such as appropriate vegetation planting have the potential to enhance the landscape.
Climate Change Resilience	<ul style="list-style-type: none"> • Climate change is anticipated to increase extremes of weather and thus the frequency and severity of flood risk. 	<ul style="list-style-type: none"> • Integrate wastewater climate change resilience measures for long term benefits to customers and stakeholders.

SEA Topic	Issues	Opportunities
	<ul style="list-style-type: none"> Climate change is anticipated to increase extremes of weather with implications for biodiversity, such as through low flows within watercourses and habitat fragmentation. Those least able to adapt to climate change are likely to be more sensitive to the effects, this could increase socio-economic inequalities. 	<ul style="list-style-type: none"> Options that are resilient to climate change are likely to have wider ranging benefits across many other SEA topics from biodiversity to flood risk, and human health. Increased resilience to extreme weather and extreme flows can have significant positive effects on human exposure to pollutants and sewer flooding; and environmental pollution/ quality. Improve place making and resilience to climate change to reduce socio-economic inequality and level up disadvantaged areas. 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)

3.3 Spatial Baseline Context

The seven Level 2 SPAs were introduced in **Figure 1.2.1**, the Study Area. These areas at Level 2 provide a more formalised way to engage with stakeholders and customers alongside facilitating a more strategic level of planning above the more detailed catchment (Level 3) assessments. The seven SPAs are:

- Northumberland
- Rural Tyne
- Tyneside
- Wearside
- Wear
- Teesside
- Teesdale

Table 3.3.1 provides a brief summary of each SPA.

Table 3.3.1. – Summary of each Level 2 SPA

Level 2 SPA	Key characteristics
Northumberland	<ul style="list-style-type: none"> The northernmost Level 2 SPA, it is the largest by area (2,759km²). It is highly rural, and topography becomes steeper to the west which also includes Northumberland National Park. The Level 2 SPA borders the North Sea.
Rural Tyne	<ul style="list-style-type: none"> The westernmost Level 2 SPA, it is the second largest by area (2,575km²). It is highly rural, and topography becomes steeper to the west which also includes Northumberland National Park. The majority of the Level 2 SPA would be described as either undulating or hilly. The Level 2 SPA does not border the North Sea.
Tyneside	<ul style="list-style-type: none"> A central eastern Level 2 SPA, it is the second smallest by area (425km²). It is highly urban, and topography is largely flat with some small undulating

Level 2 SPA	Key characteristics
	areas that do not intercept any National Park. The Level 2 SPA borders the North Sea.
Wear	<ul style="list-style-type: none"> A central Level 2 SPA, it is the median by area (1,172km²). It is a mixture of urban and rural, and topography is a mixture of flatter areas towards the east with more undulating and hilly areas towards the west. The Level 2 SPA borders the North Sea.
Wearside	<ul style="list-style-type: none"> A central eastern Level 2 SPA, it is the smallest by area (172km²). It is highly urban, and topography is largely flat with some small undulating areas that do not intercept any National Park. The Level 2 SPA borders the North Sea.
Teesdale	<ul style="list-style-type: none"> The south-western most Level 2 SPA, it is the third largest by area (1,211km²). It is highly rural, and topography becomes steeper to the west which also includes the Yorkshire Dales National Park. The majority of the Level 2 SPA would be described as either undulating or hilly. The Level 2 SPA does not border the North Sea.
Teesside	<ul style="list-style-type: none"> The south-eastern most Level 2 SPA, it is the third smallest by area (910km²). It is a mixture of urban and rural, and topography is largely flat with some undulating areas, with steeper hills towards the southern extent where the Level 2 SPA intercepts the North York Moors National Park. The Level 2 SPA borders the North Sea.

3.3.1 Categorisation of Level 3 Catchments

SEA is strategic in nature and so the assessment of options should not assess each Level 3 (L3) Catchment on its own. However, for this DWMP, the number of Level 2 areas (seven as shown in **Table 3.3.1**) is quite low for a meaningful assessment. To resolve this issue Level 3 catchments have been grouped within their Level 2 SPA using the classification set out below.

The following categories have been used to classify L3 catchments:

1. **HU - prominent Historic Urban catchment** (e.g., market towns or locations with high heritage value).
2. **IU - Industrial/ Economic Urban catchment** (e.g., city centre catchments; areas of significant industry; or urbanised). The category is used in a wide context for activities of an economic/ commercial purpose.
3. **CU - Coastal Urban catchment** (e.g., a coastal urban area such as a tourist focussed seaside town).
4. **LR - Lowlands Rural catchment** (e.g., a small village or series of villages that are located at lower altitudes within the context of Northumberland, usually associated with higher quality agricultural land/ mix of pastoral and crop farming).
5. **UR - Uplands Rural catchment** (e.g., a village located in the upland areas of Northumberland, usually associated with lower quality agricultural land/ predominantly pastoral farming and/ or National Park boundaries).
6. **SU- Suburban Fringe catchment** (e.g., a mixed catchment towards the edge of a large settlement which would be difficult to exclusively place into either a rural or urban category).

Given the varying nature of catchments, the criteria for catchment types are based on judgement, rather than strict numerical values. The judgement has been informed by satellite imagery; Google StreetView; catchment location; population numbers; catchment size; GIS datasets including the agricultural land classification, various heritage and landscape information; and textual information sources when available. Numerical values

were not strictly applied as they were found to vary based on the catchment characteristics. For example, in terms of population and catchment size, a small catchment could consist of 1,100 people, whereas a catchment five times larger could consist of 2,000 people, therefore a simple threshold number would not provide accurate groupings. Further, there are several industrial dockland catchments that have very small populations but are almost completely urbanised.

The assessment used catchments provided by NWG, which are usually named in relation to local villages or towns. This means that reviewing just the context of the name could lead to confusion where a catchment named after a small town could be rural when another named after a small village could be urban. This is because the catchment may spread over a large area encompassing many towns and villages/ or be a small town surrounded by a large expanse of rural land. Readers should therefore be aware of this.

Consideration was given to including a coastal rural category; however, this was not taken forward as most of the SEA assessment results were found to be comparable to the lowland rural catchments category. In contrast, there is a category for coastal urban areas as access to open space, air quality benefits, and additional flood risk from coastal waters were found to vary between coastal urban areas and non-coastal areas. These environmental impacts were less likely to be different for rural catchments by their rural nature. This fits the strategic nature of SEA.

3.4 How are Options to be Assessed?

The Water UK framework recommends undertaking SEA on the final Plan, which is for L1, the highest and most strategic level of the DWMP. However, a requirement of the Water UK framework is also to undertake the development of options with an understanding of the environmental and social impacts, supported by SEA requirements.

Undertaking SEA of the final plan was deemed unlikely to be effective in influencing the plan, development of options, and its environmental effects, as such the SEA was carried out during the development of the plan.

To keep the assessment manageable and informative, the assessment of options has been kept relatively strategic within the SEA, for example through the application of the identified options to different types of catchments (upland rural, lowland rural, economic urban areas, coastal urban, suburban fringe, and historic urban areas). The alternative would be to apply these options to each of the seven SPAs (Level 2) or the 257 TPUs that passed through risk analysis (Level 3). However, the former would be too broad, and the latter would be likely to result in an overly detailed assessment (so not appropriately 'strategic') and would probably be unmanageable given the very large number of options to be assessed.

The resulting number of catchment types was a maximum of 42, with 35 taken forward for assessment as seven were not applicable. This number was deemed to be an appropriate number for meaningful assessment. Seven of the potential catchment types were not applicable because the Level 2 SPA did not include the particular catchment category. For example, there are no coastal urban catchments in the Rural Tyne L2.

4 SEA ASSESSMENT METHODOLOGY

4.1 SEA Framework, including SEA Objectives

This SEA adopts an objective-led approach, in line with the ODPM Practical Guide to the SEA Directive.

The scope of the objectives has been carefully considered to reflect the SEA Regulations, Water UK framework on undertaking a DWMP, regional information and the nature of the DWMP. Following the review described in the earlier chapters of this report, the SEA framework has been developed based on:

- the key policy messages and environmental protection objectives identified in the review of policies, other plans, and programmes; and
- the environmental baseline conditions and their likely evolution.

The nine SEA objectives are set out in **Table 4.1.1**. Use of these objectives in the assessment of the DWMP is supported by guiding questions (**Table 4.1.2**).

When working through the assessment following the scoping stage, the geodiversity SEA objective was found to fit well as part of the biodiversity SEA objective, it was not adding value to score it individually with alignment in the topic of soils and land use as the main drivers. The climate change objective was also edited so that resilience to climate change could be assessed separately to the causes of climate change, which are now clearly included within the materials asset's objective. As such, the final SEA objectives are as follows:

Table 4.1.1 – SEA Topics and SEA Objectives

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

Table 4.1.2 – SEA Framework - Guiding Questions

SEA Topic	SEA Objectives	Guiding Questions
Biodiversity and Geo-diversity	Protect, conserve, restore and enhance biodiversity and geodiversity, including soils	<p>Will it affect the conservation status of any internationally designated sites (Special Protection Areas, Special Areas of Conservation (SACs), Ramsar sites)?</p> <p>Will it affect the conservation status of any nationally designated sites (Sites of Scientific Interest (SSSIs)?</p> <p>Will it affect the conservation status of any other designated sites (local wildlife sites)?</p> <p>Will it contribute to biodiversity loss/ gain?</p> <p>Will it affect habitat connectivity/ fragmentation?</p> <p>Will it affect the freshwater or coastal environment, habitats, and species?</p> <p>Will it affect irreplaceable habitat such as ancient woodland?</p> <p>Will it affect the introduction or spread of INNS?</p> <p>Will it affect natural capital and the ecosystem services?</p> <p>Will it avoid damage to geologically important sites (e.g. geological SSSIs)?</p> <p>Will it protect and enhance the quality of soils?</p> <p>Will it protect, conserve, and enhance resources, such as high-quality agricultural land, sterilisation of mineral resources, soil erosion and nutrient loading of waterbodies?</p> <p>Will it promote the sustainable use of land, such as using previously developed land?</p> <p>Will it create contamination or contribute to remediation?</p> <p>Will it achieve legislative & policy targets for biodiversity protection & enhancement</p>
Human Health	Protect, conserve, and enhance human health and well-being, including resilient communities	<p>Will it affect access to nature, particularly for those living within urban or deprived areas?</p> <p>Will it affect the environment for other users including for recreation, tourism and navigation?</p> <p>Will it affect human health and well-being through access to resilient, high quality, sustainable and affordable wastewater systems?</p> <p>Will it affect human health and well-being through access to a resilient, high quality, sustainable and affordable supply of water?</p> <p>Will it address specific customer concerns?</p>
Socio-economic	Protect, conserve, and enhance social and economic prosperity	<p>Will it affect opportunities for recreation and tourist activities?</p> <p>Will it affect economic development/ prosperity?</p> <p>Will it affect social deprivation and inequality?</p> <p>Will it affect important infrastructure (such as hospitals, roads, rail)?</p>
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	<p>Will it contribute towards net zero targets?</p> <p>Will it use natural rather than built solutions where appropriate?</p> <p>Will it make efficient use of existing infrastructure?</p> <p>Will it minimise the demand for resources during construction (such as through the use of soft engineering solutions rather than hard engineering solutions)?</p> <p>Will it minimise the demand for resources during operation (such as through avoiding pumping requirements)?</p> <p>Will it affect emissions of pollutants to air, including in sensitive locations (e.g. in proximity to an AQMA/ an ecologically sensitive site)?</p> <p>Will it affect waste generation, including hazardous wastes?</p>
Water Resources	Protect, conserve, and enhance water resources	<p>Will it enable better management of surface water before entering sewers?</p> <p>Will it affect coastal water quality (including bathing waters, shellfish waters)?</p> <p>Will it affect surface water quality or quantity?</p> <p>Will it affect groundwater quality or groundwater recharge?</p> <p>Will it affect drinking water or water abstraction zones?</p>

SEA Topic	SEA Objectives	Guiding Questions
		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 reduce the volume and frequency of SOs? 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?

4.2 SEA Assessment 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. Consideration is given to the likely significance of identified effects in accordance with Schedule I to the SEA Regulations (see below).

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.*

The SEA process is concerned with the likely significant effects on the environment, including the measures envisaged to prevent, reduce, and as fully as possible offset any significant adverse effects of implementing the plan.

For the purposes of 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 identified.

An initial informal appraisal of the 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 have 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 policies 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), **medium term** (6-25 years), **long term** (25-40 years).
- **Certainty:** the level of surety of an effect.

The above types of effects have been considered when conducting the assessment and where relevant they are referenced in this report.

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

5 DEVELOPMENT AND ASSESSMENT OF INDIVIDUAL OPTIONS

5.1 DWMP Process and Compatibility with the SEA

The DWMP has been produced following a risk and benefits-based approach, following the guidance provided in the DWMP Framework set out in **Chapter 1** and summarised in **Figure 1.3.1** and **Table 1.4.2**. This process is expanded upon in **Table 5.1.1** below, including setting out the factors considered in the development of the DWMP and identifying how the framework was adapted following the publication of the SODRP.

Table 5.1.1 – DWMP Framework Process

DWMP Stage	Initial Approach (prior to SODRP)	Approach for final DWMP
Strategic Context.	The Strategic Context document outlines NWG’s intended approach to producing the DWMP.	The strategic context previously agreed with stakeholders has been largely superseded by the requirements of the SODRP.
Risk Based Catchment Screening (RBCS)	<p>This stage prioritised catchments for further investigation. This initial screening stage considered 20 criteria, with prioritisation given to the following criteria:</p> <ul style="list-style-type: none"> • Bathing or Shellfish Waters • Discharge to Sensitive Waters (Part A) • Storm Overflow Assessment Framework (SOAF) • Internal Sewer Flooding • External Sewer Flooding • WwTW Effluent Quality Compliance • WwTW Dry Weather Flow (DWF) Compliance • Storm Overflows <p>Planned residential development</p>	Following the SODRP, all catchments were assessed, whereas previously in some locations these would have been screened out as not requiring assessment by the RBCS.
Baseline Risk and Vulnerability Assessment (BRAVA)	<p>Hydraulic modelling to determine the existing performance of catchments and analyse the potential impacts of future pressures such as growth, urban creep and climate change. Results are assessed against the DWMP’s Planning Objectives which are set out below:</p> <p><u>Flooding</u></p> <ul style="list-style-type: none"> • <i>PO 1 – Reduction in Internal Property Sewer Flooding risk as a result of hydraulic incapacity</i> • <i>PO 2 – Reduction in External Property Sewer Flooding risk as a result of hydraulic incapacity</i> • <i>PO 3 – Reduction in total population at risk of Sewer Flooding 1 in 50 year</i> 	No change.

DWMP Stage	Initial Approach (prior to SODRP)	Approach for final DWMP
	<ul style="list-style-type: none"> PO 3 – Reduction in total population at risk of Sewer Flooding 1 in 50 year storm; supporting Risk Management Authorities delivery <p><u>Environmental</u></p> <ul style="list-style-type: none"> PO 4 – Reduction in risk of detriment to Bathing Water Quality through intermittent discharges PO 5 – Reduction in risk of detriment to River Water Quality through continuous and intermittent discharges PO 6 – Reduction of non-compliance risk that could lead to potential Pollution <p><u>Compliance</u></p> <ul style="list-style-type: none"> PO 7 – Reduction of risk resulting from poor Asset Health PO 8 – Improvement in Wastewater Treatment Works and Intermittent Discharge Permit Compliance. 	
Problem Characterisation	Identify the level of risk and potential benefits within a catchment to inform option development. Consideration is given to flooding, SOs, pollution, WwTW dry weather flow (DWF) compliance	Identification of catchments where storm overflows are not meeting the SODRP criteria, following Environment Agency guidance.
Option Development and Appraisal (ODA)	Identify the hierarchy of options available to address the issues identified in the Problem Characterisation stage; appraise and shortlist options to determine the most preferred approach based on 'best value'. The appraisal includes: <ul style="list-style-type: none"> identification the needs of catchments with regards to current performance and performance in the future. application the options development process to enable the scoping of options to resolve catchment Needs. assessment of costs and benefits/dis-benefits of options to enable the determination of Least Cost and Best Value options. 	Options based upon reducing storm overflow spills with valuation of other social and environmental benefits; options also consider NWG internal sewer food risk target..
Programme Appraisal	Select options for delivery and their timelines, taking into account regulatory and ambitious targets	Option prioritisation based upon catchments with the highest priority storm overflows to be addressed.

The DWMP process itself provides a good coverage of the SEA topics, particularly in relation to water resources, flood risk, climate resilience and biodiversity – reflecting the nature of the plan and its objectives for flood risk, the (water) environment and 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

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. Following SEA comments on the draft plan, consideration is now given to carbon through the assessment, a positive improvement from the draft stage. Overall, the SEA topics are well covered within the DWMP development process, demonstrating integrated consideration of the SEA themes throughout the plan production.

5.2 Option Development and Consideration of Reasonable Alternatives

The DWMP Option Development and Appraisal stage has been based on the principles of the HM Treasury, The Green Book: Central Government Guidance on Appraisal and Evaluation as set out in Error! Reference source not found. below. The stages have been summarised here, further details are provided in the Option Development and Appraisal Methodology.

The methodology has been reviewed by the SEA team to ensure all reasonable alternatives were being considered, both at the draft and final plan stages, with the following noted at this stage:

- 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.
- Treatment of SO discharges to reduce harmful pathogens to bathing waters (such as disinfection by ultraviolet radiation or nature-based solutions) are not included at this stage. The focus has instead been on removal of SOs or reducing the frequency of SO discharges to meet the targets. Disinfection is energy intensive, has a high capital cost and requires a large area of land. Nature-based solutions on SO discharges has not been sufficiently investigated at this stage and is not allowed through the Environment Act, however NWG intend to promote this with stakeholders during implementation of the plan. Further consideration may be given to disinfection within later DWMP cycles if the 2035 target cannot be met.
- Installation of screens on SOs are now required through the SODRP. As such they are costed within the plan, rather than considered as an option.
- 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. Within the plan area, these sites include Roman Walls Loughs SAC and Teesmouth & Cleveland Coast Special Protection Area. 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.
- 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.

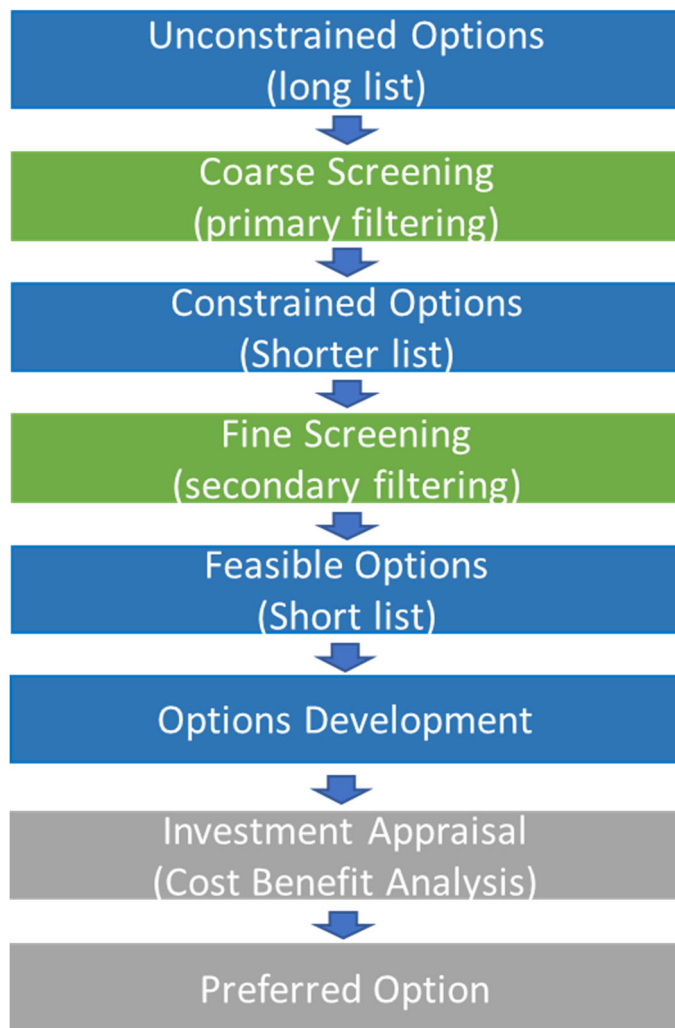


Figure 5.2.1: Process for developing and filtering options.

The long list of options considered in the DWMP is shown in **Figure 5.2.2**.

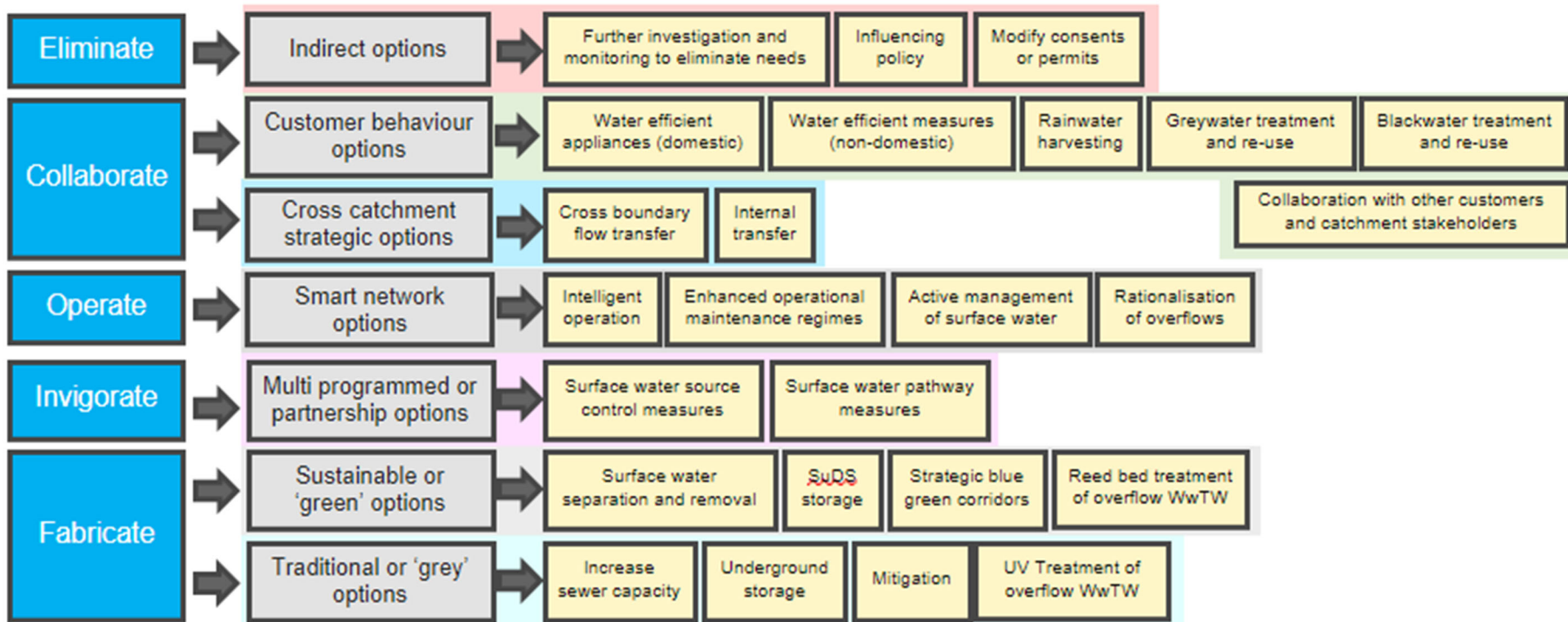


Figure 5.2.2: Unconstrained options considered in the DWMP (long list)

The unconstrained options were screened to determine if they meet the needs of the plan and are technically feasible, as set out in Error! Reference source not found.. The table also includes reasons for discarding options.

Table 5.2.3: Primary screening of options against need and technical feasibility

Option	Meets Need?	Technically Feasible?	Reason for discarding
<p>Further investigation and monitoring to eliminate needs</p> <p>Understand root cause and risk</p>	Part (PO4 & PO5 Only)	Yes	<p>Carried forward</p> <p>Investigations to understand the impact of harm and the monitoring requirements set out in our business case for monitoring which sets out the investigation and improvement of monitoring to understand the impact of storm overflows on receiving water bodies. These will inform our interventions but not remove the need for investing in reducing spills from storm overflows as this is a new statutory requirement.</p>
<p>Influencing policy</p> <p>Growth, planning and urban creep</p>	No	Yes	<p>Discarded</p> <p>This is a new statutory requirement so options for eliminating/reducing the need for investment are limited. Reducing flows by restricting flows from new development and growth are not acceptable to customers and stakeholders. Opportunities for influencing policy around sustainable urban drainage exist and have been carried forward below.</p>
<p>Modify consents or permits</p> <p>Review the permit with the Environment Agency and meet new permit conditions</p>	No	Yes	<p>Discarded</p> <p>Reviewing permits and consents is not consistent with SO guidance which is intended to reduce spills. Any change in permit would not alter the number of spills and is unlikely to be accepted by the regulator</p>
<p>Water efficient appliances/water efficient measures (non-domestic)</p> <p>Supplying customers with household appliances which are designed to reduce water consumption. Reduced per capita consumption (PCC) can also benefit the wastewater system by reducing the dry weather flow to be conveyed through the sewer network and through the STWs.</p>	No	Yes	<p>Discarded</p> <p>Even though the option is technical feasible, the inclusion of any domestic water efficiencies is not expected to result in sufficient flow reduction that would alleviate a SO need</p>

Option	Meets Need?	Technically Feasible?	Reason for discarding
<p>Rainwater harvesting</p> <p>Removing surface water from the system and making it available to re-use. By installing measures which collect and store the rainfall before it lands and is lost as runoff. Rainwater harvesting reduces the amount of flow that needs to be conveyed through the sewer network during a storm, thus reducing the likelihood of sewer flooding or spills to watercourse. Includes smart management of surface water before flow enters the system (e.g. smart water butts).</p>	Part	Yes	Carried forward
<p>Greywater/blackwater treatment and re-use</p> <p>Install systems to treat and re-use household greywater (excluding toilets) and Blackwater (including toilets) for flushing toilets and gardening use. Either at property level or larger scale to reduces both flow and load to the system. The treatment levels considered vary from treatment for potable use to pre-treatment for discharge into the combined or foul sewer network.</p>	Part (PO8 Only)	Yes	<p>Carried forward</p> <p>This option will progress if any NIDP scheme are proposed within the Drainage area.</p> <p>Currently, there are schemes planned for Sedgefield, Whickham South and South Stanley.</p>
<p>Cross boundary flow transfer</p> <p>Utilise available capacity elsewhere by transferring flows to a neighbouring Water and Sewerage Companies ie Scottish Water, Yorkshire Water or United Utilities.</p>	No	No	<p>Discarded</p> <p>This option was considered for Berwick which is adjacent to Scottish Water's area but discarded is because it wasn't technically feasible. There is no suitable network in the largely rural Scottish Water area which could accept flows from Berwick. Would require an extensive pumped transfer</p>

Option	Meets Need?	Technically Feasible?	Reason for discarding
<p>Internal transfer</p> <p>Divert flows from one drainage area into an adjacent area.</p>	No	No	<p>Discarded</p> <p>No areas identified that could be used to transfer flows from one area to another.</p>
<p>Collaboration with other customers and catchment stakeholders</p> <p>Includes supporting schemes both and being progressed by some of NWG key stakeholders. For example, Local Authority or Environment Agency funding projects. Such as flood defence works or highway upgrade etc</p>	Part (All PO's except PO8)	Yes	<p>Carried forward</p>
<p>Smart Network and Intelligent operation</p> <p>Controlling flow movement in reaction to the current situation. Allows the system to be operated proactively, maximising the use of existing assets. These options cover a range of different approaches e.g. modifying the start-stop levels at strategic pumping stations, creation of new network control points which allow for flow to be temporarily held back in the catchment.</p>	Part (All PO's except PO8)	Yes	<p>Carried forward</p> <p>Considered in conjunction with other options</p>
<p>Enhanced operation maintenance regimes</p> <p>Pro-active and targeting operation and maintenance rehab programmes.</p>	Part	Yes	<p>Carried forward</p> <p>On its own, this would not be sufficient to address SO Needs but may be used a part solution to ensure that operational problems do not exacerbate spills and which would not be addressed under routine maintenance regimes.</p> <p>It is not considered that there are any overflows which spill solely as a results of silt or operational issues.</p>

Option	Meets Need?	Technically Feasible?	Reason for discarding
<p>Active management of surface water</p> <p>Description</p>	Part	Yes	<p>Discarded</p> <p>Same answer as Smart networks, may be used as part of a wider strategic option.</p>
<p>Rationalisation</p> <p>Rationalisation of overflows with a single DA to improve management of spills without providing additional storage or increase capacity</p>	No	Yes	<p>Discarded</p> <p>Does not meet SO Need on its own and wasn't considered.</p>
<p>Surface water source control measures</p> <p>Managing surface water and maximising its potential for re-use. Opportunities for large-scale source control installation such as retrofitting in highways and around buildings.</p>	Yes	Yes	<p>Carried forward</p>
<p>Surface water exceedance pathways</p> <p>The need to provide safe conveyance (as opposed to storage) for floodwater during an extreme rainfall event (when the capacity of the sewer network is exceeded). Could, significantly mitigate the risk of considerable damage to public and private property and even loss of life that could result from an extreme rainfall event</p>	No	Yes	<p>Discarded</p> <p>Would not meet Storm Overflow reduction Need</p>
<p>Strategic blue green corridors</p> <p>Combine the management of blue and green spaces in urban environments with a focus on place making.</p>	Part	Yes	<p>Carried forward</p>

Option	Meets Need?	Technically Feasible?	Reason for discarding
Surface water separation Separate surface water from combined systems by constructing new surface water networks.	Yes	Yes	Carried forward
Surface Water Removal Removing existing surface water from discharging into the combined system by diverting to watercourses or other SW systems.	Part	Yes	Carried forward
Green or SuDS Storage SuDS Storage such as ponds, basins or swales.	Part	Yes	Carried forward
Increase sewer capacity Replace sewer with a large diameter sewer to increase capacity.	Yes	No	Discarded Not considered without assessing downstream impacts at the same time. Likely to shift problems within catchments
New CSO Construction of a new CSO with overflow to river	Part	No	Discarded Considered that it is preferable to reduce spills at existing CSOs rather than construct new assets.
Underground storage Online upgrade of existing CSO/provision of storage tanks to provide additional underground storage to reduce storm impact	Yes	Yes	Carried forward

Option	Meets Need?	Technically Feasible?	Reason for discarding
<p>Mitigation</p> <p>Surface water receptor measures. Keep floodwater away from buildings and strategic infrastructure in event of a storm. This would include property level protection (floodgates etc.)</p>	No	Yes	<p>Discarded</p> <p>Would not meet Storm Overflow reduction Need</p>

The options taken forward for further consideration are summarised in **Figure 5.2.3**. These are the reasonable alternative individual options and are assessed using the SEA framework in **Table 5.3.1** in the next section.

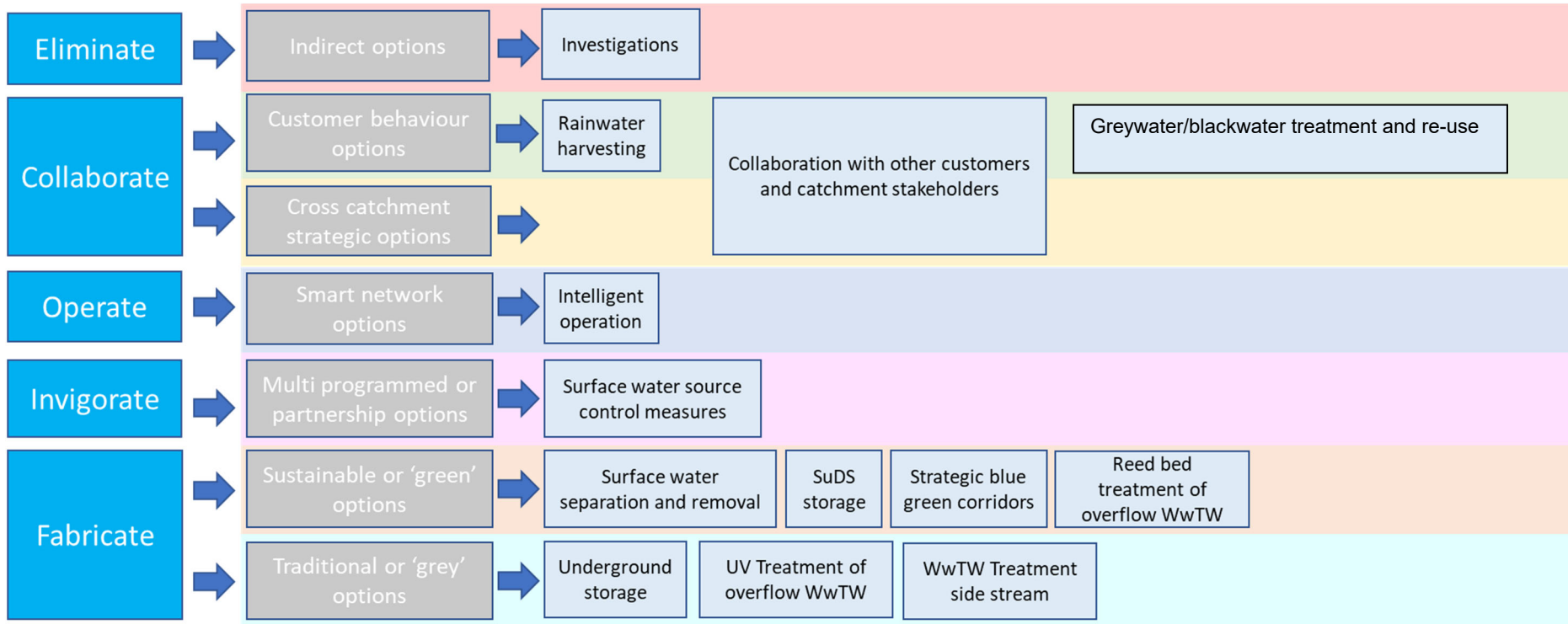


Figure 5.2.3: Constrained options considered in the DWMP (shorter list)

The following options were identified for each L4 drainage community:

- **Least-cost** option to meet the requirements of the SODRP.
- **Best value** SO option (i.e., the best cost-benefit ratio) considering the positive impacts on other Planning Objectives (such as flooding and pollution) and societal benefits from delivering the SODRP.
- **Alternative** options to identify alternative green options where the cost difference was minimal but green benefits increased and grey solutions decreased.
- **Preferred** option, selecting one of the above three options.

5.3 SEA Assessment of Options (Level 1)

The reasonable alternative individual options identified in **Figure 5.2.3** have been first assessed across the Level 1 plan area using the SEA framework and guiding questions (**Table 4.1.2**). Results are presented in **Table 5.3.1** below, with narrative supporting the assessment provided in **Table 5.3.2**. The option 'Investigations' is not likely to have significant environmental effects and is not assessed further.

Assessment key:

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

Table 5.3.1 – Assessment of reasonable alternative individual options using SEA framework (applied to the Level 1 DWMP area)

Level 1 Study Area

Option		<i>Protect, conserve, and enhance biodiversity & geodiversity, including soils</i>	<i>Protect, conserve, and enhance Human Health and well-being, including resilient communities</i>	<i>Protect, conserve, and enhance social and economic prosperity</i>	<i>Address causes of climate change, manage and improve efficient use of resources, inc. carbon, emissions to air & waste generation</i>	<i>Protect, conserve, and enhance water resources</i>	<i>Reduce and manage flood risk, increasing flood resilience</i>	<i>Protect, conserve, and enhance the historic environment, including archaeology</i>	<i>Conserve, protect and enhance the landscape, townscape, and visual amenity</i>	<i>Adapt, and improve resilience to climate change</i>
	Options	Biodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
Rainwater harvesting		0	+	+++	++	+			++	
Greywater/blackwater treatment and re-use		0	+	+++	++	+			++	
Surface water source control measures	+	0		+++	++	+			++	
Smart Network and Intelligent operation				+	+	+			+	
Partnership working, collaboration with others	+	+	+	+	+	+	+	+	+	
Strategic blue green corridors	++	++	++	++	++	++	0	++	++	
SuDS storage	+	+	+	+	+	+	0	+	++	
Surface water separation and removal	-	0	0	--	++	-	-		++	
Below ground storage	-	0	0	-	+	+	-		+	
WwTW Treatment side stream (to expand capacity)	-	-	0	-	+	-	-	-	+	

Reed bed treatment of WwTW final effluent	++	+	0	+	++	+		+	+
UV Treatment of WwTW final effluent	+	+	0	--	++			0	0

Table 5.3.2 – Narrative supporting the assessment of reasonable alternative individual options using SEA framework (applied to the Level 1 DWMP area)

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
Rainwater harvesting	Removing surface water from the system and making it available to re-use. By installing measures which collect and store the rainfall before it lands and is lost as runoff. Rainwater harvesting reduces the amount of flow that needs to be conveyed through the sewer network during a storm, thus reducing the likelihood of sewer flooding or spills to watercourse. Includes smart management of surface water before flow enters the system (e.g. smart water butts).	<p>This option is assessed on the basis it aims to reduce flow to the sewer network (both domestic and non-domestic flows). Rainwater harvesting systems may be feasible both in new development, and in some instances by retrofitting. Whilst these may be outside the direct control of NWG, NWG will have some influence through partnership working (such as through local authority planning policy) and direct promotion of such measures with customers and developers. The intention of this option is to reduce flows to the sewer network and WwTWs, reducing SO discharges by allowing an increased proportion of sewerage to be treated within the capacity of WwTWs, thus improving water quality. See note on potential cumulative effect below*.</p> <p>This option assesses positively in terms of addressing the causes of climate change and material assets (noting that some measures may require increased resource use to implement, however they would reduce water consumption), water and flood risk. In areas of deprivation, there is a minor positive effect from the measure for metered customers in instances where low-cost retro fit measures are implemented and where wider measures are implemented within new developments. It assesses positively in terms of resilience to climate change through reducing water consumption as pressure on resources increases and reducing flows to the sewer network.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report. In addition, this option is likely to be promoted through wider water sector schemes aimed to reduce per capita water consumption.</p>
Greywater / blackwater treatment and re-use	Install systems to treat and re-use household greywater (excluding toilets) and Blackwater (including toilets) for flushing toilets and	<p>This option aims to reduce water consumption (and thus discharge) through increasing greywater / blackwater re-use by households and organisations to relieve pressure on the wastewater network and treatment works.</p> <p>Such measures may be feasible both in new development, and in some instances by retrofitting. Whilst these may be outside the direct control of NWG, NWG will have some influence through partnership working (such as through local authority planning policy) and direct promotion of such measures with customers and developers. The intention of this</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
	<p>gardening use. Either at property level or larger scale to reduces both flow and load to the system. The treatment levels considered vary from treatment for potable use to pre-treatment for discharge into the combined or foul sewer network.</p>	<p>option is to reduce water consumptions and subsequent flows to the sewer network and WwTWs, reducing SO discharges by allowing an increased proportion of sewerage to be treated within the capacity of WwTWs, thus improving water quality. See note on potential cumulative effect below*.</p> <p>This option assesses positively in terms of addressing the causes of climate change and material assets (noting that some measures may require increased resource use to implement, however they would reduce water consumption), water and flood risk. In areas of deprivation, there is a minor positive effect from the measure for metered customers in instances where low-cost retro fit measures are implemented and where wider measures are implemented within new developments. It assesses positively in terms of resilience to climate change through reducing water consumption as pressure on resources increases and reducing flows to the sewer network.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report. In addition, this option is likely to be promoted through wider water sector schemes aimed to reduce per capita water consumption.</p>
<p>Surface water source control measures</p>	<p>Managing surface water and maximising its potential for re-use. Opportunities for large-scale source control installation such as retrofitting in highways and around buildings.</p>	<p>This option is assessed on the basis that it aims to reduce flow to the sewer network (primarily non-domestic flows). This option includes more substantial measures such as permeable paving, green roofs, etc. Such measures may be feasible both in new development, and in some instances by retrofitting. Whilst these may be outside the direct control of NWG, NWG will have some influence through partnership working (such as through local authority planning policy) and direct promotion of such measures with customers and developers. The intention of this option is to reduce flows to the sewer network and WwTWs, reducing SO discharges by allowing an increased proportion of sewerage to be treated within the capacity of WwTWs, thus improving water quality. See note on potential cumulative effect below*.</p> <p>This option assesses positively in terms of addressing the causes of climate change and material assets (noting that some measures may require increased resource use to implement), water and flood risk. It assesses positively in terms of resilience to climate change through reducing flows to the sewer network.</p>
<p>Smart network and Intelligent operation</p>	<p>Intelligent network operation, including monitoring and management measures to control flow movement in reaction to the current situation. Allows the system to be operated proactively, maximising the use of existing assets. These options cover a</p>	<p>The option is assessed on the basis that no, or minimal, materials and construction are required, and that it aligns more with green options than grey options. It provides the opportunity to manage flows, for example by controlling flow movement in reaction to the current situation and to allow the system to be operated proactively, maximising the use of existing assets. As such it provides benefits for water quality, flood risk, climate resilience and material assets through more effective use of existing assets, without the requirement for substantial network changes. In this way, it helps to address the causes of climate change and supports resilience to climate change.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report.</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
	<p>range of different approaches</p> <p>e.g. modifying the start-stop levels at strategic pumping stations, creation of new network control points which allow for flow to be temporarily held back in the catchment.</p>	
<p>Partnership working, collaboration with others</p>	<p>Working in partnership with others (such as other flood management authorities and wider organisations), to implement programmes with multiple benefits beyond those directly relevant to NW.</p> <p>e.g. work with Local Authority or Environment Agency funding projects, flood defence works or highway upgrade etc</p>	<p>Whilst this approach would effectively implement other options within the DWMP (which are each individually assessed), working in partnership increases the potential to implement options which are multi-functional, providing a wide range of benefits beyond just those relevant to drainage. For example, green infrastructure may be able to provide flood alleviation along with open spaces and active travel routes and biodiversity improvements, which allow efficient use of land, help to combat the urban heat island effect, enhance townscapes, and provide efficiency in relation to resource use. The full suite of benefits would be unlikely to be able to be delivered within the scope of a drainage only scheme.</p> <p>Given the potential for wide ranging benefits, this approach appraises positively across all the SEA objectives (noting that there will be some variation depending on the nature of the options implemented in partnership). For this reason, this approach is not assessed further within each catchment type.</p> <p>The DWMP anticipates that there will be 116 NIDP programs from AMP7 to AMP9.</p> <p>Typically, partnership working requires a longer lead in time.</p> <p>This option is taken forward through NWGs overall approach to the DWMP.</p>
<p>Strategic blue green corridors</p>	<p>Combining the management of blue and green spaces in urban environments with a focus on place making.</p> <p>e.g. multi-functional corridors providing drainage through SuDS to attenuate runoff before it</p>	<p>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).</p> <p>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 frequency and</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
	<p>enters the sewer network (and groundwater), typically also providing access routes and green spaces.</p>	<p>extent of SO discharges, thus offering water quality improvements. The volume of wastewater requiring treatment also reduces. See note on potential cumulative effect below*.</p> <p>Slowing the rate of drainage promotes natural flood risk reduction and thus climate resilience. Since the publication of the draft DWMP, it has been possible to undertake greater investigation into the effectiveness of blue green corridors in terms of their ability to provide flood risk reduction, reducing the level of uncertainty.</p> <p>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.</p> <p>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 Northumbrian Water's SuDS Policy Document (currently in draft) 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.</p> <p>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.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report.</p>
<p>SuDS storage</p>	<p>SuDS Storage such as ponds, basins or swales</p> <p>e.g. SuDS attenuation basin which will be dry outside of high flow events, as well as permanently wet features such as ponds.</p>	<p>This option is assessed on the basis that it is a green, SuDS based option, designed for both water quality and quantity improvement.</p> <p>SuDS features mimic natural processes, holding back surface water runoff on the surface, promoting infiltration to groundwater and discharge to watercourses in preference to discharge to the sewer network. This option covers individual features (as opposed to corridors).</p> <p>Typically, there will be less opportunities for multi-functional provision with individual SuDS features than the larger scale blue/green corridors, however they assess positively in terms of material assets (assumes low carbon construction and minimal maintenance), biodiversity (likely to provide biodiversity gains – depends on nature of implementation), provide health and social benefits through improved environment, and climate resilience.</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
		<p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report.</p> <p>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 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. It has been assumed that SuDS would be developed in line with Northumbrian Water's SuDS Policy Document (currently in draft) 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.</p>
<p>Surface water separation and removal</p>	<p>Separation of surface water flows through engineered solutions to take runoff out of the combined sewer network.</p> <p>e.g. provision of a new surface water sewer network.</p>	<p>This option includes:</p> <ul style="list-style-type: none"> - Removing existing surface water networks from the combined sewerage system and discharging flows to a watercourse or to other surface water systems - Providing new surface water sewer networks to intercept highway runoff that is currently connected to the combined sewerage network and discharge to a watercourse <p>This green-grey option would reduce the total volume of water entering the sewer network and requiring treatment by preventing surface water flows entering the sewer.</p> <p>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. See note on potential cumulative effect below*.</p> <p>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. Where this option is prioritised for further investigation, flood risk will be considered further and as such this is noted as a minor negative.</p> <p>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 there would be no 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.</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
		<p>Beyond the benefits in relation to flood risk, there would be no particular effects in relation to human health or socio-economics in the long term (beyond the nuisance issues during construction) which assess as neutral against these SEA objectives.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report.</p>
<p>Below ground storage</p>	<p>Retention of flows within engineered below ground storage to hold large volumes of runoff on both combined and surface water networks. Typically located online, or in close proximity to the existing sewer network.</p> <p>e.g. concrete tanks.</p>	<p>This option reduces peak flows through the sewer network, thus reducing the risk of sewer flooding; and reduces peak flows to WwTWs, reducing SO discharges by allowing an increased proportion of sewage to be treated within the capacity of WwTWs, thus improving water quality. However, the increase in the treatment of wastewater, will increase resource use within WwTWs; depending on the scale of this option, this could require the provision of new or expanded WwTWs.</p> <p>This option is assessed on the basis that it is a grey option that will be constructed of concrete/ a similar material and require the use of pumps during operation to empty the storage after high flow events. However, it is assumed to be smaller in scale than other options such as flow transfer. Through provision of flow storage, it would provide some resilience to climate change.</p> <p>The construction of below ground 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 locally where these issues may have higher sensitivity, such as adjacent to SOs and thus watercourses (in some locations, project level HRA will be required). From a landscape perspective, it is assumed to be located below ground, therefore with no long-term landscape effects.</p> <p>Beyond the benefits in relation to flood risk, there are no particular effects in relation to human health or socio-economics which assess as neutral against these SEA objectives. However, this will depend on the reinstatement provided.</p> <p>This option effectively sterilises land from development, however the post-construction reinstatement may be able to provide beneficial uses, such as public access.</p> <p>This option has been taken forward within the DWMP as part of the option hierarchy approach set out later in this report.</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
<p>WwTW Treatment side stream (to expand capacity)</p>	<p>Upgrades to existing WwTW to provide additional treatment/storm storage capacity.</p> <p>e.g. replicate existing treatment process through provision of an additional filter bed.</p>	<p>This option is based on upgrades to an existing WwTW to address population growth. It could also potentially be implemented in combination with the WwTW rationalisation and flow transfer options.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>This option has been taken forward within the DWMP.</p>
<p>Reed bed treatment of WwTW final effluent</p>	<p>Polish the final effluent from WwTW using Reed bed</p>	<p>This option makes use of Reed bed to treat the final effluent from WwTW prior to discharge.</p> <p>The reed bed will help to polish the overflow from 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.</p> <p>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.</p> <p>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.</p>

Options	Description and example options	Assumptions made for assessment and discussion of SEA findings
		<p>This option has not been taken forward within the DWMP as further investigation is required as to their performance and costs, however NWG is looking to develop this option further.</p>
<p>UV Treatment of WwTW final effluent</p>	<p>Use of UV to remove <i>E. Coli</i> / faecal coliform on the overflow from WwTW</p>	<p>This option makes use of UV Light to treat the overflow from WwTW.</p> <p>The UV light will help to remove <i>E. Coli</i> / 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.</p> <p>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.</p> <p>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.</p> <p>This option has not been taken forward within the DWMP.</p>

* Reducing the flows of water to WwTWs will reduce the frequency and extent of SO discharges, thus improving water quality with subsequent benefits for biodiversity and human health. The reduced flow of water to WwTWs, will increase the concentration of pollutants entering WwTW's. There is a risk that this increase could go beyond the optimal level for treatment (such as biological treatment). As such the cumulative reduction in flows to WwTWs through the options of influencing customer behaviour, collaboration with other customers and catchment stakeholders, blue green infrastructure, SuDS, new surface water sewers and below-ground storage should be reviewed. These risks may be able to be overcome through changes to the treatment process. In terms of the subsequent discharge to rivers, and the potential for low flows during dry periods, a reduced flow from WwTWs from such measures may be offset when implementing blue green corridors, SuDS, and collaboration with other customers and catchment stakeholders, which increase infiltration to ground, supporting the natural hydrogeological processes and thus river baseflows.

5.4 SEA Assessment of Options (Level 2)

As proposed within the SEA Scoping Report, L3 catchments have been categorised both by their spatial location within an L2 SPA, and also by the catchment type. This section sets out how catchments were categorised in order to assess environmental and social impact.

5.4.1 Assessment Output

Table 5.4.1 provides a summary of the variation between catchments across the SEA topic areas, with full results of the Level 2 Assessment Matrices available in **Appendix D**.

Table 5.4.1 – Explanation of catchment classification variation

SEA Topic	Overarching SEA objective
Biodiversity & Geodiversity	Protect, conserve, and enhance biodiversity and geodiversity, including soils
<p>Differentiation between catchment types is perhaps most obvious in the rural vs urban nature of the classification with a final category of Suburban Fringe added to reflect those catchments with an even split between urban and rural land use. Historic Urban varies and is largely driven by the type of historic area, for example small market towns are in contrast to city centre catchments in Newcastle or Sunderland. These city centre catchments tend to perform worse for biodiversity levels and for access to them for local residents. Coastal urban areas across Northumberland often provide access to areas of high-quality biodiversity, such as protected sites for example SACs or SSSIs. Likewise, Ramsar sites are frequently found in estuarine environments given their context as a wetland based European designation. Industrial Urban catchments, and some city centre Historic Urban catchments usually scored the lowest compared to the other four catchment classifications (Coastal Urban, Lowlands Rural, Uplands Rural, and Suburban Fringe).</p> <p>Differences between Level 2 SPAs are driven by the designations applicable to them, for example if they fall within national parks. There is a high number of designated areas for biodiversity/ geodiversity within rural Level 2 SPAs. However, not many of these directly intercept the Level 3 catchments that have been identified to be taken forward for optioneering. The more urban SPAs tend to have fewer designated areas, but a number do intersect, or are in close proximity, to the Level 3 catchments identified for optioneering. A number of these designations are for coastal or estuarine areas which are the furthest downstream extent of the study area and therefore may have most potential to be impacted by negative drainage and wastewater impacts.</p> <p>Specific catchment variation within each SPA is driven by multiple factors. One example is the variation between historic areas. Some L2 SPAs have large city centre urban areas, whilst other SPAs have small market towns/ villages or small populated areas with high heritage value.</p>	
Human Health	Protect, conserve, and enhance health and well-being, including resilient communities
<p>Differences between catchment types are driven by a couple of factors. The first being open, green spaces which are shown to both increase physical and mental well-being. Rural catchments and the Suburban Fringe tend to score highest for this category when compared to the urban categories. The coastal urban category also scores higher when compared to the other two urban categories as the coastal areas across Northumbria generally provide good access to open spaces. Another factor is levels of deprivation with variation across the catchments as more deprived areas correlate to areas with higher levels of unemployment, lower average age, and other criteria measured within the indices of multiple deprivation.</p> <p>Differences between SPAs are driven by the generalised land uses within. Tyneside, Wearside, and Teesside are all relatively urban areas, especially compared to Teesdale, Northumberland, and Rural Tyne. The absence of large towns or cities has benefits for green, open spaces and their accessibility.</p>	
Socio-economic	Protect, conserve, and enhance social and economic prosperity
<p>Differentiation between L2 SPAs and catchment types within are largely driven by the indices of multiple deprivation. There is potential for more benefits from green options in those catchments with less green, open space and also less ability to change customer behaviour. Customer behaviour options can be both low and high cost, an example of a high cost one could be a new washing machine which uses less water. Residents</p>	

SEA Topic	Overarching SEA objective
<p>of areas of higher deprivation are less likely to be able to pay for measures with a high capital cost, even if they lead to monthly savings on water or energy usage.</p>	
<p>Carbon & Material Assets</p>	<p>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</p>
<p>Differentiation was not made between catchment types or L2 SPAs for this SEA topic. The carbon and material asset effects of the various proposed options do not tend to vary based on their location, with carbon being a global issue.</p> <p>Rather, differentiation is made per option and assumed to be the same across all catchment types. Grey options tend to score more negatively given the embedded carbon in their construction; some options also require pumping which also increases the level of carbon emissions through the operational phase of the option. The SEA topic of climate change resilience has more variation based on both the spatial location and the option types.</p>	
<p>Water Resources</p>	<p>Protect, conserve, and enhance water resources</p>
<p>Differentiation between catchment types and Level 2 SPAs is difficult to assess accurately in the regional context. Water quality is more important for certain catchments (rather than certain catchment types) e.g., where discharge takes place to sensitive waters. Therefore, differences are too detailed to be identified in the strategic context of SEA. However, it can be assumed that options will not be taken forward unless they generate positive benefits for water resources as this is one of the main DWMP drivers.</p> <p>Water resources are important across all areas; however, some areas have increased sensitivity as a result of the presence of Source Protection Zones (SPZ), or the presence of an ecological designation with hydrological influences, e.g., a Ramsar designated wetland.</p>	
<p>Flood Risk</p>	<p>Reduce and manage flood risk, increasing flood resilience</p>
<p>Differentiation is limited between catchment types in relation to flood risk at this regional scale. However, the impact of flooding is flooding may increase in areas of deprivation where residents are less likely to have home insurance and be able to respond to flood damage. Reference should therefore be made to the socio-economic topic area. Funding for flood risk, or flood risk economics, is often driven by economic benefits, which are likely to be greater in urban catchments than rural catchments, due to the higher number of properties at risk of flooding. This means that partnership working is likely to be focused on more urban areas, and often towards areas of higher deprivation where schemes can obtain a higher percentage of government funding.</p> <p>Differentiation between Level 2 SPAs is limited because all SPAs have areas at risk of flooding (surface water and fluvial). Some Coastal Urban catchments have an additional risk from coastal flooding; however, this is unlikely to be significant in the context of the DWMP and the options likely to be generated from it, and therefore assessment rarely changes between urban and coastal locations for this issue specifically. For other sources of flood risk, generalisations cannot easily be made at the catchment type scale. As such, differentiations have not been made for this topic between catchment types.</p>	
<p>Heritage</p>	<p>Protect, conserve, and enhance the historic environment, including archaeology</p>
<p>Differentiation between catchment types is largely driven by major heritage designations. The catchment classification includes a Historic Urban classification which makes the assessment of urban areas more straightforward. These areas tend to be historic market towns; central parts of cities with high heritage value; or coastal/estuarine settlements that have developed from early settlement. All of these classifications share certain constraints such as access issues or direct impact on valued heritage assets, or their setting. Rural catchments include small villages where there can be heritage assets but usually not at the same scale as the urban catchments. There is potential for unknown archaeological assets across all catchments, especially in areas where there are registered battlefields or a high density of known assets such as Scheduled Monuments.</p>	

SEA Topic	Overarching SEA objective
<p>Differentiation between Level 2 SPAs is largely driven by major heritage designations. For example, Hadrian's Wall World Heritage Site intersects large parts of a couple of SPAs, such as Tyneside and Rural Tyne. Some of this has been identified within the catchment classification and some within the comparison of SPAs.</p>	
<p>Landscape</p>	<p>Conserve, protect and enhance the landscape, townscape, and visual amenity</p>
<p>Differentiation between catchment types and Level 2 SPAs is largely driven by major landscape designations. Examples of these designations includes: AONB; National Parks; green belt and conservation areas. Greater value is placed on the designations with most restrictions such as National Parks which mostly intersect rural areas, although some urban areas are within/close to these designations. Historic Urban catchments quite often have a conservation area designation as they are associated with heritage, often driven by landscape and in particular townscape qualities.</p>	
<p>Climate Change Resilience</p>	<p>Adapt, and improve resilience to climate change</p>
<p>Differentiation is limited between catchment types in relation to resilience to climate change at this regional scale. Consideration of coastal locations is inherent in the classification of L3 catchments and flood risk is a separate SEA topic. Urban heat island effect is considered within certain urban catchment classifications and is focused on major settlements such as Newcastle, Sunderland, and Middlesbrough, where this impact could be most prevalent.</p> <p>Differentiation between Level 2 SPAs is limited due to climate data being regional or national in scale.</p>	

6 DEVELOPMENT AND ASSESSMENT OF COMBINED OPTIONS

6.1 Development of Combined Options

To achieve the SODRP targets, a combination of the individual options identified in Section 5 is required within catchments. Workshops were held to identify how to combine these shortlisted options to achieve the SODRP targets. A hierarchy approach was adopted where consideration is given first to the reduction in quantity of wastewater, before considering the green options (such as SuDS), with remaining need met through grey options (such as below ground storage). The hierarchy selects option elements in the following order of preference:

1. Residential source control (rainwater harvesting of roof runoff).
2. Commercial property source control (rainwater harvesting of roof runoff).
3. Smart networks to intelligently operate the sewer network to utilise existing capacity within the network.
4. Surface water removal by disconnection of existing separately drained catchments from the combined sewer network (i.e., green options such as SuDS, blue green infrastructure).
5. Separation of highway runoff from the combined sewer network through the provision of new surface water networks.
6. Provision of below-ground storage.
7. Separation of highway runoff from the combined sewer network through the provision of new surface water networks.

An Options Screening Tool was developed to enable each L4 drainage community with a defined Need to be analysed using this hierarchy. The Tool identifies the 'demand' at each SO to understand the scale of measures required to achieve the SODRP spill frequency targets. For example, to achieve the spill frequency target, a storm overflow may require 200m³ of flow to be removed, or 2ha of surface water runoff area removal from the combined sewer network. The Tool then identifies the ability of each option in the hierarchy to achieve the 'demand' (i.e., to achieve the SODRP targets). If the 'demand' is not met by the first option element, the next type of option element is considered, etc.

Analysis of each catchment using this approach identified the technically feasible options. In many catchments, the hierarchy approach was not technically feasible, or substantially greater cost (such as three times the cost). Where this was the case, other options/ option combinations were considered as set out in **Table 6.1.1**.

Table 6.1.1 – Storm overflow option combinations

Option	Name	Description
G1	DWMP Option Hierarchy	This option follows the Option Hierarchy approach of maximising the provision of sustainable infrastructure and minimising the provision of below-ground network storage.

Option	Name	Description
		In drainage areas where surface water removal and/or separation is scoped, there may also be a requirement for the provision of blue-green infrastructure to enable disposal of surface water into an appropriate receptor. This is not always required, for example, if the separation area is located within close proximity to a receptor. Below-ground storage has been restricted based on the acceptability of the downstream sewage treatment works to accept additional dry weather flow without causing issues with compliance and/or technical feasibility
G2	Below-ground Storage Only	This option includes only the provision of below-ground network storage, where this has been deemed to be technically feasible.
G3	Option Hierarchy, No High-Expense Separation, plus Storage	This option follows G1; however, in catchments where there is deemed to be a requirement for higher expense surface water separation (Hierarchy Element 7), this is removed from the scope and replaced with below-ground storage.
G4	Smart Networks and Storage	This option maximises the number of smart network installations and meets any remaining demand through the provision of below-ground network storage.
G5	Surface Water Separation plus Storage	This option maximises the surface water removal and separation within a catchment, then any remaining demand is provided through below-ground network storage. This option has included any blue green corridor originally costed.
G6	Maximise Smart Networks and Surface Water Management	This option maximises the number of smart network installations and meets any remaining demand through the provision of surface water removal and separation. This option has included any blue green corridor originally costed.

6.2 Calculation of Costs and Benefits

For suitable options (i.e., those that meet the SODRP targets), estimated costs and benefits were calculated. Costs are based on whole-life CAPEX and OPEX costs over a 30-year life. All of the options that have been evaluated in the development of the DWMP have been assessed for impact on embodied and operational greenhouse gas emissions. The carbon impact has been used alongside other factors in the determination of the monetised (dis)benefits provided by each option in the identification of the Best Value option for a catchment. The other monetised benefits include environmental and societal benefits provided through the creation of habitats and green spaces, which have been calculated using the industry standard Benefits of SuDS Tool (B£ST), including:

- Air Quality - Monetary value for pollutant removal by a small tree
- Amenity - Estimated number of residents living on a street that is 'greened'
- Biodiversity and Ecology - Area (ha) of changed land use type
- Carbon Sequestration - Number of trees planted
- Flooding - Health Benefits of reducing flood risk e.g., reduced or avoided stress and anxiety
- Health - number of visits to greenspace per year for physical activity

In addition to the environmental and societal benefits that have been calculated using B£ST, the Multi Coloured Manual Handbook has been used to evaluate annual average flooding

damages avoided as a result of an option being implemented. This has been calculated using the Weighted Annual Average Damages (WAAD) approach. The values calculated contribute to the overall benefit of an option, which is used to determine 'Best Value'.

This informs the determination of the 'Best Value' option for storm overflow spill frequency within each L4 drainage community.

The valuation of these environmental and social benefits is a positive improvement since the draft DWMP and in line with recommendations made with the SEA Environmental Report at that stage, embedding these considerations further within decision making.

6.3 DWMP Scenarios Considered

NWG has considered three scenarios, namely Least Cost Options, Best Value and Alternative Storm Overflow Options in the DWMP, which are developed from the options combination listed in **Table 6.1.1**. The three scenarios are described in **Table 6.3.1**. The Alternative scenario was developed through a manual review of findings to identify alternative green options where the cost difference was minimal but green benefits increased and grey solutions decreased.

Table 6.3.1 – DWMP Scenarios Considered

Scenario	Description
Scenario 1: Least Cost Option	This scenario is to meet the requirements to deliver the SODRP targets at the least cost. Reduce internal sewer flooding by 60% post 2030 WwTW DWF compliance options are included.
Scenario 2: Best Value Option	This scenario considers the positive impacts on other planning objectives (such as flooding and pollution) and societal benefits from delivering the SODRP. To determine the best value options, using the assessment of benefits and whole life cost, a cost-benefit ratio was calculated for selection of the best value option. Reduce internal sewer flooding by 60% post 2030. WwTW DWF compliance options are included.
Scenario 3: Alternative Option	As Scenario 2 Best Value, with additional alternative green options where the cost difference was minimal but green benefits increased and grey solutions decreased

The findings for individual L4 drainage communities (based on the option combination listed in **Table 6.1.1**) from AMP8 to AMP12 have been collated at the plan level and is summarised in **Table 6.3.2**.

Table 6.3.2 – Option combination for the three scenarios from AMP8 to AMP 12 considered in DWMP to address SOs*

Scenario	Description	G1	G2	G3	G4	G5	G6	Total Cost at 2050 £
1	Least Cost Option	10.2%	76.4%	0.8%	10.2%	0.2%	2.2%	2750M

Scenario	Description	G1	G2	G3	G4	G5	G6	Total Cost at 2050 £
2	Best Value Option	10.2%	75.8%	1.0%	10.2%	0.6%	2.2%	2753M
3.	Alternative Option (Best Value plus ~£70M green options)	12.3%	72.0%	1.8%	9.2%	1.6%	3.2%	2825M

*measures and associated costs to address internal sewer flood risk and DWF compliance are consistent across the three scenarios so are not included here

6.4 SEA Assessment of the Combined Options

This section assesses the three scenarios for the combined options for the DWMP as a whole (the earlier **Chapter 5** assessed the individual options available within the plan).

Assessment key:

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

Table 6.4.1 – SEA Assessment Matrix for Scenarios 1 to 3 of the DWMP

Level 1 Study Area

	<i>Protect, conserve, and enhance biodiversity & geodiversity, including soils</i>	<i>Protect, conserve, and enhance Human Health and well-being, including resilient communities</i>	<i>Protect, conserve, and enhance social and economic prosperity</i>	<i>Address causes of climate change, manage and improve efficient use of resources, inc. carbon, emissions to air & waste generation</i>	<i>Protect, conserve, and enhance water resources</i>	<i>Reduce and manage flood risk, increasing flood resilience</i>	<i>Protect, conserve, and enhance the historic environment, including archaeology</i>	<i>Conserve, protect and enhance the landscape, townscape, and visual amenity</i>	<i>Adapt, and improve resilience to climate change</i>
Scenario 1 (Least Cost Option)	Biodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
Overall DWMP: during construction	--	0	+	--	-		-	0	
Overall DWMP: during operation	+	+	+	--	+++	+++	+	+	+
Scenario 2 (Best Value Option)	Biodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
Overall DWMP: during construction	--	0	+	--	-		-	0	
Overall DWMP: during operation	+	++	+	--	+++	+++	+	+	+
Scenario 3 (Alternative Scenario)	Biodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
Overall DWMP: during construction	--	0	+	--	-		-	0	
Overall DWMP: during operation	++	++	++	-	+++	+++	+	++	+

Table 6.4.2 – Assessment Narrative

Scenario	Description
Biodiversity	<p>Scenario 1 has a predominance of storage grey options and 2 will have less '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.</p> <p>Relatively, Scenario 3 has 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.</p>
Human Health	<p>For scenarios 2 and 3, NWG set an ambitious goal to eradicate sewer flooding in homes by 2040. This option delivers the SODRP and sewer flooding ambitious goal together by 2040. These provide immediate permanent human health benefits in relation to health (exposure to sewage) and well-being (stress, anxiety). This is excluded from the Least Cost option.</p>
Socio-Economic	<p>Given the scale of work that will need to be implemented through the plan, there is likely to be a socio-economic boost such as employment opportunities through the construction phase for all scenarios. Whilst this will be temporary, it is expected to continue in the long-term until 2005.</p> <p>The additional green and blue green infrastructure provided through Scenario 3 provides 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.</p>
Carbon and Material Assets	<p>Given the scale of below ground 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.</p> <p>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 3.</p>
Water	<p>There are no substantive differences between the Scenarios.</p>
Flood Risk	<p>Scenario 1 excludes measures to directly address internal flooding risk.</p> <p>Scenarios 2 and 3 deliver the SODRP and sewer flooding ambitious goal together by 2040. Hence, they are considered as major positive.</p>
Heritage	<p>For the 3 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.</p>
Landscape	<p>The additional green and blue green infrastructure provided through Scenario 3 provides opportunities for a positive benefit in terms of townscape (in urban area) or landscape (in rural area).</p>
Climate Resilience Change	<p>Whilst substantive differences between the Scenarios have not been identified, the additional green and blue green infrastructure provided through Scenario 3 provides increased climate change resilience, such as the urban heat island effect.</p>

6.5 Other Related Assessments, including HRA

Through the development of the plan, consideration has been given to other related assessments at the plan level:

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

6.5.1 Habitats Regulations Assessment

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

Through a review of the DWMP in relation to these sites, it has been possible to screen out some L3 catchments from further consideration due to distance and a lack of hydrological connectivity resulting in no likely significant effect to the national site network. 95 L3 catchments underwent plan level appropriate assessment, screening out further catchments. At this stage, given the strategic nature of the plan and the proposed measures (which are currently not location or scheme specific), it has not been possible to screen out some catchments/measures, as such further HRA screening will be required as the plan develops. In general, given the location of the national site network and the drainage communities being considered, these areas are typically within the coastal area.

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

The plan level appropriate assessment carried out on the remaining 95 L3 catchments shows that with appropriate mitigation, no likely impact is expected on any protected sites. Whilst there are high level threats identified within the report, these are expected to be mitigated by siting the options appropriately, i.e., not siting options within European Sites or within 500-1000m of any European Sites. Importantly, another full HRA including stage 1 screening and stage 2 appropriate assessment where appropriate will be conducted on each L3 catchment at project level when more information is available.

6.5.2 Invasive Non-Native Species (INNS) Risk Assessment

The SEA framework has considered the risks posed by INNS at a strategic level under the Biodiversity SEA Objective. At the strategic level, the SEA has not identified any high-risk activities such as water transfers within the DWMP, however more detailed INNS assessment may be required if substantial changes are made post implementation if any options involve water transfers or other high-risk activities. INNS assessment determines the risk posed by INNS based on the species present, the relevant pathways and the receptors that could be impacted.

6.5.3 Biodiversity Net Gain Assessment

At this strategic level, awareness of the requirement to achieve biodiversity net gain for development projects has been considered through the SEA framework to influence options

selection (including aiming to prevent the selection of options involving significant biodiversity loss). 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. NWG aims to deliver biodiversity net gain of at least 10% on all projects requiring planning permission and no net loss of biodiversity within permitted developments.

7 SEA ASSESSMENT OF THE PREFERRED PLAN AND CUMULATIVE EFFECTS

7.1 The Preferred Plan

NWG has selected the Alternative Options as the Preferred Plan (Scenario 3) to address SODRP targets. This Chapter summarises the Preferred Plan and assesses the total plan effects and the cumulative effects.

The Preferred Plan has been selected to meet the target in the Storm Overflow Discharge Reduction Plan:

Table 7.1.1 – Percentage and Number of SOs Improved

Year	2030	2035	2040	2045	2050
% of high priority site storm overflows improved	38% (138)	75% (252)	87% (293)	100% (336)	100% (336)
% of total storm overflows improved	14% (143)	28% (286)	52% (530)	76% (775)	100% (1018)

This will be achieved through provision of the following options within catchments requiring interventions:

- G1 and G3 combined – 14.1% of catchments to be addressed in line with the hierarchy of options
- G2 – 72.0 % of catchments to be provided with below ground storage
- G4 – 9.2% of catchments to be provided with smart networks and below-ground storage
- G5 – 1.6% of catchments to have surface water separation maximised (including blue green corridors), with remaining demand managed through below-ground storage
- G6 – 3.3% of catchments to implement smart networks with remaining demand managed through surface water management (including blue green corridors)

A marginal increase in expenditure results in a reduction in grey concrete storage solutions, to be replaced by green infrastructure and the removal of surface water from the combined sewer network. This approach reduces storage requirements by 15,200m³ in the period 2025-2035.

The green infrastructure forms the majority of the interventions identified in the DWMP.

The Preferred Plan includes investment at the four WwTWs predicted to fail the DWF permit compliance in the 2030 planning horizon. A further eight WwTWs are anticipated to fail DWF permit conditions by 2045 or 2050.

The Long-Term Delivery Strategy identifies a target of reducing sewer flooding by 60% from the 2025 position. To achieve this, NWG will plan to reduce hydraulic flood risk by

- 18,017 internal properties, and
- 210,014 external properties

in the period between 2030 and 2050. This approach deals with the impact of climate change, growth and urban creep. The reduction in modelled internal sewer flood risk is shown in **Figure 7.1.1**.

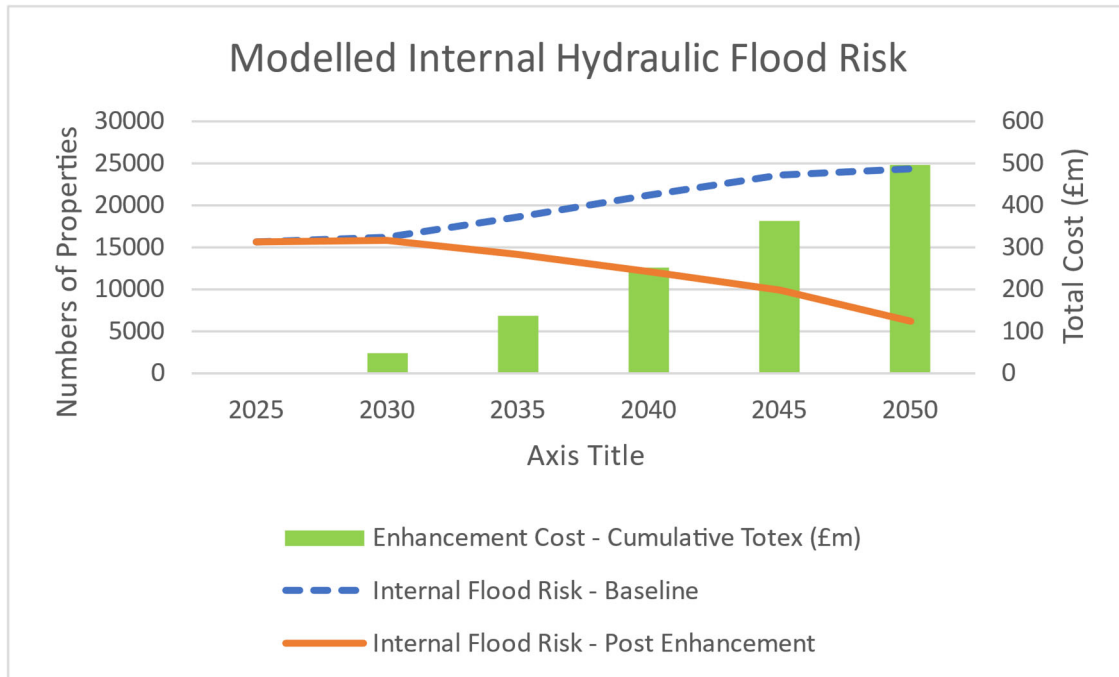


Figure 7.1.1 Reduction in modelled internal flood risk 2030-2050

Further measures include:

- the achievement of Technically Achievable Limit (TAL) of Urban Waste Water Treatment Directive (UWWTD) - Nutrient Neutrality on River Tees.
- Six nature-based catchment solutions presented (covering 30 waterbodies and 30 WwTW's) are targeted for improvements in the period 2025-2030.
- Undertaking Continuous River Water Monitoring in line with the Environmental Act
- Commitment to partnership working through the NIDP and improve 500km blue spaces

7.2 SEA Assessment of the Preferred Plan Effects and Cumulative Effects

The DWMP aims to protect and enhance the environment, support resilient communities and economic growth. The key performance target of the DWMP relates to environmental improvements to tackle SOs, which is a key issue in relation to water quality (and subsequently biodiversity and bathing water quality/ human health). SOs impacting the most sensitive environments are prioritised for action first. Measures to address internal property sewer flooding provide strong socio-economic and human health benefits. As such the overall direction and purpose of the DWMP shows positive alignment with the SEA objectives.

Table 7.1.1 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**.

Assessment key:

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

Table 7.1.1 – Total Plan Effects and Cumulative Effects

SEA Objective	Total plan effects	Cumulative effects
Biodiversity & Geodiversity	<p>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.</p> <p>WwTW upgrades to cope with additional demand from population growth will prevent damage to aquatic biodiversity from that population increase.</p> <p>The Preferred Plan includes the greatest proportion of ‘green’ and ‘blue-green’ infrastructure components of the alternative 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.</p> <p>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).</p>	<p>Climate change will impact wildlife in the future by various means including, but not limited to, drought, timing of seasonal activities, higher frequency of storms, native species redistribution, invasive non-native species, and increased potential for wildfire.</p> <p>Changing climate could impact on the quality of soils across the region through temperature extremes and changing rainfall patterns.</p> <p>Development pressure is likely to increase the risk of habitat loss and fragmentation, particularly outside of the extensive designated areas.</p> <p>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.</p> <p>Reduced spills from SOs and WwTW upgrades will support biodiversity, reducing susceptibility to the above threats.</p>
Human Health	<p>Human health is particularly important in this region where the health of residents is lower than the average for England, life expectancy ranges from 6.6 to 15.26 years lower than the average for England and childhood obesity rates are up to 26.9%.</p> <p>It is anticipated that the human health impact will be neutral during the construction of measures included within the DWMP.</p>	<p>The population of the UK is ageing, putting additional pressures on public finances and services.</p> <p>Policy is placing increasing emphasis on access to green space, green infrastructure, and improved accessibility to sustainable modes of transport.</p>

SEA Objective	Total plan effects	Cumulative effects
	<p>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.</p> <p>Within the Preferred Plan, NWG set an ambitious goal to eradicate sewer flooding in homes by 2040. This option delivers the SODRP and sewer flooding ambitious goal together by 2040. These provide immediate permanent human health benefits in relation to health (exposure to sewage) and well-being (stress, anxiety).</p> <p>The more 'green' and 'blue-green' infrastructure components (which are greatest in the Preferred Plan) 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).</p>	<p>The 'green' and 'blue-green' infrastructure components (which are greatest in the Preferred Plan) provide an opportunity to support these measures, improving health and well-being.</p>
Socio-economic	<p>The plan area experiences higher than average levels of unemployment, with a large number of neighbourhoods being the most deprived nationally.</p> <p>The plan area experiences higher than average levels of unemployment, with a large number of neighbourhoods being the most deprived nationally. This can result in communities being more susceptible to the effects of flooding (e.g., residents are less likely to have home insurance or available funds for clean-up and replacement of goods). As such reduced flood risk provides a positive, permanent, long-term effect to a more sensitive population.</p> <p>The Preferred Plan has more 'green' and 'blue-green' infrastructure components than the alternatives, the multi-functional nature of blue/green corridors can provide 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.</p>	<p>In both the short and longer term, there is uncertainty in relation to socio-economics across the country. Whilst the plan is unlikely to substantially affect this, the flood risk reduction and water quality improvement measures for both scenarios will reduce risks and support a good economic and social environment.</p>
	<p>Given the scale of work that will need to be implemented through the plan, there is likely to be a socio-economic boost such as employment opportunities through</p>	

SEA Objective	Total plan effects	Cumulative effects
	the construction phase. Whilst this will be temporary, it is expected to continue in the long-term until 2050.	
Carbon & Material Assets	<p>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.</p> <p>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.</p> <p>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.</p>	The future trend is towards reducing carbon emissions and increasing resource efficiency, which the below ground storage approach does not necessarily support. The majority of the negative impact is likely to be during the construction phase rather than operation (depending on the amount of pumping and additional treatment that may be required).
Water Resources	<p>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.</p> <p>There is potential for short-term, localised, temporary pollution of watercourses through construction works in close proximity to watercourses. However, in line with legal requirements and best practice, these are anticipated to be prevented through good construction practices.</p>	Climate change and growth are anticipated to increase stress on the water environment, such as through changing rainfall patterns, extreme weather events and increased demand for water and associated wastewater treatment requirements. The DWMP has accounted for these pressures and is designed to address them to help address this issue.
Flood Risk	The DWMP will result in major positive permanent effects by reducing internal sewer flood risk.	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 sewer flooding to help address this issue.
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	Historic assets may be at greater risk from the direct impacts of future climate change, through flooding, sea level change, storms, and other

SEA Objective	Total plan effects	Cumulative effects
	<p>flood risk to some heritage assets, such as Listed Buildings, providing a minor positive permanent effect.</p> <p>Construction works, particularly those that involve ground works are likely to have a minor negative effect on heritage assets, particularly archaeology. However, this will be location specific, with potential for significant adverse effects at the project level which will require further controls.</p>	<p>factors; the DWMP will help to address those risks associated with sewer flooding.</p>
Landscape	<p>Below ground storage, once restored post construction, is not anticipated to have a landscape impact.</p> <p>The “green” and “blue-green” infrastructure components of the DWMP provide an opportunity to create a positive benefit in terms of townscape (in urban area) or landscape (in rural area).</p>	<p>Climate change has the potential to impact high value landscapes through changing patterns of rainfall or sea level rise; population growth also has the potential to erode landscape quality.</p>
Climate Change Resilience	<p>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 a more natural hydrological cycle, groundwater recharge, and can help counter the urban heat island effect.</p>	<p>Resilience to the changing climate is a key issue nationally. The plan will support the wider move to increase resilience to climate change.</p>

8 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))

8.1 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 NWG 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. *This recommendation remains valid, however more detailed assessments have been undertaken when developing the final DWMP.*
- 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.*
- NWG 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, NWG have committed to implement catchment and nature based solutions, including nutrient balancing within six catchments and 8 phosphorus removal schemes. This remains a valid recommendation for future DWMP cycles as experience and understanding of catchment nutrient management develops.*

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

Option Development

- Development of the options hierarchy, which aligns well to the SEA findings.
- Using the options hierarchy, more detailed analysis of the applicability of options within each L4 (drainage community) level to investigate the practicality of the options according to site specific conditions.
- Reduced reliance on the below ground storage option, in favour of an increased uptake of the more sustainable options within the hierarchy. The purpose is to maximise the provision of sustainable infrastructure and minimise the provision of below-ground network storage.
- Amendments and clarifications to the options considered when developing the plan, and their hierarchy.

Commitments to the following goals by NWG in relation to the DWMP to:

- Carry out natural capital assessment for all catchments by 2030
- Report zero pollution incidents by 2035 and maintained to 2050 and beyond.
- Report zero internal sewer flooding by 2040
- Report zero external sewer flooding caused by the failure of NWG's assets by 2050
- Achieve zero avoidable waste by 2025 and maintaining that level to 2050 and beyond
- Achieve carbon neutrality (including both embodied and operational carbon) by 2027
- Deliver biodiversity net gain of at least 10% on all projects requiring planning permission and no net loss of biodiversity on the permitted developments
- Improve blue spaces by 500km by 2030, and by 1500km by 2040. NWG will maintain these improved blue spaces to 2050 and beyond.

Catchment and nature-based solutions (C&NBS)

- Implement C&NBS, including eight C&NBS schemes for phosphorus (P) removal.
 - Six catchment solutions (using catchment nutrient balancing and catchment permitting)
 - Two nature-based solutions (based on wetland treatment solutions but led by catchment partners)

Review Mechanism

- Implement adaptive planning process for DWMP review

8.2 Recommendations as the Plan is Implemented

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 8.2.1** below.

Table 8.2.1 – Measures to prevent, reduce, mitigate and compensate effects during plan implementation

Options	Measures to prevent, reduce, mitigate, compensate
Strategic blue green corridors	<p>Along with water management, blue/green corridors should be designed to achieve multi-functional benefits, including active travel routes (footpaths, cycle paths), recreation, biodiversity, landscape/ townscape, and reducing the urban heat island effect. To achieve this, the design will need to take account of more localised issues such as biodiversity value, local connectivity, and locally prepared Landscape Character Assessments.</p> <p>Blue/ green corridors should be designed and implemented following SuDS guidance, including in relation to pollution control and discharge to watercourses and groundwater.</p> <p>Early and effective partnership working is required.</p>
SuDS storage	<p>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.</p> <p>SuDS features should be designed and implemented following SuDS guidance, including in relation to pollution control and discharge to watercourses and groundwater.</p>
Surface water separation and removal	<p>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.</p> <p>Design new surface water sewers in a manner which slows the flow of water to the receiving environment.</p> <p>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.</p> <p>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 consents⁴) and</p>

⁴ Given the proposed short sections of new sewers, EIA screening is considered to be unlikely to be required.

	<p>traffic management. The nature of constraints/impacts will vary on a catchment-by-catchment basis. For example, a number of the catchments have high historic value and will require greater specialist heritage input; particular care is required within areas of high biodiversity value, in particular for certain ecological designations where, as a minimum, HRA screening will be required.</p> <p>Reducing the extent of new surface water sewers through use as part of a hybrid solution provides the greatest opportunity to minimise resource use. Some further reduction in resource use is likely to be able to be achieved within construction through design optimisation, such as materials selection.</p>
<p>Below ground storage</p>	<p>Limited reduction in resource use during construction and operation may be able to be achieved through design optimisation, such as materials and plant selection.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Given the scale at which this option is being taken forward, consideration should be given to capturing these issues through design codes, or similar.</p>
<p>WwTW Treatment side stream</p>	<p>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:</p> <ul style="list-style-type: none"> • The nature of the site and any sensitive receptors (e.g., terrestrial and aquatic biodiversity, heritage, archaeology, landscape, local land uses 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

8.3 Adaptive Planning

As set out in NWG PR24 and Beyond Long Term Delivery Strategy, adaptive planning is adopted for the long-term delivery strategy. The future is inherently uncertain, and it is important that the strategy is flexible enough to cope with changes in circumstances so it is robust over time.

The DWMP adaptive planning strategy sets out how the vision and ambition will be delivered and explains the governance procedures that have been established to oversee delivery.

The adaptive planning approach enables strategies to be developed in the context of different future scenarios. It aims to optimise the profile of key interventions across time, ensuring that decisions are not avoided when they are needed – for example, to ensure resilience against high-impact scenarios – while minimising the risk of stranded assets should low impact scenarios come to pass.

Adaptive planning can therefore establish what investments are needed now, and where decision points can be scheduled later in the timeline, when there is likely to be greater certainty about what is needed. It can also consider where to bring forward investment and where to invest to create flexibility.

As shown in **Figure 8.3.1**, adaptive planning can facilitate the delivery of solutions that more closely reflect what later turns out to be required, compared to building traditional large infrastructure solutions on the basis of uncertain assumptions about the future, which risks unnecessary investment. At the same time, adaptive planning ensures, through regular monitoring, that solutions continually deliver the service level required to meet outcomes in the short and long term.

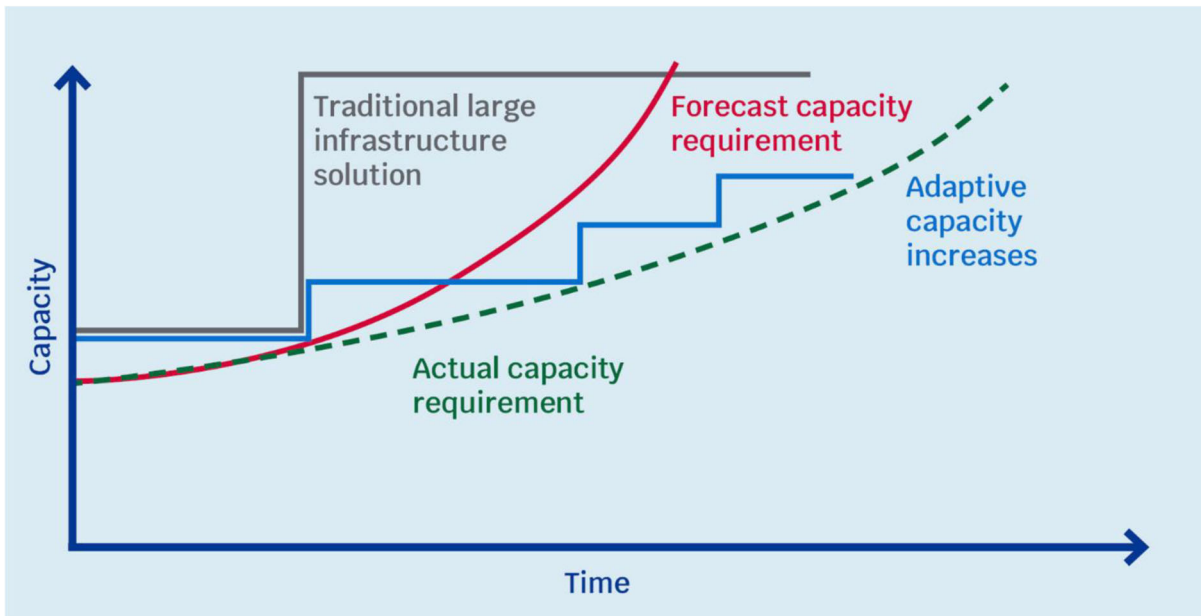


Figure 8.3.1 Adaptive planning versus conventional planning

The major focus of adaptive planning is on the timing of large new enhancement investments. Nevertheless, the following wider interventions will be considered:

- behaviour change, for example to reduce water use;

- partnership working, for example around catchment management, and collaboration with other water companies where appropriate, for example to develop new innovations and solutions;
- learning, for example from the Ofwat innovation fund projects and from overseas and other sectors;
- testing through local and production scale pilots; and
- interventions at systems level as well as at the individual infrastructure level.

Adaptive planning offers the potential to increase the uptake of the more sustainable options within the hierarchy, thus reducing adverse impacts and increasing the potential for wider benefits.

8.4 Project Stage Assessments and Controls During Implementation

NWG 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 environmental 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, and 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:

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

8.4.1 Habitats 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 46 L3 catchments requiring mitigation (dependent on option) and the 95 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.

8.4.2 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.

8.4.3 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.

8.4.4 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. NWG aims to deliver biodiversity net gain of at least 10% on all projects requiring planning permission and no net loss of biodiversity within permitted developments.

8.5 Recommendations for Subsequent DWMP Cycles

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.
- NWG 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.
- 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.

9 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 the SEA Regulations, monitoring is only required for significant environmental effects and may comprise or include monitoring undertaken for other purposes – monitoring of all topic areas is not required.

9.1 Proposed Monitoring

At this stage, it is only necessary (and appropriate) to set out the measures envisaged concerning monitoring. **Table 9.1.1** 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 process. 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 NWG’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. Monitoring proposals within the DWMP have been reviewed and been found to cover all the potential significant adverse effects (and benefits), as such no additional monitoring is proposed here. These are undertaken both by NWG and other organisations such as the Environment Agency (e.g., water quality).

Table 9.1.1 – Proposed Monitoring Parameters

Proposed Monitoring Parameters	Source of Information (organisation undertaking monitoring or holding the data)
<ul style="list-style-type: none"> Water Quality Monitoring Data 	<ul style="list-style-type: none"> NWG - DWMP includes provision for the installation of continuous water quality monitoring in line with the Environment Act NWG – investing in monitoring to provide 100% near Realtime Data on all Storm Overflows by 2023 EA - water quality monitoring of waterbodies

Proposed Monitoring Parameters	Source of Information (organisation undertaking monitoring or holding the data)
<ul style="list-style-type: none"> • Sewer Flooding 	<ul style="list-style-type: none"> • NWG – Sewer Level Monitoring and Rain Radar data
<ul style="list-style-type: none"> • Biodiversity 	<ul style="list-style-type: none"> • NWG - 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, which must include the ability to assess ecological harm • NWG - Biodiversity Net Gain for schemes requiring planning permission
<ul style="list-style-type: none"> • 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 of purchased) 	<ul style="list-style-type: none"> • NWG reporting to Ofwat in line with Ofwat requirements

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

APPENDIX A: CONSULTATION RESPONSES

Appendix A Consultation Responses

Consultee Responses

The **SEA Scoping Report** was issued to statutory consultees and selected partners, on 17 January 2022 for a five-week period. Comments received have been collated in this Appendix/ the table below.

Comments Received	Northumbrian Water Response
Environmental Agency	
No comments	N/A
Natural England	
No comments	N/A
Historic England	
No comments	N/A
Non-Statutory Consultee – Northumberland County Council	
<i>“The SEA Scoping Document seems comprehensive. It is particularly pleasing that the range of SEA objectives takes in areas of concern to the Council, in terms of health and wellbeing, heritage, biodiversity and the landscape.”</i>	Thank you, these have been carried forward through the SEA Environmental Report.
<i>“On landscape, we note that the documentation listed in Appendix A does not include locally prepared Landscape Character Assessments, which would, we feel, aid the understanding of the key qualities of valued landscapes that could be significantly affected by aspects of the DWMP’s programmes.”</i>	Thank you, LCAs have been added to the policy review appendix. They have been reviewed and key issues relating to drainage have been identified within the baseline environment appendix. To prompt these to be considered further as the DWMP progresses to the implementation stage, reference has been to the LCAs within the measures to prevent, reduce, mitigate, and compensate any landscape effects.
<i>“We note that the health and well-being objective includes resilient communities, which is important in relation to the almost existential threat that past flooding events have posed to the central hubs of some of the County’s key town and village communities.”</i>	Noted, and yes, we recognise the importance of the key targets the DWMP sets out to achieve could play both now and in the future.
Non-Statutory Consultee – Durham County Council	
Pg 11 - Table 3.1.1: Flood risk comments. <i>Reduce flood risk (not decrease); simplify to say manage all flood risk; change “resilience to flood risk” to “resilience to flooding”; insert water quality to last line.</i>	Thanks, the first three points are agreed. The last point is covered within the Water Resources SEA Topic and separate to our Flood Risk SEA Topic.
Pg 13 - Section 4.2.1: Clarification of HRA regs and impact pathways. <i>2017 Regs not the latest. Update terminology like Natura 2000 (National Site Network) to reflect latest legislation. SPA (2010) should be updated. Not clear what impact pathways were used and therefore what sites outside the Level 1 boundary were scoped in/out.</i>	Thank you, text has been checked and developed further within the HRA Screening report. The 2017 regulations remain the key legislation, although they have been updated and as such are noted to be ‘as amended’. Clarity added to the report regarding the national site network. For the purpose of scoping only those designations that intersected the Level 1 Study Area were listed ahead of future work on the HRA. The subsequent HRA Screening Report has considered such sites beyond the boundary of the Level 1 study area – this report details how they were scoped in/out based on the impact pathways. The HRA Screening considers both hydrological and non-hydrological influences outside the Study Area.
Pg 29 - Section 4.2.9: Whilst 'defined' not designated there is no reference made to the Durham Heritage Coast or the associated Management Plan. The DHC stretches from Sunderland to Hartlepool and is given protection	Thanks for bringing this plan to our attention, we have reviewed and added it to the baseline environment and opportunities section of the SEA report.

Appendix A Consultation Responses

<p>through the NPPF and CDP. https://durhamheritagecoast.org/about_us/the-vision/ There is also no reference to locally defined Areas of Higher Landscape Value.</p>	<p>Given the strategic nature of the DWMP, at this stage, locally defined landscapes have not been reviewed. This is consistent with the approach taken within other SEA topic areas.</p>
<p>Pg 37/38 – Table 5.2.1: Issues and Options Summary Table (water resources & flood risk). “Avoid and control contamination” – <i>can you control?</i> “Early integration of climate change resilience measures...” – <i>Is this written as an opportunity or as a statement?</i> “Reduce flood risk and associated impacts at NWG sites, customer homes, and elsewhere” – <i>Similar comment to Page 11 – too wordy.</i> “Increase infrastructure resilience to flooding including climate change impacts” – <i>just infrastructure or community and economic?</i> Change “intensified” to <i>increased</i>. “Encourage soft engineering techniques to sustainably manage wastewater” – <i>It is not clear if the intention is to encourage NW or developers. Does this point actually relate to surface water rather than waste water or should it be both?</i></p>	<p>Thanks, wording of these have been clarified in line with your comments set out.</p>
<p>Pg 50 – HRA scoping and in combination effects. <i>Should Identify positive and negative impacts.</i> “risk having a significant effect on a European site on their own or in combination with other projects or plans” - <i>Needs to be clear how we are taking account of neighbouring authority plans.</i></p>	<p>Comments passed to the authors of the HRA screening.</p>
<p><i>In relation to the HRA elements the following link takes you to the County Durham Plan evidence page.</i> https://durhamcc-consult.objective.co.uk/kse/folder/52317 Document C16 is the HRA for the Plan and should be helpful in identifying in combination impacts. Document I2 is the council’s HRA Developer Guidance which should help with the scoping and screening elements of the HRA. We would also welcome consultation at the next stage of the HRA process.</p>	<p>Thanks, we are sure this will be useful and have passed this onto our colleagues who are undertaking the initial HRA screening.</p>
<p>Appendix A (Policies and Plans) – <i>should include the DCC Flood Risk Management Strategy, Strategic Flood Risk Assessment and Water Cycle Study. The LDP and GIP include relevant evidence bases like SFRA and WCS.</i></p>	<p>Thanks, these have been added in our policy, plans and objective section.</p>
<p>Non-Statutory Consultee – Member of SPG</p>	
<p>Suggest splitting the SEA category for Climate Change into Cause and Resilience as options may assess differently for the two issues.</p>	<p>Noted and agreed. Following a review of the SEA Objectives, the ‘Material Assets’ objective has been clarified/expanded to cover ‘Carbon & Material Assets’; and the ‘Climate Change’ objective amended to ‘Climate Change Resilience’.</p>

Appendix A Consultation Responses

The **Draft SEA Environmental Report** was issued for consultation along with the Draft DWMP, for 12 weeks until 23rd September 2022, including with the SEA consultation bodies. Comments received have been collated in this Appendix/ the table below.

Comments Received	Northumbrian Water Response
Environment Agency	
<p>There appears to be an inconsistency between the Technical summary and the SEA, carried out for scenario (option) 4 only. Here it states that the plan has been assessed for climate change and that for this scenario there is a 'minor positive effect'.</p>	<p>Wording has been clarified to distinguish between the DWMP considering the effect of climate change on the level of risk, and the SEA considering the approaches used in the plan to adapt and improve resilience of the DWMP to climate change and to address the causes of climate change.</p>
<p>The report is identified as a draft Environmental Report and we note that the final report will be published with the final DWMP in March 2023. It is not made clear in the Environmental Report that the appraisal is only of one of the four strategic scenarios in the draft DWMP – although it is stated in the Draft DWMP. The SEA should assess all reasonable alternatives and clearly set out the reasons for the strategic scenarios/options selected.</p>	<p>Noted. Section 6.3 assesses the draft DWMP as a whole. For the SEA of the final DWMP, Table 6.3.1 within this section will be expanded to consider all four scenarios.</p> <p>The SEA assessed all reasonable alternatives by considering the individual options that make up the four strategic scenarios in the draft DWMP – see section 5.2 and 5.3 of the SEA (including Tables 5.2.1, 5.2.2 and 5.2.3). The reasons for including/omitting these options within the draft DWMP are clearly set out in Table 6.2.1 (page 59)</p> <p>The preferred strategic scenario will be subject to the public consultation and its selection will be included in the final SEA report.</p>
<p>It would be helpful if the Environmental Report was clearer on the relationship of the two documents and whether the SEA has been undertaken to assess the option as proposed or to help inform its development (the SEA should influence the development of the plan).</p>	<p>The SEA has been undertaken to influence the development of the Plan. Please refer to Section 1.1 of the draft SEA report. Figure 1.4.1 – SEA Process in the draft SEA report has illustrated the interaction between the SEA and DWMP.</p> <p>Section 7.1 (page 69) sets out how SEA has influenced the plan to date, including 'Reduced reliance on the below ground storage option, in favour of an increased uptake of the hybrid Surface Water Management approach. This has increased cost by £273m'.</p>
<p>In finalising the SEA, the limitations need be more clearly identified and where further studies will be needed to assess the environmental, social and economic effects.</p> <p>The proposals for monitoring are very limited and need to ensure that all the relevant topics (e.g. air and waste) are addressed.</p>	<p>Limitations have been included in Section 1.6. Further studies including Habitat Regulations Assessment, Invasive Non-Native Species, Water Framework Directive and biodiversity net gain assessment have been proposed in Section 9 of the draft SEA report. These further studies will be moved to Section 7 in the final report for clarity.</p> <p>Recommendations to further enhance the plan for the final are set out in section 7.2, including consideration of carbon, monitoring performance of surface water management to allow increased uptake as implementation of the plan progresses, joint working, influencing others and catchment level nutrient management in future cycles.</p> <p>The SEA Regulations requires monitoring of the significant environmental effects of the implementation of each the plan with the purpose of identifying unforeseen adverse effects at an early stage. As such the proposed monitoring arrangements focus on those topics with a potential for significant environmental effects. SEA guidance is</p>

Appendix A Consultation Responses

	clear that not all topic areas requiring monitoring through the SEA process.
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APPENDIX B: REVIEW OF RELEVANT PLANS, PROGRAMMES AND ENVIRONMENTAL PROTECTION OBJECTIVES

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

Policy or Plan	Summary of Guidance
International	
<i>Biodiversity</i>	
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.
<i>Climate Change</i>	
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)	It 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.
<i>Heritage</i>	
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.

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	
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.
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	
The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985) Revised European Convention on the Protection of Archaeological Heritage (Valletta Convention/ Malta Treaty) (1992)	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. 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.
Resource Use	
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.
Water Resources	
The Nitrates Directive (91/676/EEC) (1991)	It 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)	This directive 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.
Directive on the Assessment and Management of Flood Risks (2007/60/EC)	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.
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.

National	
<i>Biodiversity</i>	
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 Conservation of Habitats and Species Regulations (2017) (as amended)	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 apply in the terrestrial environment and in territorial waters. 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.
<i>Climate Change</i>	
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.
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 21 st 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	
'Managing Significance in Decision-taking in the Historic Environment: Historic Environment Good Practice Advice in Planning: 2'	The purpose of this Good Practice Advice note is to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the National Planning Policy Framework (NPPF) and the related guidance given in the National Planning Practice Guide (PPG)
Preserving Archaeological Remains: Decision-taking for Sites under Development	This advice is for developers, owners, archaeologists and planners working on projects where the intention is to retain and protect archaeological sites beneath or within the development. It can also be read in relation to other land-use or site management work. It has a particular focus on decision-taking on waterlogged archaeological sites.
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.
Soils and Geology	
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.
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.
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.
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 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 improving 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.
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 (the 'SORP consultation') (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'. The SORP is expected to be finalised in September 2022, as such there is some uncertainty as to the targets that will need to be achieved through the DWMP.
Overarching	
Environment Act (2021) Environment Act (1995) (as amended)	A tool to implement changes in England across environmental sectors including air quality, biodiversity, water, and waste reduction and resource efficiency. The Act includes a target to halt the decline of nature by 2030, and mandates Biodiversity Net Gain for developments.
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.
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 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 <ul style="list-style-type: none"> • '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, plants 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.
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.
The North East England Nature Partnership	The partnership brings together seven of the regions Local Authorities, NGO's, business, and Defra agencies to achieve environmental growth by investing in natural capital, as envisioned in the 20-year Vision for Environmental Growth. The Regional Plan should consider the objectives of the partnership.

Heritage

Heritage Coast Management Plans	Heritage coasts are 'defined' rather than designated, so there is not 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. Durham Heritage Coast Partnership was highlighted as one example in Scoping consultation and is a partnership of authorities, agencies, and community bodies with an interest in the coast in Sunderland, Durham, and Hartlepool.
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Landscape

Natural England, AONB Management Plans	<p>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 will measure the AONB's condition and effectiveness of management.</p> <p>The following Plans are relevant: Northumbria Coast 2020 – 2024 and the North Pennines 2019 to 2024.</p>
Natural England National Character Area (NCA) Profiles (2013/ 2014)	<p>The profiles summarize the characteristics which are unique to that local area and gives it a distinctive sense of place.</p> <p>There are 15 NCA identified within the North East. NCA beyond this could be potentially impacted but that is unknown at Scoping stage.</p>
Landscape Character Assessments: County Durham Landscape Character Assessment (2019), County Durham Landscape Strategy (2008) Northumberland Landscape Character Assessment (2010)	<p>These map, classify and describe the landscape character (i.e., the distinct set of elements that makes a landscape recognisable, and gives it a unique 'sense of place') at the county scale. They inform development as well as land use and management and include guidance on the management of future change.</p>
Water Resources	
Defra and Environment Agency (2015) River Basin Management Plans	<p>River basin management plans (RBMPs) set out how organisations, stakeholders and communities will work together to improve the water environment. Only the Northumbria RBMP is anticipated to be referenced.</p>
Water Resources North (WREN) Regional Plan – Environmental Assessment - Scoping Report (2021)	<p>Northumbrian Water, Yorkshire Water, and Hartlepool Water make up WREN's core companies. Water Resources North (WREN) is one of five regional water resources groups working under the National Framework for Water Resources (the 'National Framework'). The draft Regional Plan is anticipated to be ready in early 2022 which will be accompanied by the associated assessment reports.</p>
Environment Agency - Abstraction licensing strategies (CAMS process) (2013)	<p>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.</p>
Flood Risk	
Environment Agency - Catchment Flood Management Plans (CFMPs) (2009)	<p>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.</p>
Local Flood Risk Management Strategies – examples include: Newcastle City Council Local Flood Risk Management Plan (2016) Gateshead Council Level 1 Strategic Flood Risk Assessment (2019) Sunderland Council Level 1 Strategic Flood Risk Assessment (2020) Durham County Council SFRA (2018) and Local Flood Risk Management Strategy 2016-2020 (2017)	<p>These set out useful local information and identifies objectives to manage local flood risk to local communities. They consider all sources of local flood risk such as surface water, groundwater, and ordinary watercourses. These local authority documents usually feed into Local Development Plans, Green Infrastructure Plans, and other documents.</p>
Water Cycle Studies e.g., Durham County Council Water Cycle Study (2018)	<p>Set out the water-based infrastructure required to support new development identified through local development plans</p>
Marine Management Organisation North East Inshore and Offshore Marine Plan (2021)	<p>The North East Marine Plan provides a framework that will shape and inform decisions over how the areas' waters are developed, protected, and improved over the next 20 years.</p> <p>It covers an area of around 56,000 square kilometres of inshore and offshore waters stretching from the Scottish border to Flamborough Head, in Yorkshire. It contains large stretches of undeveloped, open coastline to the north and the south alongside important, busy industrial or formerly industrial estuaries.</p>

Northumbrian Coastal Authorities Group Shoreline Management Plans: Scottish Border to River Tyne SMP2 (2009) River Tyne to Flamborough Head SMP2 (2007)	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).
North-East Lead Local Flood Authorities Sustainable Drainage Local Standards	This guidance provides the approach that the North East LLFA will take on some key questions often asked through the planning process by developers with the aim to improve the submission of flood risk assessments, drainage strategies, and SuDS design and to promote consistency and best practice.
Overarching	
Local Development Plans and Green Infrastructure Plans (GIPs).	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. GIPs set out the details on the provision and access to quality green spaces. The following local authorities are located within the Study Area and therefore their Local Plans are relevant: Northumberland; County Durham; Hartlepool; Darlington; Redcar & Cleveland; Stockton-on-Tees; Middlesbrough; North Tyneside; Newcastle upon Tyne; Gateshead; South Tyneside; Sunderland; Richmondshire; Hambleton; Scarborough; Ryedale; Carlisle; Eden; and the Scottish Borders
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: Northumbria 2016- 2021 (2016) Yorkshire Dales 2019 – 2024 (2019) North York Moors 2017 – 2022 (2017)	Every National Park has a National Park Management Plan. It is 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.
Water/ Wastewater Company - Northumbria Water	
Water Resources	
Business Plan – Living Water Our Plan for 2020 – 2025 and beyond	There are six themes where the report is focussing on. The key one for the SEA is likely to be ‘Improving the Environment’.
Business Plan – Shaping our Future 2018 – 2040	This is a future vision statement. This document sets out how NWS plan to build on strengths and develop further as a customer focused business in order to anticipate, respond to and exceed our customers’ expectations in the future.
Drought Plan – Draft Drought Plan 2022	The Drought Plan identifies management of future droughts. It identifies what measures are available to reduce demand and support supplies and what triggers can be used to identify when actions are required. The Plan also outlines how a company will communicate with customers during a drought. Consider adjoining water companies if applicable.
Northumbria Water Resource Management Plan (WRMP) (2019)	Sets out how we will provide a reliable and sustainable supply of water to our customers. Consider adjoining water companies if applicable.

APPENDIX C: BASELINE ENVIRONMENT REVIEW

Appendix C – Baseline Environment Review

Baseline Environment Review

1.1 Biodiversity and Geodiversity

Biodiversity can be defined as the variety of plants (flora) and animals (fauna) within an area. The importance of maintaining and improving biodiversity is recognised from a local scale up to the international scale. Geodiversity refers to the geology and soils and their resulting land use. Please note, there is a separate landscape topic which focusses more on land use within the context of landscape. Data for the Biodiversity and Geodiversity topic 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. It is recognised that biodiversity and geodiversity value extend beyond these designated sites, not only to other local/regional designated sites, priority habitats and species, but also to the connectivity between habitats.

Ramsar Sites are wetlands of international importance designated under the Ramsar Convention. Five Ramsar Sites intersect Level 1 (whole Study Area) and are listed in **Table 1.1.1** and are shown on the accompanying maps at the end of this appendix.

Special Areas of Conservation (SAC) are protected areas under the Conservation of Habitats and Species Regulations 2017 (as amended) which require establishment of a national site network of important high-quality conservation sites that will make a significant contribution to conserving the habitats and species. Twenty SACs are located within Level 1 and are listed in **Table 1.1.1** and are shown on the accompanying maps. SACs can include marine components to protect habitat and/ or species associated with the in-proximity marine environment.

Special Protection Areas are protected areas for birds under the Conservation of Habitats and Species Regulations 2017 (as amended). Eight Special Protection Areas, made up of 74 individual areas, are located within Level 1 and are listed in **Table 1.1.1** and are shown on the accompanying maps. These can include marine components to protect bird species that are dependent on the marine environment for all or part of their lifecycle.

SACs and SPAs for part of the national site network. Many of these areas overlap with Ramsar sites.

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. 256 SSSIs fall within Level 1 and are listed in **Table 1.1.1** and are shown on the accompanying maps.

National Nature Reserves (NNRs) were established to protect some of the most important habitats, species and geology, and to provide 'outdoor laboratories' for research. Fourteen NNRs intersect Level 1 and are listed in **Table 1.1.1** and are shown on the accompanying maps.

Marine Conservation Zones (MCZs) are areas designated by Ministerial Orders to protect a range of nationally important, rare, or threatened marine habitats and species. Two MCZs intersect both the Northumberland and Tyneside Level 2 areas and are listed in **Table 1.1.1**.

No biosphere reserves are present in the region.

Appendix C – Baseline Environment Review

Due to the strategic nature of SEA, local sites are not included in the Environmental Report, and these include Sites of Importance for Nature Conservation (SINCs); Local Wildlife Sites; and Local Nature Reserves. Local Nature Reserves are statutory designations made under Section 21 of the National Parks and Access to the Countryside Act 1949 and amended by Schedule 11 of the Natural Environment and Rural Communities Act 2006, by principal local authorities. These will need further consideration when options are further developed as well as location specific biodiversity constraints and opportunities.

There are specific national and trans-national policies that apply to certain species such as shellfish or eel which should be followed where these are applicable to specific options at the plan implementation stage. There are seven Level 3 catchments in locations which are designated as either a bathing or shellfish water, with further catchments in close proximity (and potentially hydrologically linked). The seven catchments were found across the wider Level 1 in Northumberland, Wearside and Teesside. Both regionally, and nationally, there is public and political focus on untreated wastewater discharge and the socio-economic/ environmental impact for shellfish and other species¹. Untreated wastewater will have a negative impact on the receiving environment which will impact species health, which in turn can negatively impact the wider ecosystem.

Table 1.1.1 – Intersecting Sites for Biodiversity

Biodiversity Dataset	List of intersecting Sites within the CL		
Ramsar	<ul style="list-style-type: none"> Holburn Lake & Moss Northumbria Coast 	<ul style="list-style-type: none"> Lindisfarne Irthinghead Mires 	<ul style="list-style-type: none"> Teemouth & Cleveland Coast
SAC	<ul style="list-style-type: none"> Ford Moss Tyne & Nent Newham Fen Thrislington Castle Eden Dene Durham Coast Border Mires Kielder-Butterburn Simonside Hills 	<ul style="list-style-type: none"> Harbottle Moors Tyne & Allen River Gravels Roman Wall Loughs North Pennine Dales Meadows Tweed Estuary River Tweed Moor House-Upper Teesdale 	<ul style="list-style-type: none"> Berwickshire & North Northumberland Coast (includes marine components) North Northumberland Dunes North York Moors North Pennine Moors
Special Protection Area	<ul style="list-style-type: none"> Teemouth & Cleveland Coast (includes marine components) Holburn Lake & Moss 	<ul style="list-style-type: none"> Coquet Island (includes marine components) Lindisfarne (includes marine components) Northumberland Marine (includes marine components) 	<ul style="list-style-type: none"> Northumbria Coast North York Moors North Pennine Moors
SSSI	<ul style="list-style-type: none"> Allen Confluence Gravels Allendale Moors Allotee to Walltown Alnmouth Saltmarsh and Dunes Alston Shingle Banks Appleby Fells Arcot Hall Grassland and Ponds Arkengarthdale, Gunnerside and Reeth Moors 	<ul style="list-style-type: none"> Fairy Holes Cave Fallowfield Mine Fallowlees Flush Far High House Meadows Fishburn Grassland Ford Moss Foster's Hush Frog Wood Bog Fulwell & Carley Hill Quarries Geltsdale & Glendue Fells Gibside Gilleylaw Quarry Glebe Quarry 	<ul style="list-style-type: none"> Park End Wood Peckriding Meadows Peckriding Top Lot Pig Hill Pike Whin Bog Pinkney and Gerrick Woods Pittington Hill Pockerley Farm Pond Pow Hill Bog Prestwick Carr Quarrington Hill Grasslands Railway Stell West

¹ BBC News (2022) Saltburn protest held over dead crustaceans and sea pollution, available from: <https://www.bbc.com/news/uk-england-tees-59166814>, accessed March 2022.

Appendix C – Baseline Environment Review

<ul style="list-style-type: none"> • Aules Hill Meadows • Backstone Bank and Baal Hill Woods • Baldersdale Woodlands • Bamburgh Coast and Hills • Bamburgh Dunes • Barelees Pond • Barrow Burn Meadows • Barrow Meadow • Bavington Crags • Beltingham River Shingle • Bewick and Beanley Moors • Big Waters • Billsmoor Park and Grasslees Wood • Bishop Middleham Quarry • Black Scar Quarry • Blagill Mine • Boldon Pastures • Bollihope, Pikestone, Eggleston and Woodland Fells • Botany Hill • Botton Head • Boulby Quarries • Bowes Moor • Bowlees and Friar House Meadows • Brada Hill • Bradford Kames • Brasside Pond • Brenkley Meadows • Briarcroft Pasture • Briarwood Banks • Brignall Banks • Broughton Bank • Brunton Bank Quarry • Burnfoot River Shingle and Wydon Nabb • Burnhope Burn • Butterby Oxbow • Campfield Kettle Hole • Cassop Vale • Castle Eden Dene • Castle Point to Cullernose Point • Catton Lea Meadow • Causey Bank Mires • Charity Land • Claxheugh Rock & Ford Limestone Quarry • Cleadon Hill • Cliff Ridge • Close House Mine 	<ul style="list-style-type: none"> • God's Bridge • Gosforth Park • Grains O'th' Beck Meadows • Green Croft and Langley Moor • Greenfoot Quarry • Greenhaugh Meadow • Greenleighton Quarry • Gunnerton Nick • Hadston Links • Haggburn Gate • Haggs Bank • Hallow Hill • Hannah's Meadows • Harbottle Moors • Hareshaw Dene • Hart Bog • Harthope Burn • Hartley Cleugh • Harton Down Hill • Hastings Hill • Hawthorn Cottage Pasture • Hawthorn Dene • Hawthorn Quarry • Heatheryburn Bank • Hell Kettles • Herrington Hill • Hesledon Moor East • Hesledon Moor West • Hesleyside Park • Hetton Bogs • Hexhamshire Moors • High Haining Hill • High Knock Shield Meadow • High Moorsley • Hisehope Burn Valley • Holburn Lake and Moss • Holystone Burn Woods • Holystone North Wood • Holywell Pond • Howick to Seaton Point • Hulam Fen • Humbledon Hill Quarry • Humbleton Hill and The Trows • Hunder Beck Juniper • Hylton Castle Cutting • Joe's Pond • Kielder Mires • Kielderhead and Emblehope Moors • Kildale Hall • Kilmond Scar • Knarsdale Meadows • Lambley River Shingles • Lampert Mosses • Langbaugh Ridge • Linbrigg • Lindisfame • Longhorsley Moor • Longhoughton Quarry 	<ul style="list-style-type: none"> • Raisby Hill Grassland • Raisby Hill Quarry • Ramsey's Burn Wood • Redcar Field • Redesdale Ironstone Quarries • Ridley Gill • Rigg Farm and Stake Hill Meadows • River Coquet and Coquet Valley Woodlands • River Nent at Blagill • River South Tyne and Tynebottom Mine • River Tyne at Ovingham • River West Allen at Blakett Bridge • Roddam Dene • Rogerley Quarry • Roman Wall Escarpments • Roman Wall Loughs • Roseberry Topping • Ryton Willows • Saltburn Gill • Settlingstones Mine • Sherburn Hill • Shibdon Pond • Shipley and Great Woods • Simonside Hills • Sleightholme Beck Gorge - The Troughs • Slit Woods • Smallcleugh Mine • South Hylton Pasture • Spindlestone Heughs • Stawardpeel Woods • Stonecroft Mine • Stony Cut, Cold Hesledon • Strother Hills • Teesdale Allotments • Teesmouth and Cleveland Coast • The Allers and Lilburn Valley Junipers • The Bog • The Bottoms • The Carrs • The Cheviot • Thorneyburn Meadow • Thornley Wood • Thrislington Plantation • Till Riverbanks • Tipalt Burn • Town Kelloe Bank • Trimdon Limestone Quarry • Tunstall Hills and Ryhope Cutting • Tuthill Quarry • Tweed Catchment Rivers - England: Lower Tweed and Whiteadder • Tweed Catchment Rivers - England: Till Catchment
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Appendix C – Baseline Environment Review

	<ul style="list-style-type: none"> • Close House Riverside • College Valley Woodlands • Colour Heugh and Bowden Doors • Coquet Island • Corbridge Limestone Quarry • Cornriggs Meadows • Cotherstone Moor • Cottonshope Head Quarry • Crag Gill • Cresswell and Newbiggin Shores • Cresswell Ponds • Crime Rigg Quarry • Dabble Bank • Darras Hall Grassland • Dawson's Plantation Quarry • Derwent Gorge & Horsleyhope Ravine • Durham Coast • Durtrees Burn Grassland • Eppleton Grassland 	<ul style="list-style-type: none"> • Lovell Hill Pools • Low Hauxley Shore • Low Redford Meadows • Lower Derwent Meadows • Lune Forest • Mere Beck Meadows • Middle Crossthwaite • Middle Side & Stonygill Meadows • Middleton Quarry • Middridge Quarry • Mill and Whiskershiel Burns • Monk Wood • Moorhouse and Cross Fell • Moorsley Banks • Muckle Moss • Muggleswick, Stanhope & Edmundbyers Commons & Blanchland Moor • Neasham Fen • New Hartley Ponds • New Scroggs • Newham Fen • Newton Ketton Meadow • Newton Links • Ninebanks River Shingle • North York Moors • Northumberland Shore • Old Moss Lead Vein • Otterburn Mires 	<ul style="list-style-type: none"> • Tyne Watersmeet • Tynemouth to Seaton Sluice • Upper Teesdale • Waldrige Fell • Warks Burn Woodland • Warkworth Dunes and Saltmarsh • Wear River Bank • West Farm Meadow, Boldon • West Newlandside Meadows • West Park Meadows • West Rigg Open Cutting • Westernhope Burn Wood • Wharmley Riverside • White Ridge Meadow • Whitesike Mine and Flinty Fell • Whitfield Moor, Plenmeller and Ashholme Commons • Whitton Bridge Pasture • Williamston River Shingle • Willow Burn Pasture • Wingate Quarry • Witton-le-Wear • Yoden Village Quarry
NNR	<ul style="list-style-type: none"> • Cassop Vale • Newham Bog • Kielder Mires • Kielderhead • Muckle Moss 	<ul style="list-style-type: none"> • Thrislington • Whitelee Moor • Greenlee Lough • Castle Eden Dene • Durham Coast 	<ul style="list-style-type: none"> • Teesmouth • Derwent Gorge and Muggleswick Woods • Moor House-Upper Teesdale • Lindisfarne.
MCZ	<ul style="list-style-type: none"> • Coquet to St Marys (UKMCZ0030) 	<ul style="list-style-type: none"> • Berwick to St Mary's (UKMCZ0055). 	

Priority Habitats were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan. These habitats are now listed in section 41 of the Natural Environment and Rural Communities (NERC) Act and called 'Habitats of Principal Importance'. They are important habitats for wildlife and protection from harmful development is supported by the NERC Act and the National Planning Policy Framework (NPPF). There are a range of designated NERC Act Section 41 habitats within Level 1 which are listed below. NWG has a duty to have regard to the conservation and enhancement of biodiversity in exercising its function relating to habitats and species of principal importance (with the 'enhance' requirement recently introduced through the Environment Act).

- Blanket bog
- Calaminarian grassland
- Coastal and floodplain grazing marsh
- Coastal saltmarsh
- Coastal sand dunes
- Deciduous woodland
- Fragmented heath

Appendix C – Baseline Environment Review

- Good quality semi-improved grassland
- Grass moorland
- Limestone pavement
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland heathland
- Lowland meadows
- Lowland raised bog
- Maritime cliff and slope
- Mountain heaths and willow scrub
- Mudflats
- No main habitat but additional habitats present
- Purple moor grass and rush pastures
- Reedbeds
- Saline lagoons
- Traditional orchard
- Upland calcareous grassland
- Upland flushes, fens, and swamps
- Upland hay meadow
- Upland heathland

In recognition of the importance of connectivity between habitats (which increases resilience to climate change), Habitat Networks have been mapped by Natural England at the national scale. This network covers approximately half of the total study area with upland areas to the north and west having greatest coverage, often correlating to National Parks, in particular Northumberland. The Environment Act states that ‘a local nature recovery strategy for an area is to be prepared and published by the responsible authority’ – this might be a local authority, national park, Natural England, or Mayor for the area of a combined authority.

Provisional Agricultural Land Classification groups land into five grades and are shown on the accompanying maps. 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. Agricultural land classification covers the entire CL. Outside of urban areas, most central and eastern areas are Grade three. Generally, areas to the west of the region, including Northumberland National Park, become more elevated and agricultural land becomes lower in grade with areas of moorland or lower quality grass pasture increasingly common in upland areas. No part of the Level 1 area is ranked as Grade one land which is the highest quality agricultural land within the UK.

The geodiversity of the North East impacts its diverse landscape which outside of urban areas, allows for a variety of farming uses. Defra data for the North East region for 2019 shows that grazing livestock farms accounted for 55% of farmed area, and that cereal farms covered an additional 22% of farmed area².

² GOV.UK (2022) Agriculture Regional Profiles 2019, available at: [Agricultural facts: England regional profiles - North East \(publishing.service.gov.uk\)](https://www.gov.uk/publishing.service.gov.uk), accessed May 2022.

Appendix C – Baseline Environment Review

The geology across the region, including bedrock and superficial, is greatly varied. According to BGS³ and England's North East⁴, there are:

- Areas of carboniferous limestones to the south and east.
- Older igneous rock formations to the north and west including the Great Whin Sill which is a key feature of the Northern Pennines and Northumberland.
- Coal Measures are present within various parts of the region.
- Coal Measures, Millstone Grit, Upper and Lower Limestone dominate the geology of the upper Wear catchment.
- Coal Measures and Magnesian Limestone dominate in the middle and lower reaches of the Wear and in the locality of East Durham to the coast.
- The North Pennines of Durham and Northumberland were historical producers of lead and iron.
- The variation of geology reflects soils and the agricultural value and generally, clay-based soils dominate Northumbria in lower areas, with peaty soils in the uplands.

LIKELY FUTURE WITHOUT THE PLAN

Development is likely to increase the risk of habitat loss and fragmentation, particularly outside of the extensive designated areas. The recent Environment Act requires a biodiversity net gain from developments where planning permission is required.

The Defra 25 Year Environment Plan includes a commitment to restore 75% of terrestrial and freshwater protected sites to favourable condition and to create or restore 500,000 hectares of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits.

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.

Population is expected to increase in the region, although less than other regions. 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.

1.2 Human Health

The North East had a 2018 population of approximately 2,658,000. The projected population growth is expected to be 2.3% to a 2028 population of 2,719,000. This is below the national projected growth of 5% between 2018 and 2028⁵ and is the lowest for all English regions. The level of growth is being taken into account through the modelling of the DWMP options.

The North East has had lower life expectancy compared to the whole of England for many decades. Data released in September 2020 showed that the lowest regional life expectancy for both males and females in 2017 to 2019 was observed in the North East and that the North East's life expectancy at birth was also lower than in the countries of Wales and

³ BGS (2022) Geology of Britain Viewer, available from: [Geology of Britain viewer | British Geological Survey \(BGS\)](#), accessed March 2022.

⁴ England's North East (2020) Rocking the Region's History, available from: <https://englandsnortheast.co.uk/2020/10/15/rocking-the-regions-history/>, accessed March 2022.

⁵ Office for National Statistics (2020) Subnational population projections for England: 2018-based

Appendix C – Baseline Environment Review

Northern Ireland, but higher than Scotland⁶. This date range was used prior to Covid-19 which impacted the UK from early 2020 onwards.

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, cancer rates, and more can all be reviewed. The North East region includes data from the local authorities listed in **Table 1.1.2** which sets out key findings from each health profile⁷: As set out, the overall trend is that the North East has below national averages for most indicators⁸.

Table 1.1.2. – Key findings from each health profile

Local Authority	Summary of key findings
County Durham	<ul style="list-style-type: none"> • “The health of people in County Durham is varied compared with the England average. About 21.8% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 8.8 years lower for men and 6.6 years lower for women in the most deprived areas of County Durham than in the least deprived areas.” • “In Year 6, 22.4% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 55 per 100,000, worse than the average for England.” • “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases and under 75 mortality rate from cancer are worse than the England average”.
Darlington	<ul style="list-style-type: none"> • “The health of people in Darlington is varied compared with the England average. About 20% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 13.7 years lower for men and 9.5 years lower for women in the most deprived areas of Darlington than in the least deprived areas.” • “In Year 6, 22.5% of children are classified as obese. The rate for alcohol-specific hospital admissions among those under 18 is 52 per 100,000, worse than the average for England.”
Gateshead	<ul style="list-style-type: none"> • “The health of people in Gateshead is generally worse than the England average. About 20.9% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 10.6 years lower for men and 9.3 years lower for women in the most deprived areas of Gateshead than in the least deprived areas.” • “In Year 6, 24.2% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 63 per 100,000, worse than the average for England.”
Hartlepool	<ul style="list-style-type: none"> • “The health of people in Hartlepool is generally worse than the England average. Hartlepool is one of the 20% most deprived districts/unitary authorities in England and about 28.6% (5,020) children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 12.5 years lower for men and 10.4 years lower for women in the most deprived areas of Hartlepool than in the least deprived areas.” • In Year 6, 26.9% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 42 per 100,000.” • “The rates of statutory homelessness, violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
Middlesbrough	<ul style="list-style-type: none"> • “The health of people in Middlesbrough is generally worse than the England average. Middlesbrough is one of the 20% most deprived districts/unitary authorities in England

⁶ ONS (2022) Life Expectancy, available at: [Life expectancy for local areas of the UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/life-expectancy-for-local-areas-of-the-uk), accessed March 2022.

⁷ Office for Health Improvement and Disparities (2019) Local Authority Health Profile Reports, available at: https://fingertips.phe.org.uk/profile/health-profiles/area-search-results/E12000001?place_name=North%20East&search_type=list-child-areas, accessed March 2022.

⁸ Public health England (2022) Health Profiles, available at: [Local Authority Health Profiles - PHE](https://www.phe.org.uk/local-authority-health-profiles), accessed March 2022.

Appendix C – Baseline Environment Review

	<p>and about 31.8% children live in low income families. Life expectancy for both men and women are lower than the England average.”</p> <ul style="list-style-type: none"> • “Life expectancy is 12.6 years lower for men and 12.0 years lower for women in the most deprived areas of Middlesbrough than in the least deprived areas.” • “In Year 6, 24.7% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 41 per 100,000.” • “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
Newcastle upon Tyne	<ul style="list-style-type: none"> • “The health of people in Newcastle upon Tyne is generally worse than the England average. Newcastle upon Tyne is one of the 20% most deprived districts/unitary authorities in England and about 24.7% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 13.1 years lower for men and 8.8 years lower for women in the most deprived areas of Newcastle upon Tyne than in the least deprived areas.” • “In Year 6, 24.6% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 43 per 100,000, worse than the average for England.” • “The rates of statutory homelessness, violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
North Tyneside	<ul style="list-style-type: none"> • “The health of people in North Tyneside is varied compared with the England average. About 17.1% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 11.5 years lower for men and 10.7 years lower for women in the most deprived areas of North Tyneside than in the least deprived areas.” • “In Year 6, 21.6% of children are classified as obese. The rate for alcohol-specific hospital admissions among those under 18 is 85 per 100,000, worse than the average for England.” • “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases and under 75 mortality rate from cancer are worse than the England average.”
North-umberland	<ul style="list-style-type: none"> • “The health of people in Northumberland is varied compared with the England average. About 17.2% children live in low income families. Life expectancy for women is lower than the England average.” • “Life expectancy is 10.2 years lower for men and 8.8 years lower for women in the most deprived areas of Northumberland than in the least deprived areas.” • “In Year 6, 18.9% of children are classified as obese. The rate for alcohol-specific hospital admissions among those under 18 is 51 per 100,000, worse than the average for England.” • “The rates of violent crime (hospital admissions for violence) and employment (aged 16-64) are worse than the England average.”
Redcar and Cleveland	<ul style="list-style-type: none"> • “The health of people in Redcar and Cleveland is generally worse than the England average. Redcar and Cleveland are one of the 20% most deprived districts/unitary authorities in England and about 25.2% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 11.0 years lower for men and 7.3 years lower for women in the most deprived areas of Redcar and Cleveland than in the least deprived areas.” • “In Year 6, 22.1% of children are classified as obese. The rate for alcohol-specific hospital admissions among those under 18 is 55 per 100,000, worse than the average for England.” • “The rates of under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
South Tyneside	<ul style="list-style-type: none"> • “The health of people in South Tyneside is generally worse than the England average. South Tyneside is one of the 20% most deprived districts/unitary authorities in England and about 26.4% children live in low income families. Life expectancy for both men and women are lower than the England average.” • “Life expectancy is 9.3 years lower for men and 8.1 years lower for women in the most deprived areas of South Tyneside than in the least deprived areas.” • “In Year 6, 25.3% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 107 per 100,000, worse than the average for England.”

Appendix C – Baseline Environment Review

	<ul style="list-style-type: none"> “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
Stockton-on-Tees	<ul style="list-style-type: none"> “The health of people in Stockton-on-Tees is generally worse than the England average. About 21.3% children live in low income families. Life expectancy for both men and women are lower than the England average.” “Life expectancy is 15.2 years lower for men and 13.8 years lower for women in the most deprived areas of Stockton-on-Tees than in the least deprived areas.” “In Year 6, 19.5% of children are classified as obese. The rate for alcohol-specific hospital admissions among those under 18 is 46 per 100,000, worse than the average for England.” “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”
Sunderland	<ul style="list-style-type: none"> “The health of people in Sunderland is generally worse than the England average. Sunderland is one of the 20% most deprived districts/unitary authorities in England and about 23.6% children live in low income families. Life expectancy for both men and women are lower than the England average.” “Life expectancy is 11.5 years lower for men and 8.5 years lower for women in the most deprived areas of Sunderland than in the least deprived areas.” “In Year 6, 24.8% of children are classified as obese, worse than the average for England. The rate for alcohol-specific hospital admissions among those under 18 is 86 per 100,000, worse than the average for England.” “The rates of violent crime (hospital admissions for violence), under 75 mortality rate from cardiovascular diseases, under 75 mortality rate from cancer and employment (aged 16-64) are worse than the England average.”

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, and these should be considered on an individual design basis. There is an opportunity for option such as blue/green infrastructure to link to these. 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 2.3% 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. Many pieces of long-standing legislation such as the National Planning Policy Framework (NPPF) have promoted green areas and improved access, and this has also become more emphasised across other policies and plans. There is also greater emphasis on future development being more focused towards brownfield sites and urban areas providing greater access to green spaces.

1.3 Socio-economic

The North East had an unemployment rate (aged 16 and over) of 5.1% in the data published from July to September 2021 at the time of writing the Scoping Report. This was 0.8% above the national average of 4.3%. The Covid-19 pandemic may have impacted unemployment rates; however, it is anticipated that this effect would be even across all regions of the UK when comparing the data. The latest data, at the time of writing this Baseline Environmental Review, was published for November 2021 to January 2022 shows that the region had an unemployment rate (aged 16 and over) of 5.5% compared to the national average for England of 4.1%⁹. This is a difference of 1.4% and an increase since the data published between July and September last year.

⁹ ONS (2021) Labour market in the regions of the UK: March 2022, Available from: [Labour market in the regions of the UK - Office for National Statistics](#), accessed March 2022.

Appendix C – Baseline Environment Review

The English Indices of Multiple Deprivation (IMD) measures relative levels of deprivation in over 30,000 small areas or neighbourhoods, formally called Lower-layer Super Output Areas, in England. The 2019 IMD collects data from seven domains including income, employment, education, health, crime, barriers to housing/ services and living environment, which collectively give each neighbourhood a ranked score and are shown on the accompanying maps. The north east has a high number of areas within the lowest 10% of this national rank system. Specifically, Middlesbrough is the local authority district with the highest national proportion of neighbourhoods in the most deprived 10% at 48.8%. Hartlepool has the tenth highest percentage for the same criteria at 36.2%.

Overnight tourism has been estimated for each region in the UK by Visit Britain with a breakdown of tourism trips by region of residence and region visited (millions). North East England had over 4.2 million overnight trips in 2019 (pre-Covid19)¹⁰. This perhaps reflects the pull factor of the region with its abundance of beautiful landscapes and protected areas.

There are two international airports in the region, Newcastle and Teesside which are shown on the accompanying maps. There are numerous major A Roads and motorways within the region as well as an important rail network. The North East is also home to significant ports including the Ports of Tees and Hartlepool which are collectively ranked as the sixth largest by cargo handling capacity in the UK¹¹. The ports of Tees and Hartlepool are situated 10km away from each other and have important links to oil production in the North Sea.

LIKELY FUTURE WITHOUT THE PLAN

Uncertainty over inflation, the cost-of living crisis and government debt incurred during Covid-19 may impact the economy for years to come. The impact of Brexit may affect the North East disproportionately due to the economic presence of important ports, although Teesside (including Teesside International Airport; the Port of Middlesbrough; the Port of Hartlepool; and more) along with seven areas outside of the region were announced as freeports in March 2021 which is anticipated to bring benefits¹².

Employment rates in the future are uncertain owing to the circumstances listed above, as is the performance of the North East against other regions. Government focus on levelling up has been prominent but so far this is not directly reflected within many plans or policies. Given this, and the short-term trend seen between data in summer 2021 to Winter 2021/2022, it can be anticipated that employment rates will remain behind the UK average.

Investment in infrastructure is likely to remain moderate to high in the medium-term with optioneering currently underway for upgraded and new infrastructure.

1.4 Carbon & Material Assets

The North East is a key industrial heartland for the UK and the desire to grow the North East's economy adds pressure to energy and resource demand. Whilst population growth rate in the region is one of the lowest in the country, development will be required to meet the anticipated growth. This is likely to increase pressure on land use. Nationally there is a preference for sustainable use of land through reuse of previously developed land. Green Belt plays an important role in planning and primarily aims to reduce urban sprawl. Large areas of Green Belt surround urban centres such as Newcastle, Sunderland and Durham. The local authorities with Green Belt areas include Newcastle upon Tyne; North Tyneside;

¹⁰ Visit Britain (2019) Available from: [Great British Tourist Report 2019 \(visitbritain.org\)](https://www.visitbritain.org) , accessed March 2022.

¹¹ UK Ports (2019) What are the 10 largest ports in the UK? Available from: <https://www.ukports.com/what-are-the-10-largest-ports-in-the-uk>, accessed March 2022.

¹² GOV.UK (2021) Freeports Guidance. Available from: [Freeports - GOV.UK \(www.gov.uk\)](https://www.gov.uk), accessed March 2022.

Appendix C – Baseline Environment Review

South Tyneside; Sunderland; Northumberland; Gateshead; and Durham and are shown on the accompanying maps.

Newcastle and Sunderland have been named among world-leading cities in driving to reduce their climate change impact. Newcastle retains an 'A'-grade status, while Sunderland gains this same rating, from the international climate research provider CDP (an international non-profit organisation who collate and disseminate environmental information). Newcastle has pledged to reach net zero by 2030, with the entire city carbon neutral, whilst Sunderland is seeking to become carbon neutral by 2040. Targets consider a large scope from transport to domestic energy use and waste targets¹³.

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.

Average recycling rates in the North East for 2018/19 were 36.4% which was lower than the average for England of 43.8%¹⁴. There may be a relationship with population density and space for landfill that could explain some of the difference when compared to other regions which form the national average as the North East is one of the least densely populated areas in the UK. There are 104 permitted waste sites on the Environment Agency records for authorised landfill¹⁵ in the CL. Landfill Sites are becoming more difficult to source nationally, and historically the North East has used many former quarries.

Air quality is varied across the Level 1 with higher concentrations of air pollutants in more urbanised areas, usually from transport or industrial production. Domestic energy use releases air pollution from the generating sources, which are often power stations outside of urban centres for those generation sources that have negative air quality emissions.

Air Quality Management Areas (AQMA) are declared where the national air quality objectives are not being met and are shown on the accompanying maps. AQMA are predominately designated for Nitrogen dioxide (NO₂) and Particulate Matter (PM10). There are seven AQMA in the CL. Two AQMA are located within the Wear SPA and both have Durham as the local authority. These are the Durham City AQMA and Chester-le-Street AQMA. Five AQMA intersect the Tyneside SPA, with two in the South Tyneside Metropolitan Borough Council boundary named AQMA 1 and AQMA 2. Two are within Newcastle City Council's boundary and are named as: AQMA 1b (City Centre) and AQMA 5 (Gosforth). The final AQMA is Gateshead Town Centre within the Gateshead Metropolitan Borough Council boundary.

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.

Regeneration and investment are likely to increase the number and quality of material assets including transport infrastructure, recycling facilities, and building efficiency.

¹³ BBC News (2021) Grade A Status for Newcastle and Sunderland's Green Plan, available from: [Grade 'A' status for Newcastle and Sunderland's green plans - BBC News](#), accessed May 2022.

¹⁴ Defra (2019) Statistics on waste managed by local authorities in England in 2018/19.

¹⁵ Environment Agency Defra Data Services Platform (2022), accessed March 2022.

Appendix C – Baseline Environment Review

Air Quality is expected to improve in the short and medium terms as vehicular transport is electrified, including the ban on the sale of new petrol and diesel cars from 2030. This is despite the increase in population expected.

1.5 Water Resources

In general, rainfall is lower in the east of England compared to the west. The North East is an area of water surplus owing to its population density, climate, and topography. Supply demand status for water resource zones (WRZs) across the region shows that as of 2021, Hartlepool WRZ, Berwick-Fowberry WRZ and Kielder WRZ all are areas of surplus¹⁶. Further WRZ marginally intersect the Level 1 including North Eden; Carlisle (both United Utilities); and Grid SWZ (Yorkshire Water)¹⁷. If water usage increases this is likely to place additional pressures on wastewater treatment which can be energy intensive.

The Northumbria River Basin District (RBD) is designated under the Water Framework Directive and covers an area of 9,000km², extending from the Scottish border in the north to County Durham in the south and eastern Cumbria in the west to the North Sea in the east¹⁸. There are 4 management catchments that make up the river basin district, which include interconnected rivers, lakes, groundwater, estuaries, and coastal waters. These range from industrial urban areas in the east to the moors, hills, and valleys of the Pennines in the west. Each RBD features numerous water bodies with assessed status for ecological, biological, and chemical indicators. The Northumbria RBD had 29 water bodies that failed for chemical status and 75 water bodies with either a bad or poor ecological status/ potential, from a total of 374.

Part of NWG's operational area is within the Solway Tweed RBD where approximately 5% of the total Solway Tweed RBD is within the NWG operational area. The Tweed River Operational Catchment is the relevant part of the overall RBD - all watercourses are of good/ high ecological status and are good chemical status by 2015 and 2027¹⁹.

Where watercourses are not achieving good status, the Environment Agency identify the Reasons for Not Achieving Good Status (RNAGS); the reasons can include 'Water Industry Intermittent Discharges', i.e., discharges from storm overflows. This data has been key to identifying the measures required within the plan, and the timescale over which they must be implemented.

LIKELY FUTURE WITHOUT THE PLAN

The anticipated population growth alongside the desires for economic growth will likely increase stress on water availability and the natural environment as well as the total volume of water requiring treatment. The effects are likely to be amplified by climate change.

Ecological and chemical status of water bodies may be subject to climate change. Firstly, temperature impacts both the chemical and biological characteristics of surface water, with dissolved oxygen levels changing in the water as one example. Changing rainfall patterns may also lead to a reduction in perennial water bodies and increased intermittent or ephemeral water bodies with associated impacts. The Water Framework Directive set a target of aiming to achieve

¹⁶ Water Resources North (2021) Revised Water Resources Position Statement, available from: [wren-report-feb21-final.pdf \(waterresourcesnorth.org\)](https://www.waterresourcesnorth.org/wren-report-feb21-final.pdf), accessed March 2022.

¹⁷ Defra (2022) Spatial Download for WRZ. Available from: [Defra Spatial Data Download](https://www.defra.gov.uk/spatial-data-download/), accessed March 2022.

¹⁸ Environment Agency (2015) RBMP. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718333/Northumbria_RBD_Part_1_river_basin_management_plan.pdf, accessed March 2022.

¹⁹ Environment Agency (2022) Objectives data for Tweed River Operational Catchment. Available from: <https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3380/objectives>, accessed March 2022.

Appendix C – Baseline Environment Review

at least 'good status' in all waterbodies by 2015. However, provided that certain conditions are satisfied, in some cases the achievement of good status may be delayed until 2021 or 2027.

1.6 Flood Risk

Flood risk across the Level 1 is varied and can occur from a wide range of sources including fluvial, coastal, groundwater, reservoir, sewer, and surface water. 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.

The NWG area of operation predominantly intersects the Northumbria RBD and smaller parts of the Solway & Tweed RBD. Almost 9,200 properties in the Northumbria RBD receive direct flood warnings²⁰. Thousands of residential and non-residential properties in the RBD benefit from river flood risk management schemes, including homes and businesses in Morpeth and Warkworth. Further schemes are ongoing or planned in places such as Blyth, Team Valley, Port Clarence, Stockton, Gosforth, and Guisborough²⁰.

The Environment Agency and local councils/ Lead Local Flood Authorities (LLFAs) also manage and reduce flood risk through the planning system²⁰. There are multiple Environment Agency Main Rivers and some applicable ordinary watercourses within the region which have flood zones with planning guidance on development and the requirements for further study such as Flood Risk Assessments. Flood Risk has been considered through the DWMP as part of the problem characterisation stage and the option appraisal. Northumbrian Water manages flooding from the sewer network and there is an ongoing programme to renew and replace sewers to reduce the risk of sewer flooding to homes through the current AMP period. Development such as paving, extensions, or new housing can all increase flows in the sewer network. Northumbrian Water is working with local councils and the Environment Agency to investigate how to manage this increase of surface water and reduce flood risk from their network.

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.

The Government's 25 year Environment Plan looks to strengthen policy including National Planning Policy Framework (NPPF) guidance in regard to development in flood risk areas. Sustainable solutions are promoted, and these also fit into other policy and plans including NWG's own ambitions.

1.7 Heritage

The options within the DWMP could affect heritage assets, including built heritage and its setting, archaeological remains (and their settings), and the historic landscape character, particularly where these are related to the water environment or may be affected by drainage measures. Archaeological remains, including those below-ground, are sensitive to changes relating to land use, water quality and water levels.

²⁰ Environment Agency (2016) Northumbria River Basin Summary. Available from: [LIT_10200_NORTHUMBRIA_FRMP_SUMMARY_DOCUMENT.pdf \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/544442/LIT_10200_NORTHUMBRIA_FRMP_SUMMARY_DOCUMENT.pdf), accessed March 2022.

Appendix C – Baseline Environment Review

A dominant heritage constraint is the World Heritage Site (WHS) of Hadrian's Wall (full name: the Frontiers of the Roman Empire, Hadrian's Wall)²¹. This WHS intersects west to east across the SPAs of Rural Tyne, Northumberland, and Tyneside. This area acts as both a major tourism pull factor and as one of the UK's prominent historical heritage and archaeological areas. Additionally, 50 records from a search of Scheduled Monuments had 'Hadrian' in their name and more may be within the footprint of the WHS or in proximity. Durham Castle and Cathedral is another WHS within the CL, with both shown on the accompanying maps.

A Scheduled Monument is a nationally important archaeological site or historic building, given protection against unauthorised change. There are 1,452 Scheduled Monuments in the Level 1 and these are shown on the accompanying maps.

There are 13,031 listed buildings within the Level 1 and these are shown on the accompanying maps. Of these, 394 are Grade I listed which is for a building or structure of exceptional interest. Nationally, only 2.5% of listed buildings are Grade I. The remaining 12,637 are Grade II or II* listed. 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.

One protected wreck is located along the coastline, and this is Seaton Carew Wreck lying in the intertidal zone at Seaton Carew (1000077). There are six Registered Battlefields within the Level 1 and these are shown on the accompanying maps. Three intersect Northumberland SPA; one intersects Rural Tyne SPA; one intersects Tyneside SPA; and one intersects Wear SPA.

There are 57 Registered Parks & Gardens within the Level 1 and these are shown on the accompanying maps. 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.

Other historical sites may be undesignated, but locally important, such as castles or museums and these should be investigated on a case-by-case basis in the optioneering phase for future selected options.

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. However, other historic assets may be at greater risk from the direct impacts of future climate change, through flooding, sea level change, storms, and other factors²².

1.8 Landscape

Three National Parks are located within the Level 1 and are shown on the accompanying maps. National parks are areas of relatively undeveloped and scenic landscapes designated by national government. Water companies have a statutory duty to have regard to the protection of national parks in carrying out their functions as water undertaker. Northumberland National Park intersects the greatest area including a large area within the Rural Tyne and Northumberland SPAs. The North York Moors National Park intersects the

²¹ Historic England (2022) Available from: [Frontiers of the Roman Empire \(Hadrian's Wall\) - 1000098 | Historic England](#), accessed March 2022.

²² English Heritage, [now Historic England] (2010) Climate Change and the Historic Environment, accessed March 2022.

Appendix C – Baseline Environment Review

southern boundary of Teesside, and the Yorkshire Dales National Park intersects the southern boundary of Teesdale. Buffers for development or consultation associated with the National Parks often extend beyond their spatial location.

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. Two AONB are located within the Level 1 and these are North Pennines and Northumberland Coast, shown on the accompanying maps. Each national AONB has a Management Plan which describes the area and identifies future trends and opportunities with actions.

The North Pennines AONB is “one of England’s most special places – a peaceful, unspoilt landscape with a rich history and vibrant natural beauty featuring tumbling waterfalls, sweeping moorland views, dramatic dales, stone-built villages, and snaking stonewalls”²³. The North Pennines includes parts of the Pennine Dales Environmentally Sensitive Area.

The Northumberland Coast AONB is a wild coastline which “sweeps along some of Britain’s finest beaches and is internationally noted for its wildlife. The AONB, a narrow coastal strip, stretches from Berwick-upon-Tweed to Amble. Open miles of beach are backed in places by extensive sand dunes and the AONB takes in the island of Lindisfarne and its treacherous intertidal flats, as well as the numerous small islands and rocks of the Farne Islands further out from the coast”²⁴. Seascapes are an important aspect of the Northumberland landscape, featuring in many of the most significant views within the study area. Northumberland has a long, generally low-lying coastline to the North Sea. The coastline comprises a series of rocky headlands alternating with sandy bays, which are the result of underlying geology.²⁵

The Durham Heritage Coast is defined from Sunderland to Hartlepool and thus is given protection through the NPPF and County Durham Plan. The Heritage Coast Management Plan 2018-2025 sets out objectives, including to conserve, protect and enhance the natural beauty of the coast; and to maintain and improve the environmental health of inshore waters affecting the Heritage Coast and its beaches through appropriate works and management.

Natural England has defined a series of National Character Areas (NCA) to conserve nature in England. They are areas of countryside identified by the unique combination of physical attributes, wildlife, land use and culture. Those applicable to the region are presented below in **Table 1.8.1** and are shown on the accompanying maps.

Table 1.8.1 – National Character Areas

Name	Description
North Northumberland Coastal Plain ²⁶	Varied landscape where coastal dune makes up the highest coverage priority habitat. The expansive coastal landscape and famous wildlife reserves around Lindisfarne and the Farne Islands bring people to this area.

²³ Landscapes for Life (2022) Available from: [North Pennines Area of Outstanding Natural Beauty \(landscapesforlife.org.uk\)](https://landscapesforlife.org.uk/), accessed May 2022.

²⁴ Landscapes for Life (2022) Available from: [Northumberland Coast Area of Outstanding Natural Beauty \(landscapesforlife.org.uk\)](https://landscapesforlife.org.uk/), accessed May 2022.

²⁵ Northumberland Landscape Character Assessment Part A Landscape Classification (2010) Available from [Microsoft Word - Northumberland LCA Part A FINAL.doc](#), accessed June 2022

²⁶ Natural England (2014) North Northumberland Coastal Plain, available from: [NCA1 N Northumberland Coastal Plain 220115MW.pdf](#), accessed March 2022.

Appendix C – Baseline Environment Review

Border Moors and Forests²⁷	The high altitude and climatic conditions led to peat deposits and the formation of a large expanse of upland mire habitats, much of which is internationally designated as Special Area of Conservation. The extent of these habitats has been reduced by widespread conifer afforestation, particularly at Kielder Forest which occupies the slopes around Kielder Water, a large, winding reservoir at the head of the North Tyne Valley which also forms a prominent feature in the landscape.
Cheviots²⁸	The wild, open upland landscape is dominated by rolling moorlands; there are extensive mosaics of heath, blanket bog, and grassland, managed for sheep and cattle rearing and grouse moors.
Cheviot Fringe²⁹	Vales to the south are a patchwork of arable farmland, pasture, and meadows with the regular field pattern strong, delineated by hedgerows punctuated with trees. To the north, arable cultivation dominates, and the fields are flatter and larger with fewer hedgerows. Conifer blocks and shelterbelts are prominent in the landscape with broadleaved woodland predominantly along watercourses.
South East Northumberland Coastal Plain³⁰	The coast supports a wide diversity of habitats including sand dunes, maritime cliffs, and slopes, coastal and flood plain grazing marsh and mudflats. Parts of the coast are of European importance for the bird populations (roseate and Arctic tern, purple sandpiper, and turnstone) at Druridge Bay and Coquet Island, which are included in the Northumbria Coast Special Protection Area, and for its dune systems and their plant communities, which are part of the North Northumberland Dunes Special Area of Conservation. The area supports a diverse range of marine species and ecosystems. The rivers Blyth, Wansbeck, Coquet, Pont and Seaton Burn drain through the coastal plain from the uplands and support rich wildlife, including white-clawed crayfish, otter, water vole and salmonids.
Northumberland Sandstone Hills³¹	The ridgetops and upper slopes are covered with heather and grass moorland broken by large geometric blocks of conifer. Below this is pasture with some arable cultivation, broadleaved woodland on scarp slopes and along watercourses, and a few notable parklands. There is a long tradition of rearing hardy sheep and cattle in this area
Mid Northumberland³²	The area is dissected by several small rivers which flow eastwards to the sea. The River Coquet flows down from the Cheviots, while the rivers Font, Wansbeck and Blyth and their tributaries wind down from the sandstone hills and upland pastures through wooded valleys and lowland arable areas. Within this predominantly farmed landscape there are many small woodland and shelterbelts, and a few open water areas.
Durham Coalfield Pennine Fringe³³	204 hectares fall within the North Pennine Moors SAC and Special Protection Area, designated for its habitats (including dry heath, blanket bog, and old sessile oak woodland) and upland breeding birds (including golden plover, curlew, dunlin, hen harrier and merlin). The west is more upland in character, with large, open fields bounded by drystone walls/ fences, and is primarily used for grazing.
Tyne Gap and Hadrian's Wall³⁴	A mosaic of arable and pastureland, conifer plantations and well-wooded valley sides occur, along with the fertile lowland corridor of the river flood plain. A well-wooded mosaic of deciduous, mixed, and coniferous woodland provides habitat for priority species – red squirrel and woodland birds. Broadleaved woodland on steep slopes line the rivers.
Tyne and Wear Lowlands³⁵	An area of gently undulating land, incised by the valleys of the major rivers. It is densely populated and heavily influenced by urban settlement, industry, and infrastructure. Between settlements there are wide stretches of agricultural land.

²⁷ Natural England (2013) Border Moors and Forests, available from:

<http://publications.naturalengland.org.uk/publication/4723311363751936?category=587130>, accessed March 2022.

²⁸ Natural England (2013) Cheviot, available from: <http://publications.naturalengland.org.uk/publication/4820746454958080>, accessed March 2022.

²⁹ Natural England (2013) Cheviot Fringe, available from: <http://publications.naturalengland.org.uk/publication/8760678>, accessed March 2022.

³⁰ Natural England (2013), South East Northumberland Coastal Plain, available from: [13 south east northumberland coastal plain.pdf](#), accessed March 2022.

³¹ Natural England (2013), Northumberland Sandstone Hills, available from: [H-2-NCA2-Northumberland-Sandstone-Hills.pdf](#), accessed March 2022.

³² Natural England (2013), Mid Northumberland, available from: <http://publications.naturalengland.org.uk/publication/4839052410880000?category=587130>, accessed March 2022.

³³ Natural England (2013), Durham Coalfield Pennine Fringe, available from: [NCA Profile: 16. Durham Coalfield Pennine Fringe - NE458 \(naturalengland.org.uk\)](#), accessed March 2022.

³⁴ Natural England (2013), Tyne Gap and Hadrian's Wall, available from: [NCA Profile: 11 Tyne Gap and Hadrian's Wall - NE533 \(naturalengland.org.uk\)](#), accessed March 2022.

³⁵ Natural England (2013), Tyne and Wear Lowlands, available from: [NCA Profile: 14 Tyne and Wear Lowlands - NE483 \(naturalengland.org.uk\)](#), accessed March 2022.

Appendix C – Baseline Environment Review

Durham Magnesium Limestone Plateau ³⁶	Rural land cover consists of arable land and grazing pasture, with small, isolated areas of wildlife-rich habitat such as Magnesian Limestone grassland and ancient woodland in the narrow valleys (or denes) running down to the coast. The coast is an important breeding and feeding area for migratory birds, and harbour porpoise frequents inshore waters.
Tees Lowlands ³⁷	The mosaic of intertidal and wetland habitats within the Tees Estuary are internationally designated as Teesmouth and Cleveland Coast Special Protection Area and Ramsar site, due to their importance for waterfowl.
North Pennines ³⁸	Expansive moorlands, grasslands and meadows are important features and upland bogs and acid grassland cover much of the area. The area attracts large numbers of insects, waders, and birds of prey.
Pennine Dales Fringe ³⁹	Rolling landscapes where the Pennines and Yorkshire Dales transition. Broadleaved woodlands (many of them of ancient origin), coniferous and mixed plantations, and numerous small woods and hedgerow trees all contribute to the well-wooded character of the area.
Yorkshire Dales ⁴⁰	An undulating upland landscape with peatland and moorland common. Geologically important landforms are present with many from glacial periods. There are numerous habitats of importance and over two thirds are within National Park land.
North York Moors and Cleveland Hills ⁴¹	Large open heather moorlands which support many protected species. Some 85 per cent of the area falls within the North York Moors National Park
Vale of Mowbray ⁴²	Drained by the River Swale and its tributaries the River Wiske and the Cod Beck, meandering through flood plains with remnant rough-grazed riverine meadows of high ecological value in the north of the vale. Woodland and tree cover is sparse: small game coverts and parkland landscapes contribute locally to the tree cover,

Landscape Character Assessments⁴³ identify that moorland drainage or ‘gripping’ has been extensive in some areas such as the North Pennines, causing damage to blanket bog, erosion of peat and in some cases conversion of bog to acid grassland or heath. This reduces the water retention capacity of the peat, increasing the rate of water flow downstream. The associated drying and decomposition of bog emits carbon dioxide; erosion causes discolouration of water supplies. Similarly, wet grassland has declined as a result of field- and larger-scale drainage. Drainage is identified as a force for change in several of the Landscape Character Types (LCT) and provide landscape management guidelines relevant to drainage across parts of the study area, including:

- LCT 8 Outcrop Hills and Escarpments: restore damaged bogs and flushes by blocking grips and drains
- LCT 19 Moorland and Forest Mosaic: Discourage the drainage of moorland areas and the improvement of in-bye pastures. Encourage restoration of bogs and heather moorland by blocking drains and reducing grazing and stocking levels
- LCT21 Rolling Uplands: Conserve areas of blanket bog through the avoidance of drainage and physical damage. Restore damaged bogs and flushes by blocking

³⁶ Natural England (2013), Durham Magnesian Limestone Plateau, available from: [NCA Profile: 15: Durham Magnesian Limestone Plateau - NE435 \(naturalengland.org.uk\)](#), accessed March 2022.

³⁷ Natural England (2013), Tees Lowlands, available from: [NCA Profile: 23 Tees Lowlands - NE439 \(naturalengland.org.uk\)](#), accessed March 2022.

³⁸ Natural England (2013), North Pennines, available from: <http://publications.naturalengland.org.uk/publication/5682293?category=587130>, accessed March 2022.

³⁹ Natural England (2013), Pennine Dales Fringe, available from: [NCA Profile: 22 Pennine Dales Fringe - NE474 \(naturalengland.org.uk\)](#), accessed March 2022.

⁴⁰ Natural England (2013), Yorkshire Dales, available from: [NCA Profile: 21. Yorkshire Dales - NE399 \(naturalengland.org.uk\)](#), accessed March 2022.

⁴¹ Natural England (2012), North York Moors and Cleveland Hills, available from: [NCA Profile: 25 North York Moors and Cleveland Hills - NE352 \(naturalengland.org.uk\)](#), accessed March 2022.

⁴² Natural England (2013), Vale of Mowbray, available from: <http://publications.naturalengland.org.uk/publication/9856012>, accessed March 2022.

⁴³ Northumberland Landscape Character Area Assessment, available from: [Northumberland County Council - Studies and evidence reports](#), accessed June 2022 and The County Durham Landscape Strategy, available from: [County Durham Plan Evidence Library - Keystone \(objective.co.uk\)](#), accessed June 2022

Appendix C – Baseline Environment Review

drains. Protect historical features from inappropriate land management including drainage, woodland planting and arable cropping.

- LCT 25 Moorland Ridges: Conserve areas of blanket bog through the avoidance of gripping and physical damage. Restore damaged bogs and flushes by blocking grips and drains.
- LCT 26 Upland Farming and Plantations: Seek opportunities to revert arable back to pasture where soil conditions are poor and restore wet pastures through blocking drains.
- LCT 27 Upper Dale: The maintenance and enhancement of in-bye pastures and allotment grazing should encourage limited use of herbicides, fertilisers and liming and by ensuring appropriate stocking levels and avoiding drainage, ploughing or reseeded.
- LCT 43 Coalfield Upland Fringe: Seek to maintain and enhance semi-improved pastures and meadows, wet pastures and rough grazing areas by adopting appropriate stocking levels or cutting regimes and avoiding improvements such as drainage, ploughing and reseeded.
- Support for the blocking of moorland drainage grips, such as within the North Pennines AONB.
- Support for the restoration and creation of field ponds as part of a ‘whole landscape’ approach.
- Support for the restoration of natural hydrological conditions to wetland systems and particularly river floodplains, lowland mires and lowland carrs.
- Support for the conservation and restoration of wet grasslands.

Townscape refers to the characteristics of urban areas and this can include the layout, density, and mix of buildings, architecture, and cultural spaces. There is significant industrial heritage across the region, especially along the coast and along major rivers such as the River Tyne and River Wear. Durham City Centre is one example of a location where the townscape will constrain options where architecture and frequent narrow, cobbled streets are present. Areas of important townscape are often located within Conservation Areas. Conservation areas exist to manage and protect the special architectural and historic interest of a place that make it unique. Every local authority in England has at least one conservation area, and there are 283 within the CL.

LIKELY FUTURE WITHOUT THE PLAN

Planning legislation recognises diversity of landscape character and promotes the protection of high value areas and reducing urban sprawl through Green Belts. The NPPF gives protection to the landscapes of greatest value such as National Parks and AONB. 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.

1.9 Climate Change Resilience

Current scientific data indicates that the UK is continuing to warm because of anthropogenic causes. The year 2020 was the third warmest year for the UK in a series dating back to 1884. The most recent decade (2011–2020) has been on average 0.5°C warmer than the period from 1981–2010; and 1.1°C warmer than the period between 1961–1990. Additional to temperature change, climate change also affects rainfall which continues to change from both an average rainfall perspective and storm events. The most recent decade (2011–2020) has been on average 9% wetter than 1961–1990 for the UK.

Appendix C – Baseline Environment Review

The Met Office UK Climate Projections (UKCP) were updated in December 2018 (UKCP18)⁴⁴. The Met Office climate projections cover different levels of global warming and when, or if, these levels are reached will depend on the concentration of greenhouse gases entering the global atmosphere. Data is measured in 7.5-mile-square grids across the UK and results can be searched via a postcode to find the grid closest⁴⁵. Newcastle City Council Civic Centre in Central Newcastle was selected at random for a regional representation of results with the postcode NE1 8QH used. Selected results included:

- The hottest day in the last 30 years was 30.6°C which could rise to 31.9°C if global temperatures rise by 2°C, and 36.2°C if global temperatures rise by 4°C.
- In the past 30 summers, there was one day above 25°C per month on average. With a 2°C rise, there could be two days rising to seven days for a 4°C rise.
- In the past 30 years, there were 10 rainy days on average per month in summer. If global average temperatures rise by 2°C, this could be 9 days per month and with a 4°C rise it could be 8 days.
- On the wettest summer day of the past 30 years, 48mm of rain fell. At a 2°C rise, this could be about 64mm, and at a 4°C rise this could be about 61mm, which is 26% more than now.

LIKELY FUTURE WITHOUT THE PLAN

Government policy and international goals indicate significant cuts in greenhouse gas emissions will start to take place throughout the 2020s as progress is made towards net zero targets in 2040/2050. It is anticipated that there will be a lag between the cut in emissions and a slowdown in the rate of temperature increase, i.e., if the world became carbon neutral tomorrow, the climate would continue to change for a period of time, anticipated to be years/ decades.

⁴⁴ Met Office (2018) UKCP18. Available from: [UK Climate Projections \(UKCP\) - Met Office](#) accessed April 2022.

⁴⁵ BBC News (2021) What will climate change look like near me? Available from: <https://www.bbc.co.uk/news/resources/idt-d6338d9f-8789-4bc2-b6d7-3691c0e7d138>, accessed April 2022.

APPENDIX D: LEVEL 2 SEA ASSESSMENT MATRICES

Appendix D – Level 2 SEA Assessment Matrices

Key:

Major positive	+++	Moderate positive	++	Minor positive	+	Neutral	0	Minor negative	-	Moderate negative	--	Major negative	---	No relationship	
HU =	Heritage Urban	IU =	Industry/Economic Urban	CU =	Coastal Urban	LR =	Lowlands Rural	UR =	Uplands Rural	SF =	Suburban Fringe				

Level 2 = Northumberland

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	--		++
	Below ground storage	-	0	0	-	+	+	--		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

Appendix D – Level 2 SEA Assessment Matrices

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	++
	SuDS features	+	++	++	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+

Appendix D – Level 2 SEA Assessment Matrices

Strategic Blue/ green corridors	++	++	++	++	++	++	++	0	++	+
SuDS features	+	+	+	+	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-	-		++
Below ground storage	-	0	0	-	+	+	-	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-			+	+
UV Treatment of overflow WwTW	+	+	0	--	++				0	0

	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
SF	Not Applicable									

Level 2 = Rural Tyne

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	---		++
	Below ground storage	-	0	0	-	+	+	---		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
		Rainwater harvesting		0	+	++	++	+		
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Not Applicable									

Appendix D – Level 2 SEA Assessment Matrices

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+

Appendix D – Level 2 SEA Assessment Matrices

	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Level 2 = Tyneside

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	---		++
	Below ground storage	-	0	0	-	+	+	---		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
		Rainwater harvesting		0	+	++	++	+		
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	+++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Appendix D – Level 2 SEA Assessment Matrices

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Not Applicable									

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Not Applicable									

Appendix D – Level 2 SEA Assessment Matrices

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Level 2 = Wear

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	---		++
	Below ground storage	-	0	0	-	+	+	---		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	+++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
CU	Not Applicable								

Appendix D – Level 2 SEA Assessment Matrices

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	-	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+

Appendix D – Level 2 SEA Assessment Matrices

Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures				++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

Level 2 = Wearside

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	--		++
	Below ground storage	-	0	0	-	+	+	--		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
		Rainwater harvesting		0	+	++	++	+		
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	+++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Appendix D – Level 2 SEA Assessment Matrices

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Not Applicable									

Appendix D – Level 2 SEA Assessment Matrices

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Level 2 = Teesdale

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	--		++
	Below ground storage	-	0	0	-	+	+	--		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
		Rainwater harvesting		0	+	++	++	+		
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Not Applicable									

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Greywater / blackwater treatment and re-use		0	+	++	++	+			++
Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
SuDS features	+	+	+	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use									
	Surface water source control measures									
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Appendix D – Level 2 SEA Assessment Matrices

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Level 2 = Teesside

HU		Protect, conserve, and enhance Biodiversity/ Geodiversity & geodiversity, including soils	Protect, conserve, and enhance Human Health and well-being, including resilient communities	Protect, conserve, and enhance social and economic prosperity	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
	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	--		++
	Below ground storage	-	0	0	-	+	+	--		+
	WwTW Treatment of side stream	-	-	0	-	+	-	---	---	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

IU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
		Rainwater harvesting		0	+	++	++	+		
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++

Appendix D – Level 2 SEA Assessment Matrices

Surface water source control measures	+	0		++	++	+			++
Smart network and Intelligent operation				+	+	+			+
Collaboration with other customers and catchment stakeholders	+	++	++	+	+	+	+	+	+
Strategic Blue/ green corridors	++	+++	++	++	++	++	0	++	+++
SuDS features	+	++	++	+	+	+	0	+	++
Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
Below ground storage	-	0	0	-	+	+	-		+
WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

CU	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	++
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0	

Appendix D – Level 2 SEA Assessment Matrices

LR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0

UR	Options	Biodiversity/ Geodiversity	Human Health	Socio- Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+

Appendix D – Level 2 SEA Assessment Matrices

Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
UV Treatment of overflow WwTW	+	+	0	--	++			0	0

SF	Options	Biodiversity/ Geodiversity	Human Health	Socio-Economic	Carbon & Material Assets	Water	Flood Risk	Heritage	Landscape	Climate Change Resilience
	Rainwater harvesting		0	+	++	++	+			++
	Greywater / blackwater treatment and re-use		0	+	++	++	+			++
	Surface water source control measures	+	0		++	++	+			++
	Smart network and Intelligent operation				+	+	+			+
	Collaboration with other customers and catchment stakeholders	+	+	+	+	+	+	+	+	+
	Strategic Blue/ green corridors	++	++	++	++	++	++	0	++	+
	SuDS features	+	+	+	+	+	+	0	+	++
	Surface water removal / Surface water separation	-	0	0	--	++	-	-		++
	Below ground storage	-	0	0	-	+	+	-		+
	WwTW Treatment of side stream	-	-	0	-	+	-	-	-	+
	Reed bed treatment of overflow WwTW	++	+	0	+	+++	-		+	+
	UV Treatment of overflow WwTW	+	+	0	--	++			0	0