



BRISTOL WATER – WATER RESOURCES MANAGEMENT PLAN 2024

SEA Environmental Report

Report for: Bristol Water

Ref. WRMP24 Environmental Assessment Support

Ricardo ref. ED15765

Issue: 5

18/10/2024

Customer:
Bristol Water

Customer reference:
3500077343

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1. INTRODUCTION

1.1 OVERVIEW

Bristol Water is preparing its next Water Resources Management Plan (WRMP24). The WRMP24 sets out how the balance between water supply and demand, and security of supply, will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable. WRMPs are reviewed on a rolling five-year basis, the previous version was published in 2019¹.

WRMPs must comply with international, UK and national legislation pertaining to the environment, as well as associated guidance on the development of WRMPs². This includes The Environmental Assessment of Plans and Programmes Regulations 2004 (the 'Strategic Environmental Assessment (SEA) Regulations'). A SEA assesses the likely environmental effects of the plans and identifies ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced. The SEA of the WRMP24 has informed the development and selection of the water resource management options that comprise the WRMP24.

This Environmental Report presents the findings of the SEA of Bristol Water's WRMP24.

1.2 STRATEGIC ENVIRONMENTAL ASSESSMENT

SEA is a statutory requirement under the Environmental Assessment of Plans and Programmes Regulations 2005 ('the SEA Regulations') requiring the assessment of effects of certain plans and programmes on the environment. The objective of the SEA is to:

"provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans with a view to promoting sustainable development"

The SEA Regulations require preparation of an Environmental Report in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and geographical scope of the plan or programme, are identified, described and evaluated.

The SEA Regulations require certain plans and programmes to undergo environmental assessment, and likely significant effects on the following issues must be addressed:

"...biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and interrelationships."

These 'SEA topics' guide the structure of this Environmental Report (e.g., the baseline review in Section 4). Issues such as noise and transport are addressed within the SEA topics where relevant, e.g., within the population and human health, and air and climate topics.

1.2.1 SEA Approach

The UK Government has produced generic SEA guidance³ that sets out the stages of the SEA process. This, along with specific guidance for undertaking SEA and Habitats Regulations Assessment (HRA) of WRMPs⁴, has informed the SEA of Bristol Water's WRMP24. The 2023 Final Water Resources Planning Guideline⁵ (WRPG) also provides guidance on the role of SEA within the water resources management planning process. This includes supplementary guidelines on Best Value Planning and Environment and Social Decision Making, which contains a number of requirements and recommendations for the scope of WRMP environmental

¹ Bristol Water (2019) Final Water Resources Management Plan 2019, August 2019. Available at: <https://www.bristolwater.co.uk/about-us/our-plans/water-resources/>

² UK Government (2022) Water Resource Planning Guidance (WRPG) [online]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. [Accessed 08.08.22].

³ Office of the Deputy Prime Minister (2005). A Practical Guide to the Strategic Environmental Assessment Directive.

⁴ UKWIR (2012) Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).

⁵ Ofwat, NRW & EA (2023), Water Resources Planning Guideline – Updated 14 April 2023

assessment, in particular in relation to SEA, Biodiversity Net Gain (BNG) and Natural Capital Assessment (NCA).

SEA incorporates the following generic stages:

- Stage A: Setting the context, identifying objectives, problems and opportunities, and establishing the environmental baseline (scoping)
- Stage B: Developing and refining options and assessing effects (impact assessment)
- Stage C: Preparing the Environmental Report (recording results)
- Stage D: Consulting on the Draft Plan and the Environmental Report (seeking consensus)
- Stage E: Monitoring the significant effects of the plan or programme on the environment (verification)

Table 1-1 is an extract from the Office of the Deputy Prime Minister (ODPM) Practical Guide³ that sets out the main stages of the SEA process and the purpose of each task within the process. This Environmental Report represents Stages B and C: Task C1 of the SEA process. Specific guidance on the application of the SEA process to WRMPs is provided by United Kingdom Water Industry Research (UKWIR)⁶.

Table 1-1: SEA Stages and Tasks

SEA Stages and Tasks	Purpose
Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope	
Task A1: Identifying other relevant plans, programmes and environmental protection objectives	To establish how the plan or programme is affected by outside factors to suggest ideas for how any constraints can be addressed, and to help identify SEA objectives.
Task A2: Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
Task A3: Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring.
Task A4: Developing SEA Objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.
Task A5: Consulting on the scope of the SEA	To ensure the SEA covers the likely significant environmental effects of the plan and programme.
Stage B: Developing and refining alternatives and assessing effects	
Task B1: Testing the plan and programme objectives against SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives.
Task B2: Developing strategic alternatives	To develop and refine strategic alternatives.
Task B3: Predicting the effects of the plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and its alternatives.
Task B4: Evaluating the effects of the plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme.
Task B5: Mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered.

⁶ UKWIR (2021) Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans. Report Ref 21/WR/02/15.

SEA Stages and Tasks	Purpose
Task B6: Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance of the plan or programme can be assessed.
Stage C: Preparing the Environmental Report	
Task C1: Preparing the Environmental Report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers.
Stage D: Consulting on the Draft Plan or programme and the Environmental Report	
Task D1: Consulting on the public and consultation bodies on the draft plan or programme and the Environmental Report	To give the public and the consultation bodies an opportunity to express their opinions on the findings of the Environmental Report and to use it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public.
Task D2: Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account.
Task D3: Making decision and providing information	To provide information on how the Environmental Report and consultees opinions were taken into account in deciding the final form of the plan or programme to be adopted.
Stage E: Monitoring the significant effects of the plan or programme on the environment	
Task E1: Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects.
Task E2: Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified.

1.2.2 The Role of Strategic Environmental Assessment in Decision Making

The aim of the WRMP is to find the ‘best value’ programme of supply and/or distribution options to restore and maintain a supply-demand balance in those Water Resource Zones (WRZs) for which a supply deficit has been forecast. The selection process has been facilitated through programme appraisal modelling tools, which have been designed to produce an optimised programme taking account of the whole life cost environmental considerations.

The WRMP process already requires a substantial element of environmental assessment and consideration. Certain environmental and social impacts are monetised and incorporated into the planning process by adding them to the capital and operating costs of schemes, as documented in the WRMP24 report. SEA adds value to the appraisal process by promoting the consideration of a wider range of impacts than cannot be monetised. SEA also incorporates results from HRA screening and Water Framework Directive (WFD) compliance assessments, ensuring the WRMP24 options and preferred plan consider potential impacts on protected habitats and water bodies.

1.2.3 The Difference Between SEA and EIA

The SEA was informed by quantitative data within the boundaries of the SEA process. However, these data will not provide the level of detail in these assessments typical of the EIA process. This is consistent with national guidance on SEA and EIA. If they were to be required, detailed EIAs would be produced to minimise environmental impacts and support the planning process for individual schemes at a later date.

The SEA and EIA processes have similarities, however, the aim and approach to these processes are significantly different. While not exhaustive, Table 1-2 provides a brief overview of the differences between these processes.

One of the key differences between the SEA and EIA is that SEA aims to identify potential environmental concerns associated with plans and programmes at a strategic level, while EIA provides a detailed assessment of impacts at the project level. The aims and approach of the SEA process provide a guide for the content of this SEA Environmental Report. The environmental data that will be used in this assessment comprises that which is readily available from existing sources, and no primary research or survey work has been carried out to inform the SEA.

Table 1-2: Key differences between SEA and EIA

Topic	SEA	EIA
Aim	To provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparations and adoption of plans and programmes with a view of promoting sustainable development.	To ensure that planning decisions are made with full knowledge of a project's likely significant environmental effects, and that any negative effects are prevented, reduced or offset, while positive effects are enhanced.
Approach	Pro-active approach to development of plans and programmes.	Reactive approach to project-level development proposal.
Impact Assessment	Assesses impacts at a strategic level, with regard to environmental objectives. More qualitative assessment.	Identified specific impacts on the environment. More quantitative assessment.
Alternatives	Considers broad range of potential alternatives.	Considers limited number of feasible alternatives.
Assessment Outcome	Provides information for consideration in the decision but does not determine it. A post-adoption statement must be produced outlining changes made to the plan or programme as a result of the SEA, responses to consultations, and the reasons for choosing the plan in light of other reasonable alternatives dealt with.	In determining the project application, the competent authority is required to have regard to the Environmental Statement, as well as to other material considerations.

1.3 PURPOSE OF THE ENVIRONMENTAL REPORT

This Environmental Report documents stages B and C of the SEA being undertaken by Bristol Water to establish the environmental effects of meeting its obligation for the long-term reliable supply of water to its customers, as identified in the company's WRMP24. The purpose and scope of the WRMP is explained in more detail in Section 1.5.

A SEA Scoping Report was produced and issued to external stakeholders as listed in the SEA Regulations in March 2022. The basis and approach for the SEA was developed through the scoping process and refined as a result of consultation with Environment Agency, Natural England and Historic England. This consultation was undertaken in accordance with Regulation 12(5) of the SEA Regulations. Stakeholder feedback was collated and summarised so key issues could be addressed and any changes to the approach considered (see Appendix 1). Due to the wide range of potential environmental impacts that may have arisen as a result of options included in the list of options available at the scoping stage, it was not deemed appropriate to scope out any environmental issues during that stage, as the water resource options had not been confirmed.

The requirements of the Environmental Report are set out in Regulation 12 of the SEA Regulations. According to Regulation 12(2) the Environmental Report shall *‘identify, describe and evaluate the likely significant effects on the environment of-*

- a) implementing the plan or programme; and*
- b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme”.*

Schedule 2 of the SEA Regulations lists specific items of information which should be included in the Environmental Report. The ODPM Practical Guide³ provides a Quality Assurance checklist to help ensure that the requirements of the SEA Directive are met throughout the entire process. Compliance against this checklist is discussed in Section 10.

This Environmental Report identifies the baseline information for options under consideration for Bristol Water’s WRMP24 (a ‘feasible list’ of options), as well as identifying their environmental effects (beneficial or adverse). It also identifies the potential mitigation and enhancement measures and suggests monitoring that could be undertaken to track the environmental effects of the WRMP24 once implemented.

1.3.1 Information requirements for this Report

Schedule 2 of the SEA Regulations requires the following specific information to be included within the Environmental Report:

- An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes (see Section 2.3, Section 3 and Appendix 2).
- The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme (see Section 4 and Appendix 3).
- The environmental characteristics of areas likely to be significantly affected (see Section 3 and 4).
- Any existing environmental problems which are relevant to the plan or programmes including, in particular, those to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC (the ‘Birds Directive’) and 92/43/EEC (the ‘Habitats Directive’) (see Section 1.6).
- 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 (see Section 5, Section 6 and Appendix 4).

1.3.2 The Environmental Report

The SEA incorporates the generic stages, as set out in the ODPM Practical Guide³ and detailed in Section 1.2.1. This Environmental Report documents stages B and C of the SEA being undertaken by Bristol Water to establish the environmental effects of the WRMP24.

The requirements of the Environmental Report are set out in Regulation 12 of the SEA Regulations. According to Regulation 12(2) the Environmental Report shall

“Identify, describe and evaluate the likely significant effects on the environment of –

- a) Implementing the plan or programme; and*
- b) Reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme*

Schedule 2 of the SEA Regulations lists specific items of information which should be included in the Environmental Report. The ODPM Practical Guide provides a Quality Assurance checklist to help ensure that the requirements of the SEA Regulations are met throughout the entire process. This is available in Appendix 5.

1.4 REQUIREMENT FOR SEA OF BRISTOL WATER'S WATER RESOURCES MANAGEMENT PLAN

As stated in the WRPG, water companies need to demonstrate that they have investigated whether a SEA is required of its WRMP. As responsible authorities under the SEA Regulations, water companies must themselves determine if its WRMP falls within the scope of the SEA Regulations.

The UKWIR Guidance, from which Figure 1-1 is adapted, provides directions as to how the requirement for SEA should be determined for WRMPs. The boxes and arrows highlighted in red on Figure 1-1 describe the provisions and route through the flow chart applicable to Bristol Water's WRMP24. When undertaking the exercise early in 2022 prior to the scoping stage it was demonstrated that the dWRMP24 was within the scope of the SEA Regulations. Notably, it was shown that the dWRMP24 may include schemes that would require EIA (Box 3 in Figure 1-1).

Acknowledging that the WRMP process intrinsically includes some consideration of environmental and social effects, SEA can add value to the process. It promotes consideration of a wider range of effects that cannot be monetised; it contributes to the development and assessment of alternative solutions; and it provides a mechanism for consideration of potential cumulative effects within the WRMP24, and with other plans and programmes. Additionally, it facilitates consultation and includes consideration of Habitats Regulations⁷ and WFD⁸ implications for the WRMP24 (as explained further in Sections 1.6.2 below).

⁷ The Conservation of Habitats and Species Regulations 2010 (as amended)

⁸ Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy

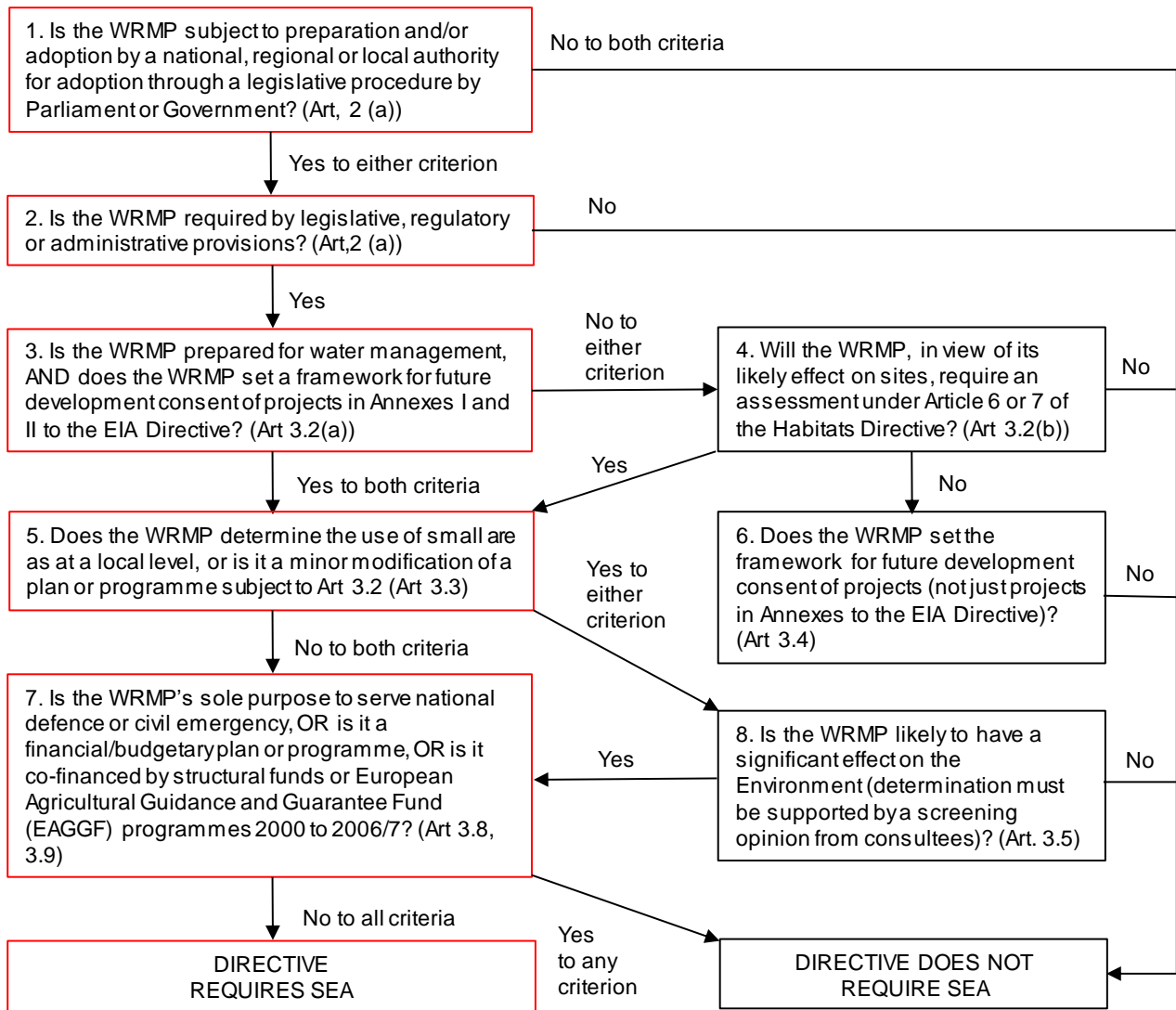


Figure 1-1: SEA Screening Process¹

1.5 SEA AND WATER RESOURCES MANAGEMENT PLANNING

In the context of water resource management planning, SEA can assist in the identification of the potential environmental effects (adverse and beneficial) of the options available, to ensure long-term resilient water supplies to Bristol Water’s customers. Knowledge of these effects can help to identify a preferred plan of options for Bristol Water’s supply area to ensure a balance is maintained between available water supplies and demand for water. The SEA informs the consideration of each option and the programme appraisal process, as well as development of the overall WRMP24. The SEA can identify cumulative effects between different environmental and social aspects of a particular option, programme or plan, as well as between alternative options and programmes. SEA also helps to identify potential cumulative effects of the WRMP24 with other plans, programmes and projects.

The WRMP process, as set out by guidance (revised WRPG), its supplementary guidance for Environment and Society in decision-making (England), already requires a substantial element of environmental assessment and consideration. Certain environmental and social effects are monetised and incorporated into the planning process by adding them to the capital and operating costs. The SEA process requires further environmental assessment and consideration of assessment outcomes. Care must be taken to ensure that environmental and social effects are not ‘double-counted’ as monetised and SEA assessed effects, potentially skewing the options and programme appraisal process.

1.6 SUPPORTING ENVIRONMENTAL ASSESSMENTS

Both statutory environmental assessments, HRA and WFD, and non-statutory environmental assessments (NCA and Invasive Non-Native Species Assessment (INNS)) have been undertaken to support the WRMP24. As identified by relevant guidance these assessments have been integrated within the SEA and WRMP24. Figure 1-2 (adapted from the UKWIR guidance⁶) illustrates how the SEA and other environmental assessment processes are aligned with the WRMP development process. A summary of each environmental assessment and their integration to the SEA are provided in the sections below. The way in which these assessments and their findings have been integrated within the SEA framework is described in Section 5 and Section 7.

1.6.1 Habitats Regulations Assessment

As a competent authority, Bristol Water must also ensure that its WRMP24 meets the requirements of the Habitats Regulations prior to implementation. If the WRMP (i.e. one or more schemes within it) may cause a likely significant effect (LSE) on one or more European sites⁹, either alone or in-combination with other schemes, plans or projects, the WRMP must be subject to Appropriate Assessment. In accordance with the Habitats Regulations, Bristol Water is undertaking a HRA of its WRMP24 in parallel to the SEA. The process has four potential stages:

1. Screening stage: identifies likely impacts, alone or in-combination with other projects or plans and considers whether these impacts are likely to be significant. Screening will initially be carried out at the option level to assess whether any options will result in likely significant effects on a European site. Screening is also carried out at the programme level and for the WRMP as a whole.
2. Appropriate Assessment stage: if screening identifies the potential for likely significant effects, an Appropriate Assessment of the impacts of an option, programme or the whole WRMP (either alone or in combination with other plans and projects) will be required such that a conclusion can be made as to whether there will be impacts on site integrity, taking into account potential alternative solutions and mitigation measures.
3. Assessment of alternative solutions: where alternative solutions are identified; and consideration of their impacts are given in comparison to those in the WRMP.
4. Assessment where no alternatives exist and adverse impacts remain, which provides an assessment of imperative reasons of overriding public interest and compensatory measures required.

Stages 3 and 4 are only involved if an option were to be included in the preferred programme that may cause likely significant effects on a European site.

The findings from the HRA have informed the SEA at each stage of the assessment process, in particular the SEA topic 'biodiversity, flora and fauna' and 'water'.

A stand-alone HRA report¹⁰ has been prepared at the same time as the WRMP24.

⁹ European sites are taken to include Special Areas of Conservation (SACs), candidate SACs, Special Protection Areas (SPAs), potential SPAs, Ramsar and proposed Ramsar sites, and sites identified as compensatory habitat for any of the aforementioned designations

¹⁰ Ricardo (2022) Bristol Water - Water Resources Management Plan 2024: Habitats Regulations Assessment. Consultancy report to accompany the Draft WRMP24, October 2022.

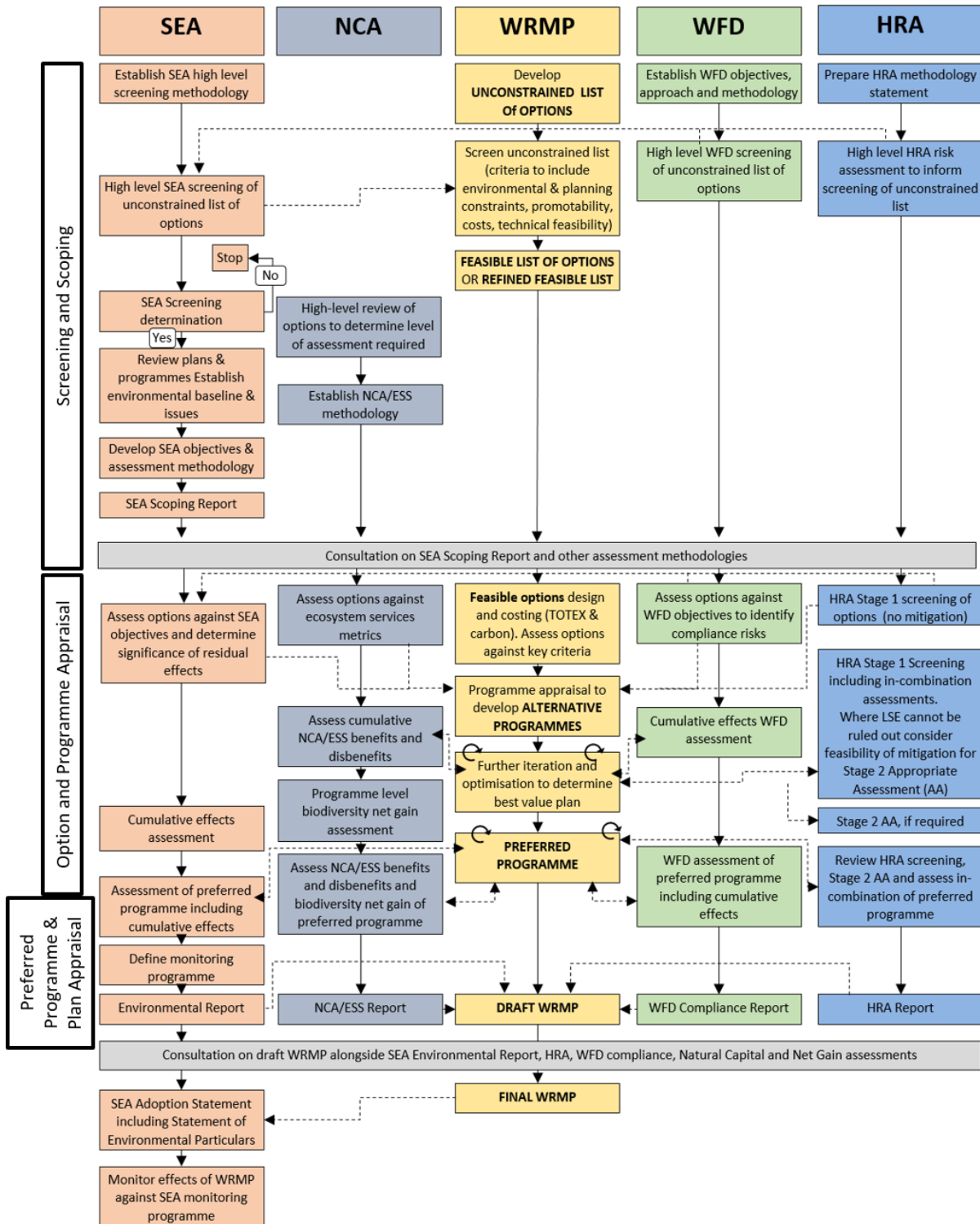


Figure 1-2: SEA and HRA aligned with the HRA Process (adapted from the UKWIR Guidance)

1.6.2 Water Framework Directive Compliance Assessment

In line with the WRPG, water companies must also consider the impact of options, programmes and plans on relevant water bodies as defined under the WFD. In particular, companies must ensure that their proposed activities do not result in any deterioration between status classes of any water body (as assessed through a series of objective measures, including biological, chemical and morphological condition), or prevent the achievement of “Good Ecological Status”.

A WFD compliance assessment has been coordinated with the SEA process, and further detailed WFD assessments will be required to support planning applications regarding any potential for non-compliance with WFD objectives.

For each scheme, the WFD compliance assessment evaluated:

Potential effects on the status of WFD elements, i.e. fish, macroinvertebrates, macrophytes and phytobenthos (diatoms).

- Compliance with WFD objectives, i.e.:
 - No deterioration between status classes.
 - No impediments to Good Ecological Status / Potential.
 - No compromises to water body objectives.
 - No effects on other waterbodies.
 - Assists attainment of water body objectives.
 - Assists attainment of protected area objectives.

These findings were integrated into assessments of relevant SEA topics, in particular biodiversity, flora and fauna, and water resources. A stand-alone WFD compliance assessment report¹¹ has been prepared at the same time as the WRMP24.

1.6.3 Natural Capital Accounting and Biodiversity Net Gain

NCA and BNG assessments are required by regulators to provide a comprehensive understanding of the benefits and costs to the natural environment of plan proposals. The approach that applied to these assessments¹² draws on the WRPG² and UKWIR⁶ guidance. It also draws on the principles of the Natural Capital Register and Account Tool¹³ and the approach outlined in Defra's Enabling a Natural Capital Approach (ENCA) (Defra, 2020)¹⁴.

Although there is currently no legislative requirement for NCA, the WRPG states that water companies should use NCA in their decision-making which can be used to include an assessment of ecosystem resilience. The EA have published separate supplementary guidance on Environment and Society in Decision-making¹⁵, which provides more detail about the expectation for NCA, and how NCA can support decision-making. The purpose of this is to allow water companies and Regional Groups to "make decisions that do not devalue, and look to enhance the value of the natural world for society benefit" (WRPG Supplementary Guidance¹⁵) together with supporting water companies to promote plans that have the potential to deliver wider environmental and social benefits.

The BNG assessment will demonstrate that options and plans will look to maximise biodiversity gain and facilitate the incorporation of BNG into supply option design. This will underpin delivery of wider environmental net gain through provision of improved habitat quality and quantity.

The purpose of NCA assessment is to evaluate the benefits and disbenefits to society that arise from changes to natural capital assets. It can work alongside the SEA and BNG which is concerned with habitat improvement for the purposes of ecosystem resilience rather than for the associated benefits to society. Therefore NCA, SEA and BNG can be seen as complementary and the outputs of all three should be considered in decision-making.

Natural capital and BNG are incorporated within the SEA framework through the inclusion of a dedicated objective associated with the 'biodiversity, flora and fauna' topic. A stand-alone NCA and BNG report has been prepared at the same time as the WRMP24¹⁶.

¹¹ Ricardo (2022) Bristol Water - Water Resources Management Plan 2024: Water Framework Directive Regulations Compliance Assessment. Consultancy report to accompany the Draft WRMP24, October 2022.

¹² Ricardo (2022) Biodiversity Net Gain and Natural Capital Method Statement – Report for Bristol Water

¹³ EA (2021) The Environment Agency Natural Capital Register and Account Tool, Version 1. Technical Report. Published January 2021.

¹⁴ Defra (2020) Enabling a Natural Capital Approach Guidance, updated August 2021

¹⁵ EA (2021) WRPG 2024 supplementary guidance – Environment and society in decision-making. Published 24/03/2021

¹⁶ Ricardo (2022) Bristol Water - Water Resources Management Plan 2024: Biodiversity Net Gain and Natural Capital Assessment. Consultancy report to accompany the Draft WRMP24, October 2022.

1.6.4 Invasive Non-Native Species Risk Assessment

Section 5.14 of the WRPG¹⁷ states that water companies must review whether current abstraction operations and future solutions will risk spreading INNS or create pathways which increase the risk of spreading INNS. The approach that has been undertaken in reviewing the INNS risk associated with the unconstrained and constrained lists of options provided information that has supported SEA and therefore option selection as well as informing the type and extent of mitigation measures that may be required. The INNS assessment is incorporated within the SEA framework through the inclusion of a dedicated objective associated with the 'biodiversity, flora and fauna' topic. A stand-alone INNS assessment report has been prepared at the same time as the WRMP24¹⁸.

1.7 CONSULTATION

1.7.1 Overview

The SEA Regulations provide for consultation with the statutory bodies during the scoping stage and with the public when the Environmental Report is issued alongside the dWRMP24.

Once the WRMP24 has been approved by the Secretary of State and adopted by Bristol Water, the company will prepare a SEA Post-Adoption Statement setting out how the SEA and any views expressed by the consultation bodies or the public have influenced the WRMP24.

1.7.2 Consultation on the Scoping Report

The consultation bodies and other interested stakeholders were invited to express their views on the Scoping Report in accordance with SEA Regulation 12(5). Scoping consultation comments received from the Environment Agency, Natural England and Historic England, alongside Bristol Water's response to those comments are set out in Appendix 1, along with the consequent actions.

1.7.3 Consultation on this Environmental Report

SEA Stage B (Developing and refining alternatives and assessing effects) and this Environmental Report takes into consideration the responses received on the SEA Scoping consultation.

This Environmental Report was issued for consultation to the SEA consultation bodies (the Environment Agency, Historic England and Natural England) and provided as part of the evidence base to support the consultation on the dWRMP24.

Public consultation on the dWRMP24 was run for a period of 12 weeks from 28th November 2022 to 17th February 2023. Feedback from the consultation on the Environmental Report has been considered by Bristol Water and incorporated into a formal Statement of Response, setting out how the feedback has been used in the finalisation of the WRMP24 and where relevant in this updated SEA Environmental Report. Meetings were held with the Environment Agency and Natural England in March and April 2023 to discuss their representations on the dWRMP24 and how Bristol Water was proposing to address them in the revised draft WRMP24 (rdWRMP24). The Statement of Response was published in August 2023. A rdWRMP24 and updated supporting environmental assessments, including this Environmental Report, was submitted to the regulators in April 2024. Bristol Water received permission to publish its plan as final in a letter from Defra dated 21 August 2024. This Environmental Report supports the Final WRMP24 which will be published in October 2024.

The company will prepare a SEA post-Adoption Statement once the Final WRMP24 has been approved for publication by the Secretary of State. This Statement will set out how the SEA and any views expressed by the consultation bodies or the public have influenced the Final WRMP24.

¹⁷ Ofwat (2021). Water resources planning guideline Draft update November 2021

¹⁸ Ricardo (2022) Bristol Water – Water Resources Management Plan 2024: INNS Risk Assessment Report. Consultancy report to accompany the Draft WRMP24, September 2022.

1.8 STRUCTURE OF THE ENVIRONMENTAL REPORT

This Environmental Report is the output of Stages B and C of the SEA process and documents the findings throughout the SEA process as described in Section 1.2. It has been prepared to facilitate the consultation on the SEA process and outcomes (Stage D). The Environmental Report is structured as follows:

Section 1 (this section) of the report describes the requirement for, purpose and process of the SEA, and its context in relation to the WRMP24.

The remainder of the report is structured as follows:

- Section 2 – describes Bristol Water’s supply system and its approach to water resources management planning; describes how Bristol Water will develop its plan to provide reliable and resilient water supplies to its customers over the long-term planning horizon.
- Section 3 – policy context; identifies key messages and environmental protection and social objectives from a review of relevant policies and plans.
- Section 4 – environmental baseline review; draws out the key environmental and social issues that Bristol Water intends to consider in the SEA. Identifies the current and future baseline conditions within the area of the potential influence of the WRMP24. Also included is a discussion of limitations identified in the data and the reasoning behind any assumptions made. The baseline review is structured in accordance with the SEA topics identified in Section 1.2. These topics comprise and are presented in full in Appendix A3.
 - Biodiversity, flora and fauna
 - Soil, geology and land use
 - Water
 - Air Quality
 - Climate Change
 - Human Health and Socio-Economics
 - Material Assets
 - Cultural Heritage
 - Landscape and Visual Amenity
- Section 5 – describes the methodological framework and processes that have been used to undertake the SEA of the individual options and assess any potential cumulative effects of options included in Bristol Water’s WRMP24.
- Section 6 – Provides a summary of the SEA Options Assessment for the constrained options within the WRMP24. Full assessments for every option are provided in Appendix 4.
- Section 7 – Provides an assessment of alternative programmes and decision making and explains the role of SEA in programme appraisal.
- Section 8 – Provides an SEA of the Bristol Water WRMP24, assesses Bristol Water’s preferred programme and provides a cumulative effects assessment.
- Section 9 – Mitigation and enhancement. Discusses measures to prevent, reduce and offset any significant adverse effects of implementing the WRMP24, as well as monitoring to track the environmental effects against the assessments, to help identify any adverse impacts and trigger deployment of any mitigation measures where necessary.
- Section 10 – Provides conclusions and next steps.

2. PLANNING

2.1 INTRODUCTION

This section provides an overview of the Water Resources Management Planning process, the Bristol Water supply system and Bristol Water's WRMP24. The Bristol Water supply area is shown in Figure 2-1.

Water Resources Management Planning is undertaken by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon. The process includes determining and forecasting how much water customers will need over the planning period (assessing demand) and how best to provide it (assessing supply, either by attempting to manage demand, or create new supply) in an efficient, timely manner (programme appraisal). Companies seek to identify the preferred, 'best value' programme of demand management and water supply options to maintain a balance between reliable supply and demand in each WRZ¹⁹ and for their supply area as a whole.

Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years; Bristol Water is now reviewing and updating their plan in order to publish a final version in 2024. Further information on the regulatory framework can be found in Section 1.2 of the WRMP. The WRMP also informs the regulatory water company business planning 'Periodic Review' process through which the Water Services Regulation Authority (Ofwat) sets the prices that water companies can charge their customers for water (and wastewater) services. The next periodic review will be in 2024.

Engagement with government, regulators, other licensed water suppliers and water companies, customers and a wide range of stakeholders is key to the WRMP process. Bristol Water's WRMP24 pre-consultation programme commenced in January 2022. Consultation included a wide range of stakeholders and the regulators. I dWRMP24 was published for formal public consultation in November 2022, accompanied by the SEA Environmental Report. As described in Section 1.7.3 above, feedback from the consultation was considered by Bristol Water and incorporated into a formal Statement of Response, setting out how Bristol Water intends to take account of the comments received in finalising the WRMP for the Secretary of State's approval. Section 2 of the WRMP24 provides full details of the engagement undertaken as part of the WRMP development.

In developing its WRMP, Bristol Water examines the supply / demand balance for its sole WRZ and determines how any deficit between forecast demand and reliable water supply availability should be addressed for the appropriate planning period. This is explained in Sections 5 to 11 of the WRMP. This is influenced by government policy, expectations and targets for example regarding leakage reduction and demand (per capita consumption levels).

Bristol Water identified feasible options from an unconstrained list. The feasible options were subsequently further appraised by Bristol Water resulting in a final constrained, feasible list of options. The constrained list is a set of options that Bristol Water consider are suitable to be taken forward for assessment as part of the process for defining the preferred programme of options required to meet any supply demand deficit. This option appraisal process is described in Section 12 of the WRMP.

Each of these options was assessed to understand the costs, the benefits to the supply-demand balance, the effect on carbon emissions and the environmental and social effects (through the SEA process and associated HRA, WFD, NCA, BNG and INNS assessments). The options were subsequently compared through a comprehensive programme appraisal process to determine the 'best value' programme of options to maintain a supply-demand balance over the planning period for the WRZ (see Section 14 of the WRMP). Decisions on the best value programme take account of a range of factors, such as the implications for water bills, the resilience to future risks and uncertainties (e.g. climate change), deliverability considerations and the environmental and social effects of the programme (adverse and beneficial, as informed by the SEA).

The UKWIR guidance on integrating SEA into WRMPs and the WRPG provide clear directions as to how SEA outputs should be used in options and programme appraisal. Section 7 of this Environmental Report explains in more detail how the SEA informed the WRMP process at each stage.

2.1.1 Regional Planning

West Country Water Resources Group (The WCWRG)²⁰ is one of five water resources groups working under the National Framework for Water Resources (the 'National Framework')²⁶. WCWRG is designed to oversee water resources planning for the Southwest of England. It is formed of the water providers Bristol Water, Southwest Water and Wessex Water, with input also from the Environment Agency.

WCWRG's aim is to build upon each individual water company's WRMP, by building a common regional understanding of;

- The current and future availability of water resources in the West Country region;
- The needs of all water users, including those who take water directly from the source rather than being supplied by a water company;
- The factors that are likely to affect water supply and demand in the future, such as economic growth, forecast population, and uncertainties of climate change;
- Options for improving the balance of water supply and demand in the West Country Region, including cross-sector solutions made possible by engaging with other water users, considering environmental issues and impacts;
- Options for future water transfers both between water companies in the West Country and to other regions²¹.

The WRMP24 is guided by the principles followed in the WCWRG Regional Plan, reflecting the overall strategy and the three outcomes identified: improving environment, ensuring water supply resilience and delivering societal benefit.

2.2 BRISTOL WATER'S SUPPLY AND RESOURCE SYSTEM

Bristol Water is a water-only company that provides water supplies to 1.18 million people and all the associated businesses in an area of approximately 2,400km² centred on Bristol and including the towns and villages within approximately a 30km radius of the city. The water supply area stretches from Thornbury and Tetbury in the north, to Street and Glastonbury in the south, and from Weston-Super-Mare in the west to Frome in the east. Bristol Water relies upon various water sources, including reservoirs, rivers, springs, well and boreholes. Reservoir and river sources each supply between 35% and 50% of the company's total water supply.

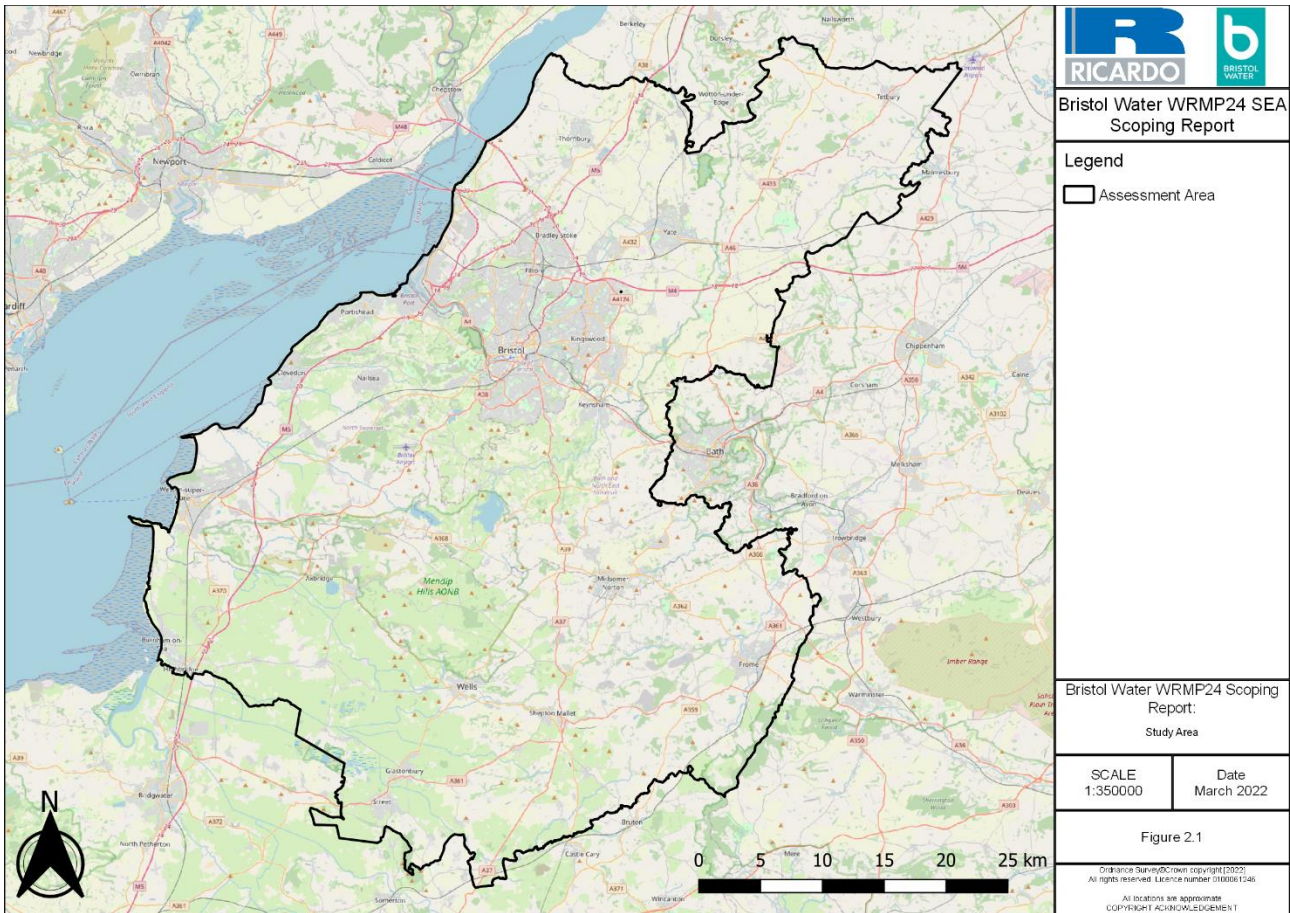


Figure 2-1: Bristol Water WRMP24 Environmental Study Area

Water resources within the Bristol Water supply area alone are not sufficient to meet customer demand for water and therefore water supplies are also imported from neighbouring areas, including the River Severn. This is sourced from the Gloucester & Sharpness Canal to supply the largest northern treatment works. This source accounts for approximately 46% of Bristol Water’s licensed resources. Bristol Water has an agreement with the Canal & Rivers Trust (the owners of the abstraction licence) to receive water supplies from the Gloucester & Sharpness Canal, which is supplied by the River Severn and other local rivers, the Cam and the Frome. The volume of water available for abstraction from the River Severn is controlled by the Environment Agency according to the River Severn Regulation System operating rules. The Mendip Reservoirs and associated surface water abstractions account for approximately 42% of the available licensed water resource. The remaining 12% of licensed water resources for Bristol Water are derived from groundwater.

There is a significant degree of resilience and connectivity in both the raw water network and the treated water bulk transfer systems. This flexibility permits the sharing of resources and allows optimum use according to seasonable availability. As a result, the Bristol Water supply area is operated as a single WRZ in which all sources are used conjunctively. Bristol Water’s supply area is bounded by three other water companies (Thames Water, Wessex Water and Severn Trent Water). A number of water supply transfers are made between Bristol Water and Wessex Water.

The area under consideration for the WRMP24 SEA is defined by the Bristol Water supply areas as shown in Figure 2-1.

2.3 BRISTOL WATER'S WATER RESOURCE MANAGEMENT PLAN 2024

2.3.1 WRMP outline and objectives

The Bristol Water WRMP24 sets out how Bristol Water proposes to ensure a sufficient supply of water to meet the demand forecast for their customers over a 55-year period from 2025 to 2080, whilst also protecting and enhancing the environment. The WRMP24 is one of the core business planning tools directly linking the Bristol Water Business Plan, Drought Plan and annual operations planning. The WRMP must comply with the Water Resource Management Plan (England) Direction 2022. It reflects Bristol Water's strategies set out in 'Our routemap to Net Zero Carbon by 2030'²² and 'Bristol Water...Clearly'²³ that sets out our long-term ambition looking ahead to 2050. It is also consistent with the strategy for the West Country Region as set out in the WCWRG Regional Plan²⁴ which is due to be published December 2023.

The WRMP describes the technical assessments completed to determine water availability for supply over the planning period to 2080, the anticipated customer demand for water over this time and the supply demand balance. It sets out how Bristol Water will maintain the balance of supply and customer demand, and the options that have been considered in determining the preferred plan, including demand reduction measures, optimising the use of existing water resources, water transfers from outside Bristol Waters supply area and/or developing new water resources within the supply area.

The WRMP is closely related to a number of other frameworks, plans and strategies. This includes the 25-Year Environmental Plan which sets out the government's comprehensive and long-term approach to protecting and enhancing our natural environment (landscapes and habitats) in England for the next generation. As indicated by the WRPG, the WRMP24 should reflect the ambitious nature of the government's 25 Year Environment Plan and the first revision of this set out in the Environmental Improvement Plan²⁵ (EIP). The Bristol Water WRMP24 reflects this ambition by setting the destination for environmental sustainability and resilience (see Section 8.4 of the WRMP24 and Section 2.3.2 and 2.3.4 of this Environmental Report), supporting nature recovery using natural capital in decision making (see Section 13.2.1 and Section 14 of the WRMP24), using a catchment approach (see Section 5.9.1 of the WRMP24) and delivering net gain for the environment (see Section 13.2.3 and Section 13.5 of the WRMP24).

The WRMP contains the following information;

- A characterisation of the baseline scenario (present day), including a summary of current water supply, and the current situation surrounding metering, leakage control and water efficiency (Sections 3 to 5, and 7);
- Supply and demand analysis with the appropriate level of drought resilience, allowing for the environmental destination and ongoing abstraction investigations and consideration of the sustainability of Bristol Water's abstractions (Sections 5, 6 and 8);
- An explanation of how climate change has been incorporated into the deployable output assessment, uncertainty and the baseline supply-demand deficit (Sections 9, 10 and 11);
- A description of the options and programme appraisal process, including environmental appraisal, to close the forecast supply demand deficits across a range of different scenarios (Sections 12 to 14);
- Information on the preferred plan showing how Bristol Water proposes to maintain customer security of supply and levels of service over the planning period to 2080 (Section 15).

The approach taken for the detailed appraisal of options included the following assumptions (full details are provided in the WRMP24):

- It was assumed that Bristol Water would aim to deliver the EIP target to reduce the use of public water supply in England per head of population by 20% from the 2019 to 2020 baseline reporting figures, by 31 March 2038.

²² Our routemap to Net Zero Carbon by 2030 (Bristol Water, 2021)

²³ Bristol Water...Clearly (Bristol Water, 2018)

²⁴ Emerging Plan for Consultation and Comment (WCWRG, 2022)

²⁵ Defra (2023) Environment Improvement Plan 2023. First Revision of the 25 Year Environment Plan, 31 January 2023.

- It was assumed that Bristol Water would aim to develop a plan to reduce per capita consumption (PCC) to 110 litres per head per day by 2050 as outlined by the National Framework for Water Resources²⁶ and the EIP and to also deliver the interim 122 litres per head per day by 2038 EIP target.
- It was assumed that a programme of works to reduce non-household demand would be undertaken and that the options selected would generally align to the programme of work for household demand reduction to deliver non-household reductions in water use of 9% by 2038 and 15% by 2050 from a 2019/20 baseline.
- It was assumed that Bristol Water would aim to develop a leakage plan to deliver leakage levels as indicated in the Public Interest Commitment (PIC) to 2030, EIP to 2027 and 2032 and National Infrastructure Commission's (NIC) challenge to 2050, aligned with West Country Water Resource (WCWR) leakage reduction scenarios. These targets include leakage reductions from a 2017/18 baseline of 20% by 2027, 30% by 2032, 37% by 2038 and 50% by 2050.

The spatial scope of the options considered in the plan is shown in Figure 2-1. The temporal scope of the plan covers a period of 55 years to 2080 rather than being limited to the statutory planning period of 25 years. However, as WRMPs are required to be updated every five years, the options and programmes for balancing supply and distribution will be reviewed and subject to SEA, HRA and WFD assessment again during the period 2029/30.

When establishing a baseline supply demand balance, Bristol Water has to consider the sustainability of their water abstractions from the environment and take into account climate change impacts and future demand. The plan considers the new principle of "Environmental Destination" for reduction in abstraction. The outcome of these aspects on the supply-demand balance and therefore, on the plan, is summarised in the sections below; further information can be found in Section 8 of the WRMP24.

2.3.2 Sustainable Abstractions

The WRMP24 sets out Bristol Water's long-term strategy for maintaining reliable and resilient water supplies to its customers. The strategy includes the use of existing water resources to meet demand as well as existing demand management measures to ensure sufficient supply under current baseline conditions.

The Environment Agency Review of Consents (RoC) process, undertaken in the early 2000s, considered Bristol Water's existing water source abstraction licences (at the abstraction licence limit) and the potential for adverse effects on European sites. Where adverse effects were identified, recommendations were made to change abstraction licences. Since the RoC process was completed, there have been changes to the baseline, conservation objectives and/or Supplementary Advice to Conservation Objectives, and site condition, which may require the original RoC conclusions to be revisited.

As part of the WRMP process, licences are identified between the water company and Environment Agency that are determined as valid for the planning period or identified as requiring sustainability reductions. This informs the baseline and provides an opportunity to flag any other licences considered to be at risk.

Bristol Water has engaged with both the Environment Agency and Natural England to explore the risks and issues associated with the existing licences. These risks and issues have been developed into the PR24 WINEP investigations programme. This includes a programme of Environmental Destination investigations across all Bristol Water sources and catchments to understand the potential impacts on water availability in the face of growth and climate change over the longer term. A programme of WFD investigations around existing licences is also proposed, and discussions are ongoing with the Environment Agency as to any additional licences to be included in the investigations where there is an impact pathway to a designated site. The conclusions of these investigations will allow for any licence modifications to be made.

2.3.3 Environmental Destination

The Environment Agency Water Resource Planning Guidance (WRPG) requires water companies to include a long-term environmental destination in the WRMP24, setting out how Bristol Water will achieve and maintain sustainable abstraction to 2050 (and beyond), taking into account climate change impacts and future demand. The principle of Environmental Destination is to understand how much water the environment is going to need

²⁶ [National Framework for water resources summary.pdf \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/104444/national-framework-for-water-resources-summary.pdf)

in the long term in the context of climate change alongside the water demand as a result of population growth. Bristol Water has worked collaboratively with the WCWRG to develop a regional view and approach to environmental destination. In light of this work Bristol Water has included an allowance for environmental destination in the baseline supply demand balance, based on an initial assessment of trial catchments under the WCWRG project. Bristol Water also tested a scenario in which additional abstraction reductions were applied to test the resilience of the WRMP24.

Bristol Water set out seven areas to develop understanding of the environmental destination needs (see Section 8 of the WRMP). These cover both the short term and the longer term (out to 2050/2080).

1. Existing WINEP investigations: To identify and implement additional future investigations to enhance the environment. This includes abstraction at P30R and R24Ra (short term).
2. Improvement schemes as an outcome of the WINEP for Cheddar Yeo and Banwell, where we will work with the local communities to enhance the environment at these sites (phased into WINEP for AMP9).
3. An assessment for each catchment within the Bristol Water supply area to identify the likely future pressures on the water environment as a result of climate change and demand increase (short term investigation work to identify long term ambition).
4. Peat investigations: An AMP8 investigation into the location of sites, and how they can be protected and restored or enhanced (short term).
5. SSSI status assessment: A review of Bristol Water existing sites and a condition assessment, the outputs of the project will enable identification of any additional environmental enhancement opportunities across Bristol Water land holdings (short term action with long term outlook).
6. Connectivity investigations: Bristol Water will be looking to the long term and how their catchments can be managed to encourage connectivity, re-wilding and wildlife corridors (long term - phased into WINEP for AMP9).
7. Linking people and the environment: This area will help Bristol Water customers understand how water consumption behaviours impact the environment and what people can do to support the environment in the face of climate change (short medium and long term to address cultural change – phased into WINEP for AMP9).

The WINEP will include investigations under the Environmental Destination driver to include these areas. These investigations will explore the effects of climate change and growth on abstractions taking into account environmental need over a longer (80 year) timeframe. This will then feed into future company scale and regional water resource planning. Bristol Water will also be building on the abstraction sustainability investigations undertaken in AMP7.

2.3.4 Bristol Water's Constrained Options List

Bristol Water investigated an unconstrained list of potential options to balance future supply and demand. Unconstrained options include all options that could technically be used to meet the deficit. To identify which of the options included in the unconstrained list should be investigated further, Bristol Water reviewed the technical, environmental, carbon and social attributes of each option at a high level. This resulted in a sub-set of the unconstrained list of options, which is referred to as the "feasible" list. As described in Section 2.1, the feasible options were subsequently further appraised by Bristol Water resulting in a final constrained list of options. The constrained list is a set of options that Bristol Water consider are suitable to be taken forward for assessment as part of the process for defining the preferred programme of options required to meet any supply demand deficit. Options on the constrained list fall into the following categories:

- Customer Demand – Options which aim to encourage customers to reduce their water usage;
- Distribution Management – Options which aim to improve the way in which water is moved around, reducing leakage;
- Production Management – Options which improves the output of existing sources;
- Resource Management – Options which increase the supply of water.

The WRMP24 consultation process led to the development and/or refinement of a number of options following publication of the dWRMP.

- Leakage options: The costs and effectiveness of the components of the leakage scenarios tested were reviewed in the context of consultation feedback and in conjunction with similar options being tested by South West Water. This resulted in three new leakage scenario optimisation runs being evaluated:
- Flow regulators: A further four demand management options have been developed and added to the feasible list which has been developed in conjunction with South West Water.
- Metering: In response to the consultation responses Bristol Water received from Ofwat, Arqiva and Consumer Council for Water (CCW) and in collaboration with South West Water, the focus is now on AMI meters. This resulted in a reduction in the number of demand management options.
- Supply options – Cheddar 2 reservoir: there is not the need, in Bristol Water’s supply area, for an additional reservoir at the present time. As a result, the option has been removed from Bristol Water’s feasible options list. However, this option has been selected as a preferred option within the WCWR regional plan and is being developed within Bristol Water’s supply area to serve the wider region as part of the RAPID gated process.

Further information on these changes is provided in Section 12.7 of the WRMP24.

Within the SEA and this Environmental Report, the options on the constrained list were grouped for assessment and discussion into supply-side options (including production management and resource management options), demand management and leakage options. These are documented in Table 2-1, Table 2-2 and Table 2-3 below, noting that Cheddar 2 reservoir option has been retained in this SEA Environmental Report for reference.

For each option, baseline information was collated to facilitate the SEA, WFD, HRA, NCA, BNG and INNS assessments, focussing on:

- Analysis of the environmental and hydrological issues;
- Strategic assessment of the residual environmental effects after mitigation (including construction / implementation and operational effects)
- Assessment of secondary, cumulative and synergistic effects
- Identification of potential monitoring requirements.

Table 2-1: Constrained List of Bristol Water WRMP24 Options – Supply-side options

ID	Option Name/Brief	Option Category	Maximum Resource Value
P01-01	Charterhouse – Increase performance of existing sources to increase DO near to licensed quality	Resource Management (Water treatment works (WTW) capacity increase)	0.74MI/d
P01-02	Forum – Increase performance of existing sources to increase DO near to licensed quality	Resource Management (WTW capacity increase)	1.59MI/d
P06	Catchment Management of the Mendip Lakes (Chew, Blagdon and Cheddar) to manage outage risk from algal blooms	Resource Management (Catchment management)	0.7MI/d
P08	Alderley WTW – Increase performance of existing sources (Alderley WTW) to increase DO	Resource Management (WTW capacity increase)	7.00MI/d

ID	Option Name/Brief	Option Category	Maximum Resource Value
R005	Cheddar Reservoir ²⁷	Resource Management (New Reservoir)	13.5MI/d
R007	Pumped Refill of Chew Valley Reservoir	Resource Management (Reservoir enlargement)	
R08-02	Bathford – New water sources within Bristol Water CAMS area for the location Middle River Avon at Bathford	Resource Management (New surface water)	1.4MI/d
R08-03	Frome at Frenchay - New water sources within Bristol Water CAMS area for the location Bristol Frome at Frenchay	Resource Management (New surface water)	1.1MI/d
R014	Avonmouth WwTW Direct Effluent Reuse	Resource Management (Water reuse)	10MI/d
R016	Huntspill Transfer	Resource Management (Internal raw water transfer)	20MI/d
R24	Honeyhurst – Bring Honeyhurst source back into supply	Resource Management (New groundwater)	2.4MI/d

Table 2-2: Constrained List of Bristol Water WRMP24 Options - Demand Management Options

ID	Option Name/Brief	Savings in Demand upon full implementation
HH_M_009 (AMI) (15) (Baseline)	Progressive AMI smart metering & Watersmart (15 year) (Baseline)	4.01
HH_M_009 (AMI) (15) (Enhancement)	Progressive AMI smart metering & Watersmart (15 year) (Enhancement)	13.84
HH_A_001	Home efficiency visits (HEV) - Targeted water efficiency audit with free water efficient device installation - In person.	14.32
HH_A_002	Home efficiency visits (HEV) - water efficiency audit with free water efficient device installation - metered	5.42
HH_A_003	Home efficiency visits (HEV) - water efficiency audit with free water efficient device installation - New meter	13.78
HH_A_004	Virtual Home efficiency visits (VHEV) - water efficiency audit with free water efficient devices	5.33
HH_E_001	Appliance subsidies (rebates for water efficient devices and appliances)	0.86
HH_E_002	Pay per use appliances (e.g. Miele bundles subscription)	0.11

²⁷ Since the Draft WRMP24, it has been shown that there is not the need, in Bristol Water's supply area, for an additional reservoir at the present time and as a result the option has been removed from Bristol Water's feasible options list. However, this option has been selected as a preferred option within the WCWR regional plan and is being developed within Bristol Water's supply area to serve the wider region as part of the RAPID gated process. Information concerning the Cheddar 2 option as assessed at the Draft WRMP24 stage has been retained in this report for reference.

ID	Option Name/Brief	Savings in Demand upon full implementation
HH_E_004	Leaky Loos' Wastage Fix: large scale targeted fixes	3.41
HH_E_005	Eco branding water efficiency programme	1.18
HH_E_006	Distribution of household water efficiency kits for self-installation - via the water company or WCWR website.	4.27
HH_E_008	Partnerships/targeting of large/small developers to install water efficient devices	5.88
HH_E_009	Home Efficiency Visits (HEVs) - water efficiency audit - local authorities, housing associations, corporate landlords)	1.01
HH_E_010	Home Efficiency Visits (HEVs) - water efficiency audit - combined with energy efficiency audits	7.62
HH_E_013	School visits water efficiency programme	0.06
HH_E_016	Media campaigns to influence water use	2.37
HH_I_001	Targeted incentives scheme - Individual customer/community reward (e.g. Greenredeem) - New metered customers	6.17
HH_I_004	Community competition	0.07
HH_T_006	Community reward tariff	-
HH_T_008	Individual reward tariff	-
HH_N_002	Home retrofit of rainwater harvesting	0.56
HH_N_003	Rainshare - Communities direct harvested rainwater into a centralised shared resource	0.38
HH_N_004	Grey water recycling retrofitting to existing properties.	1.15
C019	Water Butts (Bristol Water subsidy)	0.40
HH_P_001	Change WC standards	4.77
HH_P_002	Water labelling - with minimum standards	51.93
HH_P_003	Water labelling - with no minimum standards	21.50
HH_P_004	New development standards - water neutrality	2.60
HH_P_005	New home standards - mandatory	12.98
HH_W_001	Resource West campaign	0.15
NHH_A_001	Business Efficiency Visits (BEV) - water efficiency audit - in person audit, fix and retrofit, targeted at specific sectors/businesses	0.53
NHH_A_003 & NHH_A_006	Business Efficiency Visits (HEV) - leakage detection - in person targeted at specific sectors/businesses	0.64
NHH_E_001	Sector specific water efficiency advice e.g. partnerships with holiday rental companies Airbnb.	0.01
NHH_E_002 (AMI)	Progressive AMI smart metering & Watersmart (25 year)	0.71
NHH_I_001	Rewards to water retailers for business water use savings.	0.18
NHH_T_003	Benchmarked rising block business tariffs	0.06

ID	Option Name/Brief	Savings in Demand upon full implementation
NHH_N_001	Rainwater harvesting is included in new developments to meet planning conditions - commercial/public sector developments - single or multiple	0.02
NHH_N_002	Rainwater harvesting feasibility assessment and/or subsidised installation - target large water users	0.18
NHH_N_003	Rainwater harvesting - target large water users	0.33
C016	Water saving devices - waterless urinals	1.03
HH_A_005	Home efficiency visits (HEV) - HEV/retrofit visits during flow regulator installation visit.	0.00
HH_E_020	Communication and awareness campaign	0.02
HH_E_021	Innovative water saving devices 1 – Installation of flow regulators in supply pipes	8.98
HH_E_022	Innovative water saving devices 2 – Installation of flow regulators with meter installation	21.63
HH_E_023	Innovative water saving devices 3 - Combining installation with home efficiency visits	0.03

Table 2-3: Constrained List of Bristol Water WRMP24 Options - Leakage Reduction

ID	Option Name/Brief
D001	Pressure reduction
D002	Mains infrastructure replacement
D003	Communication pipe replacement
D004	Communication pipe and subsidised supply pipe replacement
D005	Leak-stop enhanced
D006	Active leakage control increase
D007	Enhanced permanent zonal monitoring (includes permanent noise loggers, district meters etc...)
D008	Lift and shift loggers
D009	Customer side leakage reduction through smart metering
D010	Innovation fund

These leakage reduction options were optimised separately by Bristol Water to assist in developing an intelligent pathway for delivering the reduction requirements set out by public interest commitments (PIC) to 2030, the Environmental Improvement Plan (EIP) to 2038 and National Infrastructure Commissions (NIC) 50% reduction challenge to 2050. The outcome of this work was a range of leakage reduction scenarios. The resulting leakage scenario options (which comprise the leakage reduction activities shown in Table 2-3) are provided below, these are the leakage options as assessed by the SEA:

- No reduction
- Linear reduction to 50% by 2050
- Linear reduction to 50% by 2045

These were also developed to be consistent with the activities of the WCWRG. Further information on the development of the leakage options is provided in Section 12.7.1 of the WRMP24.

3. POLICY CONTEXT

3.1 INTRODUCTION

A review of relevant plans, policies and programmes is presented in Appendix 2. A summary of key messages derived from the review is presented in Table 3-1.

Identifying other relevant plans, policies and programmes, as well as environmental protection and social objectives, is one of the first steps in undertaking an SEA, forming part of Stage A of the SEA process. The review identifies how Bristol Water's WRMP24 might be influenced by other plans, policies, programmes and other objectives which the WRMP24 should consider. This information helps to identify and inform the objectives for the SEA process.

Relevant plans, policies and programmes were identified from the wide range that have been produced at an international, national, regional and local level. The emphasis is on relevance. Policies, plans and programmes that have no likely interaction with the WRMP24 have been excluded from the review.

The review and the key messages derived from it are documented in Appendix 2. Alongside the current and future baseline information reviewed in Section 4 and Appendix 3, the key messages have been used to develop proposed objectives for the SEA (see Section 5).

3.2 REVIEW OF PLANS, POLICIES AND PROGRAMMES

Table 3-1 summarises key policy messages and objectives derived from the review of plans, policies and programmes. The full list of plans, policies and programmes reviewed can be found in Appendix 2.

Table 3-1: Key policy measures and objectives derived from the review of policies, plans and programmes

SEA Topic	Key Messages and Objectives
Biodiversity, Flora and Fauna	<p>Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC Act Section 42 for England), whilst taking into account future climate change.</p> <p>Promote a catchment-wide approach to water use to ensure better protection of biodiversity.</p> <p>To achieve favourable condition for priority habitats and species in particular designated sites.</p> <p>Avoidance of activities likely to cause irreversible damage to natural heritage.</p> <p>Support well-functioning ecosystems, respect environmental limits and capacities, and maintain / enhance coherent ecological networks, including provision for fish passage and connectivity for migratory / mobile species.</p> <p>Strengthen the connection between people and nature and realise the value of biodiversity.</p> <p>Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contribute to the economy and therefore should be protected and, where possible, enhanced.</p> <p>Avoidance of activities likely to cause the spread of INNS.</p> <p>A need to protect the green infrastructure network.</p>
Soil, Geology and Land Use	<p>Protect and enhance the diversity of geology (including geological Sites of Special Scientific Interest (SSSIs)) and soils, including geomorphology and geomorphological processes which can be lost or damaged by insensitive development.</p> <p>Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development.</p>

SEA Topic	Key Messages and Objectives
	<p>Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change.</p> <p>Promote mixed use developments and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions.</p> <p>Encourage the effective use of land by reusing land that has been previously developed (brownfield) land, provided that it is not of high environmental value.</p>
Water	<p>Promote sustainable water resource management, including a reduction in water consumption.</p> <p>Maintain and improve water quality and water resources (surface waters, groundwater and bathing water).</p> <p>Meet protected area targets related to water quality and flow in the WFD.</p> <p>Expand the scope of water quality protection measures to all waters, surface waters and groundwater.</p> <p>Improve the quality of the water environment and the ecology which it supports and continue to provide high levels of drinking water quality.</p> <p>Ensure appropriate management of abstractions and protect flow and level of variability across the full range of regimes from low to high conditions.</p> <p>Prevent deterioration of water quality status.</p> <p>Balance the abstraction of water for supply with the other functions and services the water environment performs or provides, whilst ensuring that Bristol Water’s activities minimise the extent to which watercourses differ from their normal flow.</p> <p>Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change.</p> <p>Promote measures to enable and sustain long term improvement in water efficiency.</p> <p>Promote a catchment-based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quality.</p> <p>Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions.</p> <p>Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value.</p> <p>Reduce risk of flooding by changing operation of reservoirs.</p>
Air Quality	<p>Reduce the effects of air pollution on ecosystems.</p> <p>Improve overall air quality.</p> <p>Achieve and sustain compliance with and contribute towards national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas.</p>
Climate Change	<p>Reduce greenhouse gas emissions. Targets include:</p> <p>Reduce the UK’s greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050.</p> <p>Minimise energy consumption, support the use of sustainable / renewable energy and improve resilience to climate change.</p> <p>Build in adaptation to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly.</p> <p>Need for adaptive measures to respond to present and future climate change impacts on water supply and demand.</p>

SEA Topic	Key Messages and Objectives
Human Health and Socio-economics	<p>Water resources play an important role in supporting the health and recreational needs of local communities and businesses.</p> <p>To ensure all communities have a clean, safe and attractive environment in which people can take pride.</p> <p>To ensure safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities.</p> <p>Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and wellbeing of communities.</p> <p>Promotion of healthy communities and protection from risks to health and wellbeing.</p> <p>Promotion of sustainable economy supported by access to essential utility and infrastructure services.</p>
Material Assets	<p>Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently.</p> <p>Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources.</p> <p>Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment.</p> <p>Minimise the production of waste, ensure waste management is in line with the waste hierarchy, and eliminate waste sent to landfill.</p> <p>Promote the sustainable management of natural resources.</p>
Cultural Heritage	<p>Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site.</p> <p>Ensure active management of the Region’s environmental and cultural assets.</p> <p>Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposit.</p> <p>Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlement.</p> <p>Conserve and enhance the historic environment, heritage assets and their settings.</p>
Landscape and Visual Amenity	<p>Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside).</p> <p>Abstraction and low river flows could negatively affect landscape and visual amenity.</p> <p>Enhance the value of the countryside by protecting the natural environment for this and future generations.</p> <p>Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.</p>

4. ENVIRONMENTAL BASELINE REVIEW

4.1 INTRODUCTION

An important part of the SEA process is to identify the current baseline conditions, and how they might change over time, in absence of the WRMP24. It is only with knowledge of baseline conditions that potential impacts of the WRMP24 and its schemes can be quantified and if necessary mitigated. This baseline does not constitute a 'do nothing' option, as there will be elements of the Bristol Water WRMP that is active (currently WRMP19) that would continue, even in absence of a new plan. These will continue to alter the baseline.

As discussed, the temporal period covered by the WRMP24 is lengthy, which introduces uncertainty in considering future baselines.

In this section, the best available projections for environmental and social characteristics have been considered and summarised, but with time comes significant uncertainty. A scenario approach is therefore proposed as part of the assessment process, where known or likely changes are incorporated into the SEA to test the sensitivity and resilience of the options.

Baseline data have been drawn from a range of sources, including a number of plans, policies and programmes reviewed and summarised in Table 3-1 and Appendix 2. The environment baseline review is presented in full in Appendix 3, which also summarises the likely future baseline in the issues considered (where information is available). The key issues arising from the baseline review are summarised at the end of each sub-section and presented in Section 4.5 below.

4.2 SPATIAL EXTENT OF THE SEA

The scope of the assessment is the Bristol Water supply area. The supply area is centred around Bristol in the southwest of England and includes the local authorities of Bath and northeast Somerset Council, Bristol City Council, Mendip District Council, North Somerset Council, Sedgemoor District Council and South Gloucestershire Council (the supply area also includes parts of Wiltshire, Cotswolds, and Stroud local authority areas). It should be noted that the city of Bath lies outside of the Bristol Water supply area (see Figure 2-1).

The environmental baseline (contained within Appendix 3) includes areas outside of the Bristol Water supply area. This allows the ability to consider cross-boundary effects. This is included because some supply side options represent large infrastructure schemes. As is the case with the WRMP24, such schemes have the potential for effects on the environment outside the plan area (i.e., cross-boundary effects) depending on exact location. It is noted that the WRMP24 does not include options in the constrained list that are located or operate outside the study area.

4.3 LIMITATIONS OF THE DATA AND ASSUMPTIONS MADE

The dominant limitations surround the future social and environmental baseline, where the projections across the various SEA topic areas vary in temporal scope and reliability. For example, whilst some water companies are planning 80 years ahead and climate change estimates extend to a similar horizon, regional population and housing projections only extend 20 years into the future. Forecasts of changes in the natural environment are shorter still, and subject to considerable uncertainty.

The spatial aspect of the baseline data is also complex, adding to limitations of the data. The study area for the SEA covers a broad range geographies and social regions, which makes establishing a baseline challenging. There are also challenges surrounding the extrapolation of information from data collected at different spatial resolutions. The geographical baseline is presented in figures where possible. In some instances, reporting cycles mean that available information may not be representative of the true baseline (for example, most available Census data is from 2011).

SEA is a high-level assessment aimed at highlighting potential environmental concerns. The data to be used in an SEA is based on that which is readily available from existing sources, such as statutory organisations. No primary research or data collection has been carried out specifically to inform the SEA and therefore it is possible that at option level, there may be hyper-local conditions that could influence the WRMP24 option. At a later stage during the implementation of WRMP24 options, depending on their extent and nature, some schemes will be subject to environmental appraisal, including EIA where appropriate.

The baseline information presented within this report may not identify specific, localised issues that are reflective of the general trends of the region. For example, this may include locally important sites for recreation or nature conservation.

4.4 OVERVIEW

The Bristol Water service area contains a population of approximately 1.23 million people, centred around the city of Bristol. Deprivation levels within the Bristol Water supply area are relatively low compared to England as a whole. Bristol Water supplies nearly 276 million litres of drinking water to its customers every single day.

The area contains many sites important to wildlife, including many nationally and internationally designated sites, the largest being the Severn Estuary. It also contains many areas protected for their nationally important landscape quality, including the Cotswolds, the Mendips and the North Wessex Downs. One of the special qualities of the Mendip Hills Areas of Outstanding Natural Beauty (AONB) is that the entire area lies over an important Carboniferous Limestone aquifer which is designated as a Major Aquifer Unit making a major contribution to Bristol Water's supply.

Bristol Water's supply comes from a range of sources, predominantly surface water. 85% of Bristol Water's supply comes from surface water sources, including 50% alone from an abstraction at the Gloucester and Sharpness Canal. There are three surface water impounding reservoirs that collect water from the Mendip Hills; Cheddar, Blagdon and Chew Valley. There are four WFD estuarine waterbodies in the assessment area: Bristol Avon, Seven Upper, Seven Middle and Seven Lower.

The Bristol Water service area is geologically diverse. There is a low-lying floodplain to the west and north of Bristol. To the south and east, the land rises and undulates, forming the Mendips and the Cotswolds hill ranges. The supply area is underlain by Triassic and Jurassic soft rocks. The majority of the non-urban land in the supply area is ALC grade 3, with smaller areas of Grades 2 and 1.

4.5 KEY ISSUES

The key environmental issues of the Bristol Water supply area, as identified by the environmental review within the SEA Scoping Report (which can be found in Appendix 3), have been considered in the formulation of objectives. They are displayed in Table 4-1.

Table 4-1: SEA Topics' Key Issues

SEA Topic	Key Issues
Biodiversity, Flora and Fauna	<p>The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation.</p> <p>The need to avoid activities likely to cause irreversible damage to natural heritage.</p> <p>The need to take opportunities to improve and not reduce connectivity between fragmented habitats.</p> <p>The need to control the spread of INNS.</p> <p>The need to consider the impact of climate change upon protected species and habitats when assessing water resource options.</p> <p>The need to recognise the importance of allowing wildlife to adapt to climate change.</p> <p>The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.</p> <p>The need to deliver an increase in the Bristol Water biodiversity index.</p>
Soil, Geology and Land Use	<p>The need to protect geological features of importance and maintain and enhance soil function and health.</p> <p>The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources).</p>

SEA Topic	Key Issues
	<p>The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.</p> <p>The need to minimise development on Green Belt land.</p> <p>The need to minimise development on Best and Most Versatile (BMV) agricultural land.</p>
Water	<p>The need to further improve the quality of the region’s river, estuarine and coastal waters taking into account WFD objectives and designated sites objectives (i.e., assessment against Common Standards Monitoring Guidance, where relevant).</p> <p>The need to maintain, and where possible enhance, the quantity and quality of groundwater resources taking into account WFD objectives.</p> <p>The need to minimise the effect that Bristol Water’s activities have on the flow of the watercourses within the catchment.</p> <p>The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change on surface waters and groundwaters.</p> <p>The need to ensure sustainable abstraction to protect the water environment and meet society’s needs for a resilient water supply.</p> <p>The need to ensure that people understand the value of water.</p>
Air Quality	<p>The need to minimise emissions of pollutant gases and particulates and enhance air quality;</p> <p>The need to reduce the need to travel and promote sustainable modes of transport.</p>
Climate Change	<p>The need to reduce the need to travel and promote sustainable modes of transport;</p> <p>The need to reduce greenhouse gas emissions arising from implementation of the WRMP;</p> <p>The need to take into account, and where possible adapt to, the potential effects of climate change;</p> <p>The need to increase environmental resilience to the present and future effects of climate change.</p>
Human Health and Socio-economics	<p>The need to ensure water supplies remain affordable especially for deprived or vulnerable communities.</p> <p>The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.</p> <p>The need to improve public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures.</p> <p>The need to ensure water quantity and quality is improved for other users including tourists, recreational users and other users such as farmers.</p> <p>The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment.</p> <p>The need to accommodate an increasing population.</p> <p>The need to contribute towards maintaining sustainable growth in the region.</p> <p>Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and well-being and the economy.</p>
Material Assets	<p>The need to minimise the consumption of resources, including water and energy.</p> <p>The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill.</p> <p>The need to continue to reduce leakage from the water supply system.</p> <p>Daily consumption of water is higher than the national average in the area and consequently there is a continued need to encourage more efficient water use.</p> <p>The need to support regional and national commitments to decarbonisation.</p>

SEA Topic	Key Issues
Cultural Heritage	<p>The need to conserve or enhance sites of archaeological importance and cultural heritage interest, and their setting, particularly those which are sensitive to the water environment.</p> <p>The need to protect water-dependent heritage sites during drought conditions.</p> <p>The need to protect those assets that form part of the current water supply system, but which are also considered to have a heritage value.</p>
Landscape and Visual Amenity	<p>The need to protect and improve the natural beauty of the area's AONBs and other areas of natural beauty.</p> <p>The need to protect and improve the character of landscapes and townscapes.</p> <p>It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public.</p>

5. ASSESSMENT METHODOLOGY

This section outlines the SEA objectives and assessment framework that has been used to identify the environmental and social effects of the options identified in Bristol Water's WRMP24. The objectives and assessment methodology have been updated from WRMP19 to reflect current best practice and changes to key messages in the plans, programmes and policies that were considered when undertaking the SEA (summarised in Appendix 2). It differs from the WRMP19 methodology in the sense of the baseline changing since then also.

5.1 SEA OBJECTIVES

The effects assessment of the options is 'objectives-led': establishing assessment objectives is a recognised way of considering the environmental and social effects of a plan and comparing the effects of alternatives. SEA objectives are often derived from environmental and social objectives established in law, policy or other plans and programmes, or from a review of baseline information and environmental problems based on the SEA topics.

Assessment objectives have been developed based on:

- The key policy messages, social and environmental protection objectives identified in the review of policies, other plans and programmes (see Section 3). It is important that the assessment takes these objectives into account as this will help it to highlight any area where the WRMP may help or hinder the achievement of the objectives of other plans (e.g., at local, national and international level).
- The current state of the environment in the area under consideration for the SEA (see Section 4) and the key environmental issues identified.
- The need to integration of the HRA, WFD, NCA and INNS assessments:
 - The findings from the HRA informs the SEA at each stage of the assessment process, in particular it is integrated via specific objectives in the SEA topic 'biodiversity, flora and fauna'.
 - The WFD findings informs the SEA at each stage of the assessment process, in particular it is integrated via a specific objective in the SEA topic 'water'.
 - Natural capital and BNG are incorporated within the SEA framework through the inclusion of a dedicated objective associated with the 'biodiversity, flora and fauna' topic: 'To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible'.
 - INNS assessment is incorporated within the SEA framework through the inclusion of a dedicated objective associated with the 'biodiversity, flora and fauna' topic: 'To reduce the spread of invasive, non-native species'.

The SEA objectives that were developed and consulted on at the scoping stage are set out in Table 5-1 alongside the key messages identified from the review of policies, plans and programmes and the key issues highlighted from the review of baseline information.

The following sections describe how Bristol Water will use these SEA objectives in the assessment of the environmental effects of the options, programmes and the WRMP24. These SEA objectives are intended to reflect changes that contribute to sustainability. By assessing each option against the objectives, it is more apparent where there might be negative effects and where options could be developed to provide beneficial effects.

As well as the overall SEA objective, a number of key questions have been developed for each SEA topic. These key questions prompt the assessment and ensure it considers all the relevant aspects. The assessment of each option, programme and WRMP required the following information:

- Details of the options involved: main components, location and / or population affected, and likelihood and predicted frequency of deployment;
- Construction (where applicable) and operational implementation;
- Amount of water provided or volume of water saved (taking uncertainty into account);
- Key elements of the conditions of baseline environment where known, such as location of designated sites, priority habitats and species, landscape area or heritage assets, etc.

5.2 ASSESSMENT FRAMEWORK

Table 5-1: SEA objectives and assessment approach

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
Biodiversity, flora and fauna	<p>Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC act Section 42 for England), whilst taking into account future climate change.</p> <p>Promote a catchment-wide approach to water use to ensure better protection of biodiversity.</p> <p>To achieve favourable condition for priority habitats and species in particular designated sites.</p> <p>Avoidance of activities likely to cause irreversible damage to natural heritage.</p> <p>Support well-functioning ecosystems, respect environmental limits and capacities, and maintain / enhance coherent ecological networks, including provision for fish passage and connectivity for migratory / mobile species.</p> <p>Strengthen the connections between people and nature and realise the value of biodiversity.</p> <p>Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital</p>	<p>The need to protect or enhance the region’s biodiversity, particularly protected sites designated for nature conservation.</p> <p>The need to avoid activities likely to cause irreversible damage to natural heritage.</p> <p>The need to take opportunities to improve and not reduce connectivity between fragmented habitats.</p> <p>The need to control the spread of Invasive Non-Native Species (INNS).</p> <p>The need to consider the impact of climate change upon protected species and habitats when assessing water resource options.</p> <p>The need to recognise the importance of allowing wildlife to adapt to climate change.</p> <p>The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.</p> <p>The need to deliver an increase in the Bristol Water biodiversity index.</p>	<p>1.1 To protect and enhance sites that are designated, both nationally and internationally, for their nature conservation value.</p>	<p>Will the option protect and enhance where possible the most important sites for nature conservation (e.g., internationally or nationally designated sites such as SACs, SPAs, Ramsar sites and SSSIs?)</p> <p>Will it affect HRA compliance?</p> <p>Will the option impact upon connectivity between designated sites?</p>
			<p>1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible.</p>	<p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development progress?</p> <p>Will the option contribute to improvements to Bristol Water’s Biodiversity Index?</p> <p>Does it protect, conserve and enhance biodiversity, natural capital and the ecosystem services the natural capital provides?</p> <p>Will it maintain and enhance the green infrastructure network and the biodiversity it supports?</p>
			<p>1.3 To protect priority habitats and species</p>	<p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will it affect WFD compliance e.g., good ecological potential / status?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	<p>contribute to the economy and therefore should be protected and, where possible, enhanced.</p> <p>Avoidance of activities likely to cause the spread of INNS.</p> <p>A need to protect the green infrastructure network.</p>		<p>1.4 To reduce the spread of invasive, non-native species</p>	<p>Will the option protect, and enhance where appropriate, coastal and marine habitats and species?</p> <p>Will the option affect a priority habitat on the priority habitat inventory?</p> <p>Will the option impact upon connectivity between priority habitats?</p> <p>Will the option exacerbate or mitigate adverse impacts experienced due to climate change?</p> <hr/> <p>Is there an opportunity to improve biodiversity value through removal of INNS?</p> <p>Will the option prevent the spread / introduction of INNS?</p>
<p>Soil, geology and land use</p>	<p>Protect and enhance and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which can be lost or damaged by insensitive development.</p> <p>Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g., supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development.</p> <p>Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change.</p>	<p>The need to protect geological features of importance and maintain and enhance soil function and health.</p> <p>The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources).</p> <p>The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.</p> <p>The need to minimise development on Green Belt land.</p> <p>The need to minimise development on Best and Most Versatile (BMV) agricultural land.</p>	<p>2.1 To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity.</p>	<p>Will it promote the efficient use of land?</p> <p>Will the option utilise previously developed land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p> <p>Will the option maintain the quality of Best and Most Versatile Agricultural Land?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	<p>Promote mixed use developments and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions.</p> <p>Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.</p>			
Water	<p>Promote sustainable water resource management, including a reduction in water consumption.</p> <p>Maintain and improve water quality and water resources (surface waters, groundwater and bathing water).</p> <p>Meet protected area targets related to water quality and flow in the WFD.</p> <p>Expand the scope of water quality protection measures to all waters, surface waters and groundwater.</p> <p>Improve the quality of the water environment and the ecology which it supports and continue to provide high levels of drinking water quality.</p> <p>Ensure appropriate management of abstractions and protect flow and level variability across the full range of regimes from low to high conditions.</p> <p>Prevent deterioration of water quality status.</p> <p>Balance the abstraction of water for supply with the other functions and services the water environment performs or provides, whilst ensuring</p>	<p>The need to further improve the quality of the region’s river, estuarine and coastal waters taking into account WFD objectives and designated sites objectives (i.e., assessment against Common Standards Monitoring Guidance, where relevant).</p> <p>The need to maintain, and where possible enhance, the quantity and quality of groundwater resources taking into account WFD objectives.</p> <p>The need to minimise the effect that Bristol Water’s activities have on the flow of the watercourses within the catchment.</p> <p>The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change on surface waters and groundwaters.</p> <p>The need to ensure sustainable abstraction to protect the water environment and meet society’s needs for a resilient water supply.</p> <p>The need to ensure that people understand the value of water.</p>	3.1 To protect and improve the quality of surface water and groundwaters	<p>Will the option protect and improve surface, estuarine and coastal water quality?</p> <p>Will the option protect and improve groundwater quality?</p>
			3.2 To protect flows and resource levels of surface waters and groundwaters	<p>Will the option reduce the demand for water resources?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option result in changes to river flows?</p>
			3.3 To reduce or manage flood risk whilst accounting for climate change	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</p> <p>Will the option be at risk of flooding now or in the future?</p>
			3.4 To meet WFD objectives	<p>Will the option prevent the deterioration of WFD waterbody status (or potential)?</p> <p>Will the option ensure a new activity or new physical modification does not</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	<p>that Bristol Water’s activities minimise the extent to which watercourses differ from their normal flow.</p> <p>Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change.</p> <p>Promote measures to enable and sustain long term improvement in water efficiency.</p> <p>Promote a catchment based approach to the management and work with local stakeholders to deliver catchment based solutions to water quantity and quality.</p> <p>Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions.</p> <p>Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value.</p> <p>Reduce risk of flooding by changing operation of reservoirs.</p>			<p>prevent the future achievement of good status for a water body?</p> <p>Will the option assist in the attainment of objectives for WFD protected areas, which include water dependent SSSIs, SACs and SPAs?</p>
Air Quality	<p>Reduce the effects of air pollution on ecosystems.</p> <p>Improve overall air quality.</p> <p>Achieve and sustain compliance with and contribute towards national objectives for pollutants, taking into</p>	<p>The need to minimise emissions of pollutant gases and particulates and enhance air quality;</p> <p>The need to reduce the need to travel and promote sustainable modes of transport.</p>	4.1 To protect and enhance air quality	<p>Will it reduce or minimise air pollutant emissions?</p> <p>Will it increase emissions to air in areas sensitive to emissions (i.e., in proximity to an Air Quality Management Area (AQMA) or sensitive habitat?)</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas.			
Climate Change	<p>Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050.</p> <p>Minimise energy consumption, support the use of sustainable / renewable energy and improve resilience to climate change.</p> <p>Build in adaptation to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly.</p> <p>Need for adaptive measures to respond to present and future climate change impacts on water supply and demand.</p>	<p>The need to reduce the need to travel and promote sustainable modes of transport;</p> <p>The need to reduce greenhouse gas emissions arising from implementation of the WRMP;</p> <p>The need to take into account, and where possible adapt to, the potential effects of climate change;</p> <p>The need to increase environmental resilience to the present and future effects of climate change.</p>	5.1 To minimise greenhouse gas emissions and embodied carbon	<p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy?</p> <p>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</p>
			5.2 To adapt and improve resilience to the threats of climate change	<p>Is the option infrastructure vulnerable to climate change?</p> <p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option impact upon designated sites, or the water environment's, ability to adapt to climate change.</p>
Human Health and Socio-economics	<p>Water resources play an important role in supporting the health and recreational needs of local communities and businesses.</p> <p>To ensure all communities have a clean, safe and attractive environment in which people can take pride.</p>	<p>The need to ensure water supplies remain affordable especially for deprived or vulnerable communities.</p> <p>The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.</p>	6.1 To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option help to meet the employment needs of local people?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	<p>To ensure safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities.</p> <p>Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and wellbeing of communities.</p> <p>Promotion of healthy communities and protection from risks to health and wellbeing.</p> <p>Promotion of sustainable economy supported by access to essential utility and infrastructure services.</p>	<p>The need to improve public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures.</p> <p>The need to ensure water quantity and quality is improved for other users including tourists, recreational users and other users such as farmers.</p> <p>The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment.</p> <p>The need to accommodate an increasing population.</p> <p>The need to contribute towards maintaining sustainable growth in the region.</p> <p>Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy.</p>	<p></p> <p>6.2 To maintain and enhance tourism and recreation</p> <p>6.3 To protect and enhance human health and wellbeing</p>	<p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option contribute to sustaining and growing the local and regional economy?</p> <p>Will the option avoid disruption through effects on the transport network?</p> <p>Will the option be resilient to future changes in resources (both financial and human)?</p> <p>Will the option affect opportunities for recreation and physical activity?</p> <p>Will the option affect public rights of way or national cycle routes?</p> <p>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</p> <p>Will the option improve access to local services and facilities (e.g., sport and recreation)?</p> <p>Will the option maintain surface water and bathing water quality within statutory standards?</p> <p>Will it be located in an area considered to be more health deprived than others in the region?</p> <p>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g., as a result of increased noise, light or traffic levels)?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
Material assets	<p>Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently.</p> <p>Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources.</p> <p>Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment.</p> <p>Minimise the production of waste, ensure waste management is in line with the waste hierarchy, and eliminate waste sent to landfill.</p> <p>Promote the sustainable management of natural resources.</p>	<p>The need to minimise the consumption of resources, including water and energy.</p> <p>The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill.</p> <p>The need to continue to reduce leakage from the water supply system.</p> <p>Daily consumption of water is higher than the national average in the area and consequently there is a continued need to encourage more efficient water use.</p> <p>The need to support regional and national commitments to decarbonisation.</p>	<p>7.1 To promote the efficient use of resources and minimise waste</p>	<p>Will the option seek to minimise the demand for raw materials?</p> <p>Will it make use of existing infrastructure?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option encourage the use of sustainable design and materials?</p> <p>Will the option reduce or minimise energy use?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
Cultural heritage	<p>Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site.</p> <p>Ensure active management of the Region’s environmental and cultural assets.</p> <p>Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposit.</p> <p>Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlement.</p> <p>Conserve and enhance the historic environment, heritage assets and their settings.</p>	<p>The need to conserve or enhance sites of archaeological importance and cultural heritage interest, and their setting, particularly those which are sensitive to the water environment.</p> <p>The need to protect water-dependent heritage sites during drought conditions.</p> <p>The need to protect those assets that form part of the current water supply system but which are also considered to have a heritage value.</p>	<p>8.1 To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites</p>	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect the setting and / or significance of a heritage asset?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p> <p>Will it avoid damage to important wetland areas with potential for paleo-environmental deposits?</p> <p>Will the option conserve or enhance water supply infrastructure that has heritage value?</p>
Landscape and visual amenity	<p>Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside).</p> <p>Abstraction and low river flows could negatively affect landscape and visual amenity.</p>	<p>The need to protect and improve the natural beauty of the area’s AONBs and other areas of natural beauty.</p> <p>The need to protect and improve the character of landscapes and townscapes.</p> <p>It is envisaged that landscape and designated sites will be maintained</p>	<p>9.1 To conserve and enhance landscape and townscape character and visual amenity</p>	<p>Will the option avoid adverse effects on, and enhance where possible, protected / designated landscapes (including woodlands) such as National Parks or AONBs?</p> <p>Will the option protect and enhance landscape character, townscape and seascape?</p>

SEA Topic	Key Messages and Objectives	Baseline – key issues	SEA objective	Key questions
	<p>Enhance the value of the countryside by protecting the natural environment for this and future generations.</p> <p>Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.</p>	<p>and enhanced for the enjoyment of the public.</p>		<p>Will the option affect access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>

5.3 INTERACTIONS BETWEEN OBJECTIVES

Schedule 2, paragraph 6 of the SEA Regulations requires that the inter-relationship between the issues referred to between SEA topics shall be explored. In most cases either no interactions occur, or the interactions are identified as compatible.

Potential mixed interactions are identified between objectives 3.3, 5.2 and 9.1 as actions improve resilience to the threats of climate and manage flood risk could be considered to enhance or detract from landscape and townscape character and visual amenity.

5.4 PRIMARY ASSESSMENT

An appraisal framework was used to assess each of the potential WRMP24 options against the SEA objectives. The appraisal framework has been applied to test the performance of each of the alternative WRMP24 option against the SEA objectives. This option level assessment was used to inform the development of the WRMP24 in a number of ways in the planning process. This includes the outputs informing the related metrics used by Bristol Water in optimisation modelling to help identify the solution to the supply-demand deficit over the planning period. This is described in more detail in Section 7. The appraisal framework table is given in Table 5-2.

The first two rows contain the name of the option and a description of the option, including new infrastructure that would be needed, and how the option would operate. The first and second columns to Table 5-2 set out the SEA topics and objectives. The third and fourth columns rate the effects that will occur from the construction phase of the option (the third column rates positive effects, the fourth column rates negative effects). The fifth and sixth columns rate the effects that will occur from the operational phase of the option (the fifth column rates positive effects, the sixth column rates negative effects). The seventh column contains a description of the effects that have been anticipated, both positive and negative, and both during construction and operation.

With respect to duration, short-term impacts will be defined as those that last for up to six months, medium term impacts are those that extend between six month and two years, whilst long term impacts are assessed as those that continue for greater than two years.

Table 5-2: Proposed Appraisal Framework

Option Name						
Option Description						
SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description (including mitigation)
Biodiversity, flora and fauna	1.1 To protect and enhance sites that are designated, both national and internationally, for their nature conservation value.					
	1.2 To avoid a reduction in natural capital assets, and to provide opportunities for biodiversity net gain, where possible.					
	1.3 To protect priority habitats and species.					
	1.4 To avoid further spread of invasive, non-native species.					
Soil, geology and land use	2.1 To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity.					

Option Name						
Water	3.1 To protect the quality of surface water and groundwaters.					
	3.2 To protect flows and resource levels of surface waters and groundwaters.					
	3.3 To reduce or manage flood risk whilst accounting for climate change.					
	3.4 To meet WFD objectives.					
Air Quality	4.1 To protect and enhance air quality.					
Climate Change	5.1 To minimise greenhouse gas emissions and embodied carbon.					
	5.2 To adapt and improve resilience to the threats of climate change.					
Human Health and Socio-Economics	6.1 To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.					

Option Name						
	6.2 To maintain and enhance tourism and recreation.					
	6.3 To protect and enhance human health and well-being.					
Material Assets	7.1 To promote the efficient use of resources and minimise waste.					
Cultural Heritage	8.1 To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites.					
Landscape and Visual Amenity	9.1 To conserve and enhance landscape and townscape character and visual amenity.					

The SEA appraisal framework was used to capture the assessment for each option (one table completed per option).

Varying levels of uncertainty are inherent within the assessment process. The assessment minimised uncertainty through the application of expert judgement. Where there was significant uncertainty, an “uncertain” effect was applied to that specific SEA objective.

The assessment of the options, combinations of options and the overall WRMP24 were carried out using the effects assessment matrix shown in Figure 5-1. The definitions for the effect significance are explained in Section 5.4.1.1.

Where negative effects were predicted, measures envisaged to prevent, reduce and as fully as possible offset these effects on the environment (as a result of implementing the WRMP) are outlined in the Environmental Report where appropriate. These are in addition to any mitigation that has already been included in the conceptual design and costs of each alternative option. Mitigation may include additional provisions within the WRMP24 itself and / or measures to be applied during the WRMP implementation stage. It may also include proposals for changing other plans and programmes to address significant residual effects. Where any remaining significant residual effects are identified monitoring is required to identify any unforeseen negative effects and to enable appropriate remedial action to be taken.

Significance of Effect		Value/sensitivity of receptor		
		High	Medium	Low
Effect magnitude (includes scale of effect)	High	Major Negative / Major Positive	Major Negative / Major Positive	Moderate Negative / Moderate Positive
	Medium	Major Negative / Major Positive	Moderate Negative / Moderate Positive	Minor Negative / Minor Positive
	Low	Dependant on nature of impact/benefit	Minor Negative / Minor Positive	Negligible/Neutral

Figure 5-1: Significance matrix used to assess effects of each WRMP24 option on each SEA objective

5.4.1.1 General Significance Definitions

Major – effects represent key factors in the decision-making process. They are generally associated with sites and features of international, national or regional importance. If adverse, such resources / features are generally those which cannot be replaced or relocated.

Moderate – effects are likely to be important considerations at a regional or district scale. If adverse, they are likely to be of potential concern.

Minor – effects are not likely to be decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or a particular resource.

Negligible – effects which are not perceptible, being within normal bounds of variation or the margin of forecasting error.

For the ‘high’ effect magnitude (top row), a major effect significance is assigned for both high and medium value receptors to reflect the magnitude of the effect.

For the ‘low’ effect magnitude and ‘high’ value receptor (bottom left box), the significance of effect could be minor, moderate or major dependent on the precise nature of the impact or benefit.

5.4.1.2 Summarising the effects assessment

The completed appraisal framework table for each option are presented in full in Appendix 4 of this Environmental Report. A summary of the assessment is presented within the main text of the Environmental Report as a colour-coded visual evaluation matrix. For each option and each objective under each SEA topic

listed in the left-hand column, the visual evaluation matrix summarises the likely significance of effects according to the significance ratings shown in Table 5-3. The full option assessment and associated commentary is provided in the completed appraisal framework tables Appendix 4.

Table 5-3: Significance ratings

Effect	Description
+++	Major Positive
++	Moderate Positive
+	Minor Positive
0	Neutral
-	Minor Negative
--	Moderate Negative
---	Major Negative
?	Uncertain

5.5 SECONDARY, CUMULATIVE AND SYNERGISTIC ENVIRONMENTAL EFFECTS

Schedule 2(6) of the SEA Regulations requires the assessment of “*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...*” These can be defined as follows:

- Secondary or indirect effects are effects that are not a direct result of the plan, (e.g. an abstraction that changes local groundwater levels and thus affects the ecology of a nearby wetland)
- Cumulative effects arise, for instance, where several nearby groundwater sources each have insignificant effect but together have a measurable effect on river flows; or, where several individual effects of a programme (e.g. traffic disruption) have a combined effect.
- Synergistic effects interact to produce a total effect greater than the sum of the individual effects. Synergistic effects often happen as habitats, resources or human communities get close to capacity. For instance, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species.

The term ‘cumulative effects’ is being adopted as the collective term to include secondary, cumulative and synergistic effects (as suggested by the Practical Guide). The SEA of the WRMP24 includes cumulative effects assessment at each of the assessment levels as described in the following sections (option-level, programme-level and overall WRMP). It should be noted that some options may be mutually exclusive (i.e., only one of these options can be developed) and this will also be identified in the SEA as part of the option-level assessment. For the programme level and WRMP level assessment, cumulative effects will include consideration of other plans, programmes and projects in the context of spatial and / or temporal proximity.

5.5.1.1 Programme and WRMP level cumulative effects assessment

To meet the requirements of the SEA Regulations, cumulative effects between those of the WRMP24 with other relevant plans, programmes or projects, including Bristol Water’s Drought Plan, the West Country Water Resources Group (WCWRG) regional plan and the WRMPs and Drought Plans of neighbouring water companies.

Cumulative effects from plans, programmes and projects not related to water resources have been considered where relevant, including existing completed projects, permitted but incomplete developments, ongoing activities, plans or projects for which an application has been made and which are under consideration by consenting authorities and plans and projects which are reasonable foreseeable (i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood and extent of cumulative and in-combination effects). Sources of information include the following:

- Land use and development plans to identify major development proposals (those which are likely to generate large scale construction or operational effects e.g. growth points, strategic centres;

- Transport and other infrastructure plans (e.g. flood risk management plans, energy, and other utilities).
- Local Plans

The following cumulative assessments have therefore been completed:

- Assessment of cumulative effects of options that could potentially be implemented at the same time. Mutually exclusive options (e.g. those that draw upon the same resource or use the same site) have been identified.
- Assessment of cumulative effects of the Bristol Water WRMP24 with the Bristol Water Drought Plan, the WCWRG Regional Plan, other water company Drought Plans and WRMPs, Environment Agency Drought Plans and other relevant water management plans. The potential for a neighbouring company implementing options under its WRMP simultaneously has been considered. Neighbouring water companies will be included as consultees to the WRMP24 and associated SEA Environmental Report in order to identify any cross-boundary issues.
- Assessment of potential cumulative effects of the Bristol Water WRMP24 with any other identified relevant programmes, plans and strategic projects that may be in place / implemented during the period of the WRMP such as the creation of Nature Recovery Networks, as described in the Government's 25-year Environment Plan and Local Development Plans.

6. ASSESSMENT OF OPTIONS

Options appraisal is an overarching term for the identification and assessment of options under consideration for the WRMP24. Through this process, options which are found to have unacceptable adverse effects have been identified through the SEA options assessment to inform the programme appraisal modelling (discussed further in Section 7). The findings of the HRA screening, WFD compliance assessment, INNS, NCA and BNG assessments informed the SEA assessment.

The assessment of each of the WRMP24 options has been undertaken in accordance with the methodology set out in Section 5. Appraisal framework tables have been completed for each individual option and are provided in Appendix 4. A summary of the likely significant effects for each option is provided in this section and is presented as a colour-coded visual evaluation matrix.

6.1 INDIVIDUAL OPTION ASSESSMENTS

6.1.1 Demand Management Options

Table 6-1 provides a summary of the SEA evaluation for each demand management option in the WRMP24 constrained list. The detailed appraisal framework tables for each option are provided in Appendix 4. As Table 6-1 shows, the assessment concluded that the demand management options would result in some negative effects to the environment. Many demand options require vehicle movements (to install meter in customers' homes, for example), which has the potential to negatively affect air quality and greenhouse gas emissions. The creation of new equipment (such as meters) may result in effects on emissions of carbon and resource use. Neutral effects on biodiversity, soils, water, human health, cultural heritage or landscape were anticipated for all demand options. Depending on the anticipated water saving, neutral to moderate positive effects are anticipated for water resources, climate resilience, the economy, and human health & wellbeing, arising from the Bristol Water supply becoming more reliable and less reliant on water extraction.

Demand management options that involve the installation of rainwater harvesting systems or grey water recycling retrofitting may result in a greater range of positive effects. These could include effects associated with attenuation of surface water runoff during rainfall events which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow.

6.1.2 Supply Management Options

Table 6-2 provides a summary of the SEA evaluation for each supply side option in the WRMP24 constrained list. The detailed appraisal framework tables for each option are provided in Appendix 4. The assessment concluded that the eleven supply options would result in negative effects to the environment. Many of the supply side options would require construction and new infrastructure within, or in close proximity to, designated biodiversity sites, resulting in either moderate or major negative effects. As identified by the HRA¹⁰, should they be progressed, a number of options require further assessment through Stage 2 appropriate assessment as a result of impact pathways to European sites or offsite functionally linked habitat.

Due to new infrastructure being required, a number of options have moderate or major negative effects regarding greenhouse gas emissions. Other objectives against which negative effects have been identified include the spread of INNS, water quality, and the efficient use of material assets. Options R007_Pumped refill of Chew Valley Reservoir and R016_Huntspill Transfer were identified as resulting in negative effects regarding a number of objectives across a range of SEA topics, of which some were considered to be major negative impacts (upon designated sites, natural capital, flood risk, greenhouse gas emissions, resource use, the historic environment). Those supply side options that involve less substantive construction phases, such as WTW capacity increase (e.g. P08_Alderley WTW) result in fewer significant negative effects.

The assessment concluded that the supply management options would result in positive effects to many objectives within the assessment framework. Many options would improve natural capital and resilience to climate change, promote a sustainable economy, enhance tourism and recreation, and protect human health and wellbeing as a result of improving water supply and strengthening its resilience. The extent of positive impacts are proportionate to the deployable output of each option.

Table 6-1: Visual Evaluation Matrix - Demand Management and Leakage Options

Option	Phase	Impact	SEA Objective																	
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1
HH_M_009 (AMI Baseline) Watersmart - customer feedback from metering	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0
HH_M_009 (AMI Enhanced) Watersmart - customer feedback from metering	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0
HH_A_001 Home Efficiency visits (HEV) - Targeted water efficiency audit with free water efficient device installation - in person	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0
HH_A_002 Home Efficiency Visits (HEV) - Water efficiency audit with free water efficient device installation - metered	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	++	0	++	0	0
HH_A_003 Home Efficiency Visits (HEV) - water efficiency audit with free water efficient device installation - new meter	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	++	0	++	0	0
HH_A_004 Virtual Home Efficiency Visits (VHEV) - water efficiency audit with free water efficient devices	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	++	0	++	0	0
HH_E_001 Appliance subsidies (rebates for water efficient devices and appliances)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	0	0	0	0	0
HH_E_002 Pay per use appliances (e.g., Miele bundles subscription)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	0	0	0	0	0
HH_E_004 Leaky Loos' Wastage Fix: large scale targeted fixes	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	0	+	0	0
HH_E_005 Eco branding water efficiency programme	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	0	+	0	0
HH_E_006 Distribution of household water efficiency kits for self-installation - via the water company of WCWR website	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	+	0	0	0	+	+	0	+	0	0
Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

HH_E_008 Partnerships / targeting of large / small developers to instal water efficient devices	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	++	0	++	0	0	0
HH_E_009 Home Efficiency Visits (HEVs) - water efficiency audit - local authorities, housing associations, corporate landlords)	Construction	Adverse	0	0	0	0	0	0	0	0	0	-	---	0	0	0	0	0	-	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0
HH_E_010 Home Efficiency Visits (HEVs) - water efficiency audit - combined with energy efficiency audits	Construction	Adverse	0	0	0	0	0	0	0	0	0	-	---	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0	0	0
HH_E_013 School visits water efficiency programme	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_E_016 Media campaigns to influence water use	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0
HH_I_001 Targeted incentives schemes - individual customer / community reward (e.g., Greenredeem) - new metered customers	Construction	Adverse	0	0	0	0	0	0	0	0	0	-/?	-	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	++	0	++	0	0	0
HH_I_004 Community competition	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_T_006 Community reward tariff	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_T_008 Individual reward tariff	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_N_002 Home retrofit of rainwater harvesting	Construction	Adverse	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-/?	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+/?	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	+/?	0	0	0	+	0	0	0	+	0	0
HH_N_003 Rainshare - Communities direct harvested rainwater into a centralised shared resource	Construction	Adverse	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	+/?	0	0	0	+	0	0	0	0	0	0
HH_N_004 Grey water recycling retrofitting to existing properties	Construction	Adverse	0	0	0	0	0	0	0	0	0	-	--	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	+/?	0	0	0	+	+	0	+	0	0	0
C019 Water Butts (Bristol Water Subsidy)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0

	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_P_001 Change WC standards	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	+	0
HH_P_002 Water labelling - with minimum standards	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+++	0	0	0	0	+++	+++	0	+++	+	0
HH_P_003 Water labelling - with no minimum standards	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	++	0	++	0	0
HH_P_004 New development standards - water neutrality	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	+	0
HH_P_005 New home standards - mandatory	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0	0
HH_W_001	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	+	0
NHH_A_001 Business Efficiency Visits (BEV) - water efficiency audit - in person audit, fix and retrofit, targeted at specific sectors / businesses	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0
NHH_A_003 and NHH_A_006 Business Efficiency Visits (BEV) - leakage detection - in person (NOT targeted at specific sectors / businesses) and Business Efficiency Visits (BEV) - leakage detection - in person targeted at leisure sector (golf)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0
NHH_E_001 Sector specific water efficiency advice e.g., partnerships with holiday rental companies AirBnb	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0
NHH_E_002 AMI SMART Online - Water smart online tools and resources.	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0
NHH_I_001 Rewards to water retailers for business water use savings	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0
NHH_T_003 Benchmarked rising block business units	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
NHH_N_001 Rainwater harvesting is included in new developments to meet planning condition conditions - commercial / public sector developments - single or multiple	Construction	Adverse	0	0	0	0	0	0	0	0	0	0/?	-/?	0	0	0	0	0	0	0	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	+	0	0	0	+	0	0	0	0	0	0
NHH_N_002 Rainwater harvesting feasibility assessment and / or subsidised installation - target large water users	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0/?	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	+/?	0	0	0	+	0	0	0	0	0	0
NHH_N_003 Rainwater harvesting - target large water users	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0/?	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	+/?	0	0	0	+	0	0	0	0	0	0
C016 Water saving devices - waterless urinals	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0
HH_A_005 - Cenergist Home Efficiency Visits (HEV) - HEV/retrofit visits (no flow regulations)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	---	0	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
HH_E_020 Communication and awareness campaign and associated product support	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	+	0	0
HH_E_021 - Innovative water saving devices 1 - Installation of flow regulators in supply pipes	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	++	0	++	0	0	0
HH_E_022 Innovative Water Saving Devices 2 - Installation of flow regulators with meter installation	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	---	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	++	0	++	0	0	0
HH_E_023 Innovative water saving devices 3 - Combining installation with home efficiency visits	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	0	-	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0
Leakage - No reduction (D001-D010)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	---	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0
Linear reduction to 50% by 2050 (D001-D010)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-/?	---	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	+/?	0	0	+	++	0	++	0	0	0
Linear reduction to 50% by 2045 (D001-D010)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0

Operation	Adverse	0	0	0	0	0	0	0	0	0	0	-/?	---	0	0	0	0	0	0	0
	Beneficial	0	0	0	0	0	0	+	0	+/?	0	0	+	++	0	++	0	0	0	0

Table 6-2: Visual Evaluation Matrix - Supply Management Options

Option	Phase	Impact	SEA Objective																		
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1	
P01_01_Charterhouse	Construction	Adverse	--	--	0	0	0	-	0	0	0	-	-	0	0	0	0	-	0	-	
		Beneficial	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	+	0	0
	Operation	Adverse	---	0	--/?	0	0	-	--	0	--/?	0	--	0	0	0	0	0	0	0	0
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	0	0	+	0	0	0	0
P01_02_Forum	Construction	Adverse	--	--	-	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	
		Beneficial	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	--/?	0	--/?	0	0	--/?	--/?	0	-/?	0	--	0	0	0	0	0	0	0	0
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0
P06_Mendip Lakes Catchment Management	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	
	Operation	Adverse	-	0	0	0	0	-	-	0	0	0	---	0	0	0	0	0	0	0	
		Beneficial	++	0	++	0	+	++	0	0	++	0	0	+	0	+	0	+	0	0	
R005_Cheddar Reservoir	Construction	Adverse	---	---	--	--	---	-	0	--	0	-	---	0	0	-	-	---	---	---	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	
	Operation	Adverse	-	0	-	--	0	-	-	0	0	0	---	0	0	0	0	-	--	--	
		Beneficial	0	+++	0	0	0	0	0	++	0	0	0	+	++	+++	++	0	0	0	
P08_Alderley WTW	Construction	Adverse	-	--	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0	
		Beneficial	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	+	0	0	
	Operation	Adverse	--/?	0	--/?	0	0	--	--	0	--/?	0	0	0	0	0	0	0	0	0	
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	0	0	
R007_Pumped refill of Chew Valley Reservoir	Construction	Adverse	---	--	-	--	--	-	0	---	0	-	--	0	0	-	-	---	---	-	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+++	0	0	++	0	0	
	Operation	Adverse	--	0	-	-	0	-	-	0	0	0	---	0	0	0	0	-	0	0	
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	++	+++	0	+++	0	0	0	
R08_02_Bathford	Construction	Adverse	--	---	-	--	0	-	0	---	0	-	--	0	0	-	-	-	-	--	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	
	Operation	Adverse	--	0	0	0	0	0	-	0/?	0	0	--	0	0	0	0	0	0	0	
		Beneficial	0	+++	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	
R08_03_Frome at Frenchay	Construction	Adverse	--	--	-	--	-	-	0	--	0	-	--	0	0	---	-	--	-	-	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	+	0	0	
	Operation	Adverse	--	0	0	-	0	0	-	0	0	0	0	0	0	0	0	-	0	-	
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	
R014_Avonmouth	Construction	Adverse	--	--	-	-	-	-	0	-/?	0	-	--	0	0	0	-	--/?	-	-	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	++	0	0	
	Operation	Adverse	--	0	0	0	0	0	0	0	0	0	---	0	0	0	0	-	0	0	
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	0	0	
R016_Huntspill Transfer	Construction	Adverse	--	---	-	--	--	-	0	--/?	0	-	--	0	0	-	-	--	--	-	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	+	0	0	
	Operation	Adverse	--	0	-	-	0	-	-	0	0	0	-	0	0	0	0	-	0	0	
		Beneficial	0	+++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	0	0	
R24_Honeyhurst	Construction	Adverse	--	--	-	-	--	-	0	0	0	-	-	0	0	--	-	-	---	-	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	
	Operation	Adverse	--	0	-	0	0	-	-	0	0	0	-	0	0	0	0	0	0	0	
		Beneficial	0	++	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	

7. SEA INFORMING DECISION MAKING

7.1 OVERVIEW

As described in Section 1.6 and shown in Figure 1-2 the SEA, as well as the other supporting environmental assessments, have informed the development of the WRMP24. The SEA findings have been used as inputs to the following key decision points:

- High-level screening assessment of the unconstrained option list.
- Full option level assessment and input to SEA related metrics used by Bristol Water in optimisation modelling to help identify the solution to the supply-demand deficit over the planning period.
- Programme level assessment.
- Assessment of the preferred programme and WRMP24.

Further details regarding how the SEA has informed the planning process at each of these decision points is summarised below. Further details can be found in Sections 12, 13 and 14 of the WRMP24.

7.2 SEA HIGH-LEVEL SCREENING OF THE UNCONSTRAINED LIST

Bristol Water developed a list of unconstrained options using appropriate guidance and information. This resulted in the identification of 134 unconstrained options, with 6 options subsequently added for the WRMP24 resulting in 138 options. This consisted of 33 supply-side options and 105 demand options (including 8 that were designed to reduce leakage). The unconstrained options were subject to a coarse screening process where the screening identified over-riding constraints or poor performance against a number of criteria.

Consideration of SEA topics was included as one of the screening criteria in the coarse screening of the unconstrained options to derive the dWRMP24 feasible options list. A qualitative assessment approach was used for the SEA at this stage which also included high-level screening of the unconstrained list of options in terms of HRA, WFD, NCA and INNS. These high-level assessments were considered by Bristol Water as part of the wider suite of assessment criteria used to assess whether any option in the unconstrained list has 'unalterable planning constraints' (as described in the WRPG) and should be rejected, or is considered unacceptable for inclusion. In terms of the SEA it supported answering the question: "is this option likely to have a highly unacceptable impact on the environment or society?". The assessment used high-level, expert judgement and the detail available about each option at that stage of the process. A qualitative "grading" approach was applied (red, amber, green (RAG)) to indicate whether each option has the potential for major adverse effects and may need to be rejected on environmental grounds.

The high-level SEA screening (as well as findings from the other supporting environmental assessment high level screening) led to six unconstrained options being screened out, with examples and justifications including:

- R003 and R004: Desalination and transfer scheme (two variants) were screened out due to environmental risks associated with the technology and proximity to a Ramsar site.
- R008: Increase capacity at Chew Valley Reservoir was screened out on environmental grounds including the fact that Chew Valley Reservoir is designated as an SPA and that the additional land take would have negative social implications.
- R022: Quarry de-watering recovery was screened out on environmental grounds.
- R026: Impoundment of gorge, River Avon was screened out on environmental grounds regarding WFD high-level screening, which identified that the associated activities would fundamentally alter the salinity of the water and therefore permanently change the related waterbody.

The result of the overall screening process was 87 feasible options composed of 11 supply-side options and 76 demand options (including the 10 leakage activities described in Section 2.3.3).

The feasible options were appraised by Bristol Water to understand their potential scope and estimate their possible impact (in terms of water saved or yield), Capital expenditure (Capex) and Operational expenditure (Opex) costs, carbon cost and environmental impacts across the planning period. The outcome of the coarse option screening process for the dWRMP24 was a final constrained, feasible list of 70 options. These are made up of Customer demand management options (58) and distribution/leakage options (2) and 10 supply-side options (composed of production options: (3) and resource options (7)).

All of the constrained options were subject to full option level SEA (as well as option level assessment in terms of HRA, WFD, NCA and INNS).

7.3 SEA RELATED WRMP METRICS AND DECISION-MAKING FRAMEWORK

The decision-making approach Bristol Water used to examine all the potential options and combinations of options (programmes) to help identify the solution to their supply-demand deficit over the planning period followed the guidance provided by the Environment Agency WRPG and other relevant documents such as UKWIR's Best Value Planning (BVP) report. With support from consultants HR Wallingford, it was decided that, in addition to the AIC and the EBSD approaches, a pragmatic optimisation-based approach in which various objectives and the corresponding metrics can be combined to identify a Best Value Plan, would be followed. This was deemed most suitable to solve Bristol Water's supply-demand imbalance and is the approach adopted by other water companies of the WCWR. The decision-making process proposed is explained in Section 14 of the WRMP24.

In order to provide the programme optimisation modelling with information about the environmental and social performance of each WRMP24 option in the Constrained List, an approach for deriving environmental and social metrics from the SEA option level results was developed. This is described in full in Section 14 of the WRMP24. The metrics developed by Bristol Water and external consultants to help identify the solution to the supply-demand deficit over the planning period are summarised in Table 7-1, this identifies which SEA objectives were mapped on to each decision-making metric.

Table 7-1: Summary of metrics used in Bristol Water's decision-making modelling

Metric type	Metric	Sub-metric	Related SEA objectives	WRMP24 Description
Monetary	Cost	N/A	N/A	Total Net Present Cost (NPC) based on Capex (initial and replacement) and Opex (fixed and variable).
Monetary	Public Water Supply drought resilience	N/A	N/A	Supply-demand balance change at 1 in 500 level.
Monetary	Carbon cost	N/A	N/A	Total NPC of monetised carbon cost.
SEA	Water (WAT)	1. Flood risk	Water SEA topic (objectives 3.1, 3.2, 3.3 and 3.4) and Climate Change SEA topic (objective 5.2).	Qualitative assessment from SEA converted to a linear scale.
		2. Multi-abstractor benefits		Water quality and quantity, and water resources from SEA converted to a linear scale.
		3. Climate change		Maximise resilience to the threats of climate change.
SEA	Human and social wellbeing (HSW)	1. Human health and socio-economics	Air Quality SEA topic (objective 4.1). Human Health and Socio-Economics SEA topic (objective 6.1, 6.2 and 6.3). Cultural Heritage SEA topic (objective 8.1).	Maximise promoting a sustainable economy and maintaining and enhancing the economic and social well-being of local communities; Maximise tourism and recreation; and maximise enhancing human health and wellbeing.
		2. Air Quality		Maximise air quality.
		3. Cultural heritage		Maximise conservation and enhancement of historic assets and other cultural heritage and their settings, including archaeologically important sites.

Metric type	Metric	Sub-metric	Related SEA objectives	WRMP24 Description
SEA	Sustainable natural resources (SNR)	1. Climate change	Biodiversity, Flora and Fauna SEA topic (objectives 1.1, 1.2, 1.3 and 1.4).	Minimise greenhouse gas emissions and embodied carbon.
		2. Biodiversity, flora and fauna		Maximise protection and enhancement for sites that are designated, both nationally and internationally for their nature conservation value; Minimise reduction in natural capital assets, and maximise opportunities for biodiversity net gain, where possible; Maximise protection for priority habitats and species; And minimise further spread of invasive, non-native species
		3. Soil, geology, and land use	Soil, Geology and Land Use SEA topic (objective 2.1). Material Assets SEA topic (objective 7.1). Landscape & Visual Amenity SEA topic (objective 9.1).	Maximise the appropriate and efficient use of land and maximise protection and enhancement of local geomorphology, soil quality and geodiversity.
		4. Landscape and visual amenity	Maximise conservation and enhancement landscape and townscape character and visual amenity.	

The metrics that were derived directly from consideration of the findings of the SEA also incorporated HRA, WFD, NCA, BNG and INNS assessment findings because the SEA itself was informed by these and the SEA framework included objectives that specifically relate to each of these assessments.

To avoid “double-counting” of the carbon effects, the SEA objective that relates to carbon emissions was excluded from feeding into the metric scores as these have been included as monetary values in the programme investment appraisal model.

To align with the other metrics in the options appraisal modelling process, the environmental metrics were translated into positive and negative values on a scale of 0 to 100 (or 0 to -100). Table 7-2 below sets out the metrics for each supply option; these metrics were incorporated into the investment programme appraisal model to provide an indication of the environmental performance of each option.

Table 7-2: Environmental and Social Metrics for the Constrained Options

Option Number	Option Description	Sustainable natural resources (SNR) ²⁸		Water (WAT) ²⁹		Human and social wellbeing (HSW) ³⁰	
		SNR +	SNR -	WAT +	WAT -	HSW +	HSW -
P01-01	P01-01 Charterhouse	8.0	-21.0	3.2	-14.0	2.2	-2.9
P01-02	P01-02 Forum	6.0	-19.5	3.2	-14.0	4.3	0.0

²⁸ The Sustainable natural resources (SNR) decision-making metric incorporates performance against the objectives under the Biodiversity, Flora and Fauna SEA topic (objectives 1.1, 1.2, 1.3 and 1.4), Soil, Geology and Land Use SEA topic (objective 2.1), Material Assets SEA topic (objective 7.1) and Landscape & Visual Amenity SEA topic (objective 9.1).

²⁹ The Water (WAT) decision-making metric incorporates performance against the objectives under the Water SEA topic (objectives 3.1, 3.2, 3.3 and 3.4) and Climate Change SEA topic (objective 5.2).

³⁰ Human and social wellbeing (HSW) decision-making metric incorporates performance against objectives under the Air Quality SEA topic (objective 4.1), Human Health and Socio-Economics SEA topic (objective 6.1, 6.2 and 6.3) and Cultural Heritage SEA topic (objective 8.1).

Option Number	Option Description	Sustainable natural resources (SNR) ²⁸		Water (WAT) ²⁹		Human and social wellbeing (HSW) ³⁰	
		SNR +	SNR -	WAT +	WAT -	HSW +	HSW -
P06	P06 Mendiplates	12.0	-9	15.9	-4.7	6.5	0.0
P08	P08-Alderley	8.0	-12.0	3.2	-16.3	8.7	0.0
R007	R007 PumpedRefill	8.0	-48.5	6.3	-14.0	19.5	-17.5
R014	R014-Avonmouth	8.0	-30.1	3.2	-4.7	10.9	-8.7
R016	R016 Huntspill transfer	8.0	-39.3	3.2	-11.7	13.0	-14.6
R08-02	R08-02 Bathford	6.0	-30.1	3.2	-11.7	6.5	-11.6
R08-03	R08-03 FromeAtFrenchay	6.0	-30.1	3.2	-9.3	8.7	-17.5
R24	R24 Honeyhurst	6.0	-22.5	3.2	-7.0	6.5	-20.4

The leakage and demand management options metric score ranges are smaller, which is reflective of the type of effects on the environment and society. These have been summarised below:

- SNR+: 0 to 2.3
- SNR-: 0 to -9
- WAT+: 0 to 19.0
- WAT-: 0
- HSW+: 0 to 15.2
- HSW-: 0 to -5.8.

The metrics provide a high-level summary of the environmental assessment findings and are not a substitute for the more detailed SEA, HRA, WFD, NCA, BNG and INNS appraisal processes for informing programme appraisal.

7.4 ROLE OF SEA IN PROGRAMME APPRAISAL AND WRMP DECISION MAKING

As described above, the option-level SEA indicated which options are more environmentally favourable than others. These findings influenced the metrics used in the optimisation modelling and therefore the alternative solutions considered. The reasonable and realistic alternative programmes that were initially being considered by Bristol Water were as follows:

- Least Cost Programme
- Best Value Programme
- Climate Change focussed Programme
- Population focussed Programme
- Environment focussed Programme
- However, as highlighted in Section 2.3, the WRMP24 developed by Bristol Water is not based solely upon the requirement to solve the supply-demand balance deficit but also to deliver leakage levels as indicated in the Public Interest Commitment (PIC) to 2030 EIP to 2027 and 2032 and National Infrastructure Commission's (NIC) challenge to 2050; to reduce per capita consumption (PCC) to 110

litres per head per day by 2050 as outlined by the National Framework for Water Resources²⁶ and EIP; and to deliver the interim 122 litres per head per day by 2038 EIP target. As a result of this, there are several steps Bristol Water took to identifying the preferred plan under the different scenarios outlined as follows:

1. Identify the most preferential leakage scenario based upon the cost, carbon cost and environmental scores.
2. Optimise the demand-side options relating to per capita consumption against the targets up to 110 l/h/d by 2050.
3. Optimise demand-side, non-household options against the non-household demand reduction targets of 9% reduction in non-household consumption by March 2038 and 15% reduction in non-household consumption by 2050 based upon the cost, carbon cost and environmental scores.
4. Use steps 1-3 to calculate the remaining supply-demand balance deficit profile for the planning period and use this to guide the selection of supply-side options.

As the modelling work undertaken by Bristol Water progressed through the development of the WRMP24, it was identified that the leakage and demand policy delivery options maintain the supply-demand deficit under all the core scenarios tested.

7.5 SEA OF ALTERNATIVE PROGRAMMES

Due to the nature of the supply-demand balance deficit a formal adaptive pathway approach was not undertaken by Bristol Water. However, scenario testing was undertaken regarding the biggest areas of uncertainty and in line with the scenarios set out in both the Environment Agency Water Resource Planning Guidance and the Ofwat common reference scenarios as well as other relevant guidance (this is discussed in Section 16 of the WRMP24). The scenario testing showed that a set of leakage and demand policy delivery options maintain the supply-demand balance deficit under all but two of the eight scenarios tested. The scenarios tested are listed below:

1. Least cost (policy targets)
2. Climate change – adverse
3. Climate change - benign
4. Low demand scenario
5. High demand scenario (Ofwat)
6. High demand scenario (Environment Agency)
7. Environmental Ambition scenario
8. Plausible worst case climate change and demand
9. Low technology scenario (Ofwat)
10. High technology scenario (Ofwat).

Table 7-3 provides a summary of the SEA evaluation for the set of leakage and demand policy delivery options selected through Bristol Water's modelling and programme appraisal processes. These options were shown to maintain the supply-demand balance deficit under scenarios 1 to 5 and scenario 7. Scenarios 6 ('High demand scenario (Environment Agency)) and Scenario 8 ('Plausible worst case climate change and demand') were shown to result in Bristol Water needing supply options to meet an additional supply demand deficit, however, not until after 2068.

The set of leakage and demand policy delivery options selected through Bristol Water's modelling and programme appraisal processes, in many cases, constitute behavioural changes of customers only, and therefore do not require the construction of any infrastructure. For those that do include new infrastructure, it is predominantly domestic and small-scale (e.g., water meters) and therefore the negative effects associated with implementation are generally considered to be minor, and associated with vehicle movements for home visits (related to effects on air quality, resource use, embodied carbon). In cases where negative effects are assessed as moderate, rather than minor, this is related to visits to a large number of homes.

Positive effects for these options are predominantly associated with the abstraction of less water from the environment. Demand management options protect river flows and groundwater levels, improve resilience to climate change, increases the sustainability of the economy, and enhances human health and wellbeing.

Neutral effects are anticipated regarding biodiversity, soils, flood risk, WFD objectives, tourism, cultural heritage and landscape value.

As noted in Section 6.1, those demand management options that involve the installation of rainwater harvesting systems or grey water recycling retrofitting could result in a greater range of positive effects. This includes those associated with attenuation of surface water runoff during rainfall events.

The leakage reduction option was assessed as resulting in negative effects associated with vehicle movements, which in turn leads to deterioration in air quality and increases in greenhouse gas emissions. Positive effects are predominantly associated with the abstraction of less water from the environment, and the promotion of a sustainable economy (noting that the effects regarding the economy were assessed using Capex as a proxy (as information regarding effects on jobs etc. are currently unknown).

It is noted that, as shown in Section 6, the selection of any combination of demand management options in the constrained list would result in a similar range of effects.

Table 7-3: Summary of options forming alternative and preferred programme when tested against Scenarios 1 to 5 and Scenarios 7, 9 and 10

Option	Phase	Impact	SEA Objective																			
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1		
HH_M_009 (AMI Baseline) Watersmart - customer feedback from metering	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0	0	0	0
HH_E_016 Media campaigns to influence water use	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0	0
HH_P_001 Change WC standards	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	+	0	0	0
HH_P_002 Water labelling - with minimum standards	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+++	0	0	0	0	+++	+++	0	+++	+	0	0	0
HH_P_005 New home standards - mandatory	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	+	+	++	0	++	0	0	0	0
NHH_A_001 Business Efficiency Visits (BEV) - water efficiency audit - in person audit, fix and retrofit, targeted at specific sectors / businesses	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0	0
NHH_E_002 AMI SMART Online - Water smart online tools and resources.	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0	0
NHH_T_003 Benchmarked rising block business units	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0	0	0	0	0
NHH_N_002 Rainwater harvesting feasibility assessment and / or subsidised installation - target large water users	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0/?	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	+/?	0	0	0	+	0	0	0	0	0	0	0
C016 Water saving devices - waterless urinals	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	0	0	0	+	+	0	+	0	0	0	0
Linear reduction to 50% by 2050 (D001-D010)	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0
	Operation	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	0	0	0	0	0	0	0	+	0	+/?	0	0	+	++	0	++	0	0	0	0

Option	Phase	Impact	SEA Objective																			
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1		
P06_Mendip Lakes Catchment Management	Construction	Adverse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Beneficial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Adverse	-	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0
		Beneficial	++	0	++	0	+	++	0	0	0	0	0	0	+	0	+	0	+	0	0	0

The 'High demand scenario' (due to high population growth) results in the need for supply options by 2068, those likely to be required are listed below with the year of implementation provided in brackets:

- P06 - Catchment Management of Mendip Lakes (2025)
- P08 - Alderley WTW (increased production) (2069)
- R014 - Avonmouth WWTW direct effluent reuse (2073)
- R24 - Bring Honeyhurst Well source back into supply (2078)
- P01-02 - Forum WTW (increased production) (2079).

The 'Plausible worst case climate change and demand' scenario is represented by a future under the high climate change scenario, resulting in less water available in the environment, and Bristol Water are unable to deliver the leakage and PCC reduction targets by 2050 (with the assumption that 50% delivery of the target is achieved). The options that are likely to be required under this scenario are listed below with the year of implementation provided in brackets:

- P06 - Catchment Management of Mendip Lakes (2025)
- P08 - Alderley WTW (increased production) (2068)
- R014 - Avonmouth WWTW direct effluent reuse (2073)
- R24 - Bring Honeyhurst Well source back into supply (2078).

Table 7-4 and Table 7-5 below provide a summary of the SEA evaluation for the supply options needed, in addition to the leakage and demand options, to meet an additional supply demand deficit under the 'High demand' scenario and 'Plausible worst case climate change and demand' scenario respectively. The set of leakage and demand policy delivery options already discussed and presented in Table 7-3 are not included for brevity.

As discussed in Section 6.1, supply side options tend to result in greater potential for negative effects to the environment and society. This may be due to the requirement for construction which may be in proximity to sensitive receptors. In operation, supply side options may result in changes to groundwater levels or surface waters which in turn has the potential to negatively affect sensitive receptors.

As shown in Table 7-4 and Table 7-5, the supply options needed to meet an additional supply demand deficit under the 'High demand' scenario and 'Plausible worst case climate change and demand' are predicted to result in only two major negative effects. The options selected include those associated with existing sources and limited construction phases such as WTW capacity increase (e.g. P08 - Alderley WTW). The Avonmouth WWTW direct effluent reuse option selected in both scenarios has a more significant construction phase and greater influence on the environment in operation.

The supply options also result in the potential for positive effects, including those that relate to resilience to climate change, sustainable economy, and human health and wellbeing as a result of improving water supply and strengthening its resilience.

The options that are identified under the two scenarios that represent the more extreme end/worst case of Bristol Waters WRMP24 scenario testing exercise, are shown not to be required until after 2068 (well beyond the statutory planning period). Undertaking any further assessment from an 'alternative programme' point of view is not considered of value considering the timeframes and the uncertainties involved.

Table 7-4: Summary of supply options identified to meet an additional supply demand deficit under the 'High demand (Environment Agency) scenario

Option	Phase	Effect	SEA Objective																			
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1		
P06_Mendip Lakes Catchment Management	Construction	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Negative	-	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0
		Positive	++	0	++	0	+	++	0	0	++	0	0	+	0	+	0	+	0	+	0	0
P08_Alderley WTW	Construction	Negative	-	--	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Positive	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Negative	--/?	0	--/?	0	0	--	--	0	--/?	0	0	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	++	0	0	0
R24_Honeyhurst	Construction	Negative	--	--	-	-	--	-	0	0	0	-	-	0	0	--	-	-	---	-	-	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0
	Operation	Negative	--	0	-	0	0	-	-	0	0	0	-	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0	0
R014_Avonmouth	Construction	Negative	--	--	-	-	-	-	0	-/?	0	-	--	0	0	0	-	--/?	-	-	-	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	++	0	0	0	0
	Operation	Negative	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	++	0	0	0

Table 7-5: Summary of supply options identified to meet an additional supply demand deficit under the 'Plausible worst case climate change and demand' scenario

Option	Phase	Effect	SEA Objective																			
			1.1	1.2	1.3	1.4	2.1	3.1	3.2	3.3	3.4	4.1	5.1	5.2	6.1	6.2	6.3	7.1	8.1	9.1		
P06_Mendip Lakes Catchment Management	Construction	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Negative	-	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0
		Positive	++	0	++	0	+	++	0	0	++	0	0	+	0	+	0	+	0	+	0	0
P08_Alderley WTW	Construction	Negative	-	--	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Positive	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation	Negative	--/?	0	--/?	0	0	--	--	0	--/?	0	0	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	++	0	0	0
R014_Avonmouth	Construction	Negative	--	--	-	-	-	-	0	-/?	0	-	--	0	0	0	-	--/?	-	-	-	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	++	0	0	0	0
	Operation	Negative	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	++	0	++	0	++	0	0	0
R24_Honeyhurst	Construction	Negative	--	--	-	-	--	-	0	0	0	-	-	0	0	--	-	-	---	-	-	
		Positive	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0
	Operation	Negative	--	0	-	0	0	-	-	0	0	0	-	0	0	0	0	0	0	0	0	0
		Positive	0	++	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	+	0	0

7.5.1 Cumulative Effects Assessment of Alternative Programmes

As part of the programme appraisal stage cumulative effects have been assessed using the SEA methodology set out in Section 5. This programme-level SEA considers both the findings of the option-level SEA and an assessment of any identified cumulative significant effects for any SEA objective. As outlined in Section 5.4, to meet the requirements of the SEA Regulations this has been considered regarding those between:

- a) the different options making up each alternative programme
- b) the alternative programme and other Bristol Water plans
- c) the alternative programme and plans of other water companies
- d) the alternative programme and any other relevant plans, programmes or projects within the SEA area.

The following cumulative assessments have therefore been completed:

- Assessment of cumulative effects of options that could potentially be implemented at the same time. Mutually exclusive options (e.g. those that draw upon the same resource or use the same site) have been identified.
- Assessment of cumulative effects of the Bristol Water WRMP24 with the Bristol Water Drought Plan,
- The WCWRG Regional Plan
- Neighbouring water company WRMPs (Wessex Water, Thames Water, Severn Trent Water)
- Other Regional Plans
- Neighbouring water company Drought Plans (Wessex Water, Thames Water, Severn Trent Water)
- Environment Agency Drought Plans
- Assessment of potential cumulative effects of the Bristol Water WRMP24 with any other identified relevant programmes, plans and strategic projects that may be in place / implemented during the period of the WRMP.

The last type of cumulative effect listed cumulative effects from plans, programmes and projects not related to water resources have been considered where relevant, including existing completed projects, permitted but incomplete developments, ongoing activities, plans or projects for which an application has been made and which are under consideration by consenting authorities and plans and projects which are reasonable foreseeable (i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood and extent of cumulative and in-combination effects). Sources of information include the following:

- Land use and development plans to identify major development proposals (those which are likely to generate large scale construction or operational effects e.g., growth points, strategic centres;
- Transport and other infrastructure plans (e.g., flood risk management plans, energy, and other utilities).
- Local Plans.

7.5.1.1 Cumulative Effects Assessment of WRMP24 Options

Cumulative beneficial effects have been identified in relation to the demand management options acting in-combination to increase the overall demand savings, thereby contributing to sustainable abstraction. The cumulative benefits will help reduce stress on the water environment and any water dependent features as well as reducing energy use for water pumping and treatment. There is a small risk that simultaneous implementation of the leakage and demand management options could lead to cumulative adverse effects regarding disturbance to human health, air quality and greenhouse gas emissions as a result of certain activities operating together. However, any such cumulative impacts are not considered significant, as most of these activities would be localised, small in scale and could be effectively mitigated through careful project management and best practice construction methods.

7.5.1.2 Cumulative Effects Assessment of other water resource related plans

The demand management options included in the alternative programmes would complement the demand management measures included in Bristol Water's Drought Plan and, together with the supply-side option (P06) and a catchment management option, any cumulative effects are likely to be beneficial. Similarly, if there are any cumulative effects of the Bristol Water WRMP24 with other water resource related plans such as the

neighbouring water company WRMPs and Drought Plans (i.e., those of Wessex Water, Thames Water, Severn Trent Water); Regional Plans; Environment Agency Drought Plans and River Basin Management Plans these are likely to be beneficial.

Potential Strategic Resource Options (SROs)³¹ relevant to the Bristol Water supply, for example those associated with the WCWRG Regional Plan (due to be published in 2024), include a second reservoir at Cheddar (Cheddar 2 Source and Transfer)³² and The Mendip Quarries SRO³³. The Poole Effluent Recycling scheme, which no longer forms part of the regional plan, is too distant to consider regarding cumulative effects. There could be cumulative effects with the Cheddar 2 Source and Transfer and The Mendip Quarries SROs. However, considering the type of activities associated with the Bristol Water WRMP24 such cumulative impacts are not considered significant, as most of these activities would be localised, small in scale and could be effectively mitigated through careful project management and best practice construction methods.

7.5.1.3 Cumulative Effects Assessment of other relevant programmes, plans and strategic projects

National planning policy guidance (for developers and inspectors) is set out in National Policy Statements (NPSs). A number of these NPSs have been published and set out the definition, and in some cases the location, of Nationally Significant Infrastructure Projects (NSIPs). Of the twelve NPS only two detail the location of options (Wastewater Treatment (England only) and Nuclear Power EN-6) and therefore the potential for cumulative effects can only be identified with respect to these.

The National Policy Statement for Wastewater states the policy of reducing demand for wastewater infrastructure by reducing domestic and industrial wastewater production and by implementation of Sustainable Urban Drainage Systems. Only two major infrastructure projects are put forward, both in the southeast of the UK and therefore are not relevant to the Bristol Water WRMP24; no cumulative effects are anticipated.

The Nuclear Power NPS (EN-6) sets out eight potentially suitable sites for the deployment of new nuclear power stations in England and Wales before the end of 2025. Of these sites, one site (Oldbury) is located within the Bristol Water supply area, whilst a second site (Hinkley Point) is located approximately 10km to the south-west of the Bristol Water supply area. The remaining sites are considered too distant from the Bristol Water supply area for cumulative effects to occur. Since the release of NPS EN-6, plans for a new nuclear power station at Oldbury-upon-Severn have been scrapped. Hinkley Point C is undergoing construction, with the expectation that it will be operational by summer 2027.

The draft National Policy Statement for Water Resources Infrastructure sets out the need and policies for development of NSIPs for water resources in England. Two NSIPs have currently been defined. These are the Cambridge Waste Water Treatment Plan Relocation (east of Cambridge) and the Thames Tideway Tunnel, beneath the Thames in Central London therefore are not relevant to the Bristol Water WRMP24; no cumulative effects are anticipated.

If a supply-side option includes development in a Local Authority, then that Local Authority’s Local Plan has been reviewed to consider potential cumulative with the Bristol Water WRMP24. There are a number of significant development projects, identified in the Spatial Strategies, that could have cumulative impacts with the proposed options within the WRMP24 (see Table 7-6). However, as identified in 7.5.1.1 cumulative effects are not considered significant, as most of the WRMP24 activities would be localised, small in scale and could be effectively mitigated through careful project management and best practice construction methods.

Table 7-6: Major Site allocations in relevant Local Plans

Local Authority	Areas of substantial development, as identified in Local Plan
Bath & North East Somerset	In the Bath & North East Somerset Local Plan, small sites are allocated for development in Midsomer Norton, Paulton, the eastern edge of Keynsham, Primrose Hill, Lower Weston and Odd Down.

³¹ The Strategic Water Resource Options (SROs) programme has been initiated by Ofwat to provide at least 1500MI/d of water to areas of England facing a water deficit. The SRO Programme includes 17 schemes which will be funded and assessed during AMP7 to determine the right portfolio of projects to be selected by Regional Plans ready for implementation in AMP8. Schemes are evaluated at a series of decision points (Gates) <https://www.ofwat.gov.uk/regulated-companies/rapid/the-rapid-gated-process/gate-two/>

³² <https://corporate.wessexwater.co.uk/media/3n0hq3ij/cheddar-sro-gate-2-report-nov-2022.pdf>

³³ <https://www.corp-cms-pp.ytlukltd.co.uk/media/cswiottl/mendip-quarries-sro-gate-2-report-jul-2023.pdf>

Local Authority	Areas of substantial development, as identified in Local Plan
Bristol	<p>The Bristol Local plan allocates sites for development in many areas of the city. Areas of the city, with development site counts, are as follows;</p> <p>Avonmouth & Kings Weston (5 sites), Henbury & Southmead (4 sites), Henleaze Stoke Bishop & Westbury-on-Trym (1 site), Horfield & Lockleaze (7 sites), Greater Fishponds (11 sites), Ashley Easton & Lawrence Hill (4 sites), St George (4 sites), Greater Bedminster (8 sites), Filwood Knowle & Windmill Hill (21 sites), Brislington (8 sites), Dundry View (6 sites), Hengrove & Stockwood (5 sites). These sites are allocated for housing, retail, community use, industry, warehousing, leisure and business.</p>
Mendip	<p>The Mendip Local Plan allocates areas immediately surrounding the following settlements for employment or housing development; Frome, Glastonbury, Radstock, Shepton Mallet, Street and Wells.</p>
North Somerset	<p>North Somerset Local Plan allocates the following sites for major housing development (over 100 dwellings);</p> <p>Weston-super-Mare: Winterstoke village at Weston Airfield, Parklands village, Westacres Caravan Park, Dolphin Square, Gas Works Winterstoke Road, Avoncrest Site south of Herluin Way, Station Gateway, Land north of Oldmixon Road.</p> <p>Nailsea: West of Engine Lane, Land at North West Nailsea, Youngwood Lane.</p> <p>Portishead: Marine View, Harbour Road.</p> <p>Other: Woodborough Farm at Winscombe, Arnolds Way at Yatton (phases 1 and 2), Pudding Pie Lane at Churchill, Land at North End Yatton, Land north of Greenhill Road at Sandford, Redwood Lodge at Failand.</p>
Sedgemoor	<p>Areas of new housing development are proposed on the western and eastern boundaries of Bridgwater, and on the western boundary of Cheddar. Land has been allocated to development for employment purposes in Puriton.</p>
South Gloucestershire	<p>Significant areas of new housing were allocated in the 2006-2027 Spatial Strategy in the following areas;</p> <p>The area to the south and west of Charlton Hayes / Patchway, east of Bristol Parkway train station, Emersons Green East, North Yate, and areas to the north and north-east of Thornbury.</p>

8. SEA OF THE WRMP24

8.1 THE PREFERRED PLAN

Whilst the initial primary criterion in selecting a programme of schemes to meet the supply-demand deficit over the planning period is whole-life cost (including any monetised values for environmental and social costs), the Environment Agency's WRPG and other WRMP guidance requires that other criteria should also be considered, including non-monetised environmental and social impacts, climate change and other risks and uncertainties.

The aim of the WRMP is to find the 'best value' programme of supply and/or demand options (the 'preferred plan') to maintain a supply-demand balance. The selection process is facilitated through programme appraisal modelling tools, which are designed to produce an optimised programme taking account of whole life cost and environmental considerations.

The preferred plan has been selected in accordance with Bristol Water's customer levels of service for water supply reliability in a cost-efficient and environmentally acceptable manner. The plan has focused on the delivery of government policy targets and regulatory expectations for leakage reduction and demand reduction, resulting in a resilient water supply service to customers. The plan takes a precautionary approach regarding potential water resource needs associated with sustainable abstraction and principle of Environmental Destination. If these targets are successfully delivered, Bristol Water is not forecasting the need for any further supply side options within the rWRMP24 planning period.

The options Bristol Water is proposing to implement are summarised in Table 8-1, which also includes the planned year of implementation. The preferred programme of options was reviewed (individually and cumulatively) to ensure that the effects of Bristol Waters WRMP24 have been identified, described and evaluated. The WRMP24 preferred plan is set out in Table 8-2 and this shows the assessed performance against each SEA objective.

Bristol Water's preferred final plan is predicated on the activity required to meet government policy target glidepaths of:

- Leakage: 20%, 30%, 37% and 50% reduction by 2027, 2032, 2038 and 2050 respectively.
- PCC: 122 litres per person per day by 2038 and 110 litres per person per day by 2050
- NHH Water Use: 9% and 15% reduction by 2038 and 2050 respectively
- Distribution Input: 9%, 14% and 20% reduction per head by 2027, 2032 and 2038 respectively. It is noted that Bristol Water have identified that in the face of current water demand there are no technical options available that can deliver the 9% reduction target by 2027. In light of the need to keep the WRMP24 affordable, Bristol Water have decided not to frontload the preferred plan and therefore do not expect to achieve a 14% reduction in Distribution Input by 2032. Neither of these will lead to any compromise in the resilience or sustainability of water supply.

Bristol Water plan to take an "intelligent pathway" to deliver this, giving incremental reduction in leakage across the planning period balancing deliverability, affordability, and intergeneration fairness. The same approach is proposed regarding per capita consumption, with a fifteen-year programme of universal smart metering between 2025 and 2040 and a steady reduction in demand that will also need government intervention on new standards for water efficiency. This also means the potential for negative cumulative effects are reduced as discussed in Section 8.2 below.

Table 8-1: Final planning options and implementation dates

Option ID	Option Name	Year of implementation
D001	Pressure management	2025
D002	Asset Renewal	2025
D006.3	Intensive ALC	2025
D009	Smart Metering	2025
D010.1	ALC Innovation – to drive ALC repair efficiency	2025
D010.2	AR Innovation – to drive Asset Renewal efficiency	2025
HH_E_016	Media campaigns to influence water use	2030
HH_M_009 (AMI) (15) (Enhancement)	Progressive smart metering automatic WCWR switch (HH_A_001) with Watersmart Technology (personalised billing, behavioural changes) (AMI)	2025
HH_P_002	Water labelling - with minimum standards	2026
HH_P_001	Change in WC Standards	2030
HH_P_005	New home standards	2030
NHH_A_001	Business Efficiency Visits (BEV) - water efficiency audit - in person audit, fix and retrofit, targeted at specific sectors/businesses	2025
NHH_E_002 (AMI)	SMART Online - Watersmart online tools and resources (AMI)	2025
NHH_N_002	Rainwater harvesting feasibility assessment and/or subsidised installation - target large water users	2025
C016	Water saving devices – waterless urinals	2025
NHH_T_003	Benchmarked rising block business tariffs	2030
P06	Catchment Management of Mendip Lakes	2025

Table 8-2: Preferred Programme (combination of options) Assessment

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	-	++	<p>Assuming the implementation of reasonable mitigation measures and the use of good construction practice the potential for effects on designated or non-designated sites are considered neutral.</p> <p>The catchment management option could result in low magnitude, minor effects on non-designated aquatic habitats or species. Water quality improvements as a result of the catchment management activities would have a positive impact on the biology within the targeted catchments.</p>
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	The potential for effects on natural capital, biodiversity net gain or ecosystems services are considered neutral due to the characteristics of the leakage reduction and demand policy delivery based options.
	1.3	To protect priority habitats and species	0	0	0	++	<p>Assuming the implementation of reasonable mitigation measures and the use of good construction practice the potential for negative effects on priority habitats and/or species is considered neutral.</p> <p>The catchment management option has potential to improve water quality which may result in a positive effect on aquatic priority habitats and species.</p>

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	The potential for increasing the risk of spreading INNS is considered neutral due to the characteristics of the options which do not present a INNS transfer risk.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	+	The leakage reduction and demand management options do not involve land take and the potential for negative effects on geomorphology, soil quality and geodiversity is considered neutral. The catchment management option would deliver to support to the agricultural sector and implementation would reduce the sources and incidents of soil contamination. This would have a positive effect on geology and soils, however this would be highly localised.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	-	++	Assuming the implementation of reasonable mitigation measures and the use of good construction practice effects on the quality of surface water and groundwater is considered neutral with respect to the leakage and demand management options. The catchment management option would primarily lead to water quality improvement in several catchments by reducing the nutrient contributions from diffuse sources.

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	++	<p>The reduction in leakage and reduction in customer demand as a result of the options included in the preferred programme will have a moderate positive effect of surface water flows and water resource levels by reducing the need for abstraction.</p> <p>The catchment management option could result in a minor reduction in flows in the rivers downstream of the reservoirs due to less abstraction outages. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	<p>Noting the characteristics of most of the options included in the preferred programme and assuming the implementation of reasonable mitigation measures and the use of good construction practice where construction is involved, no negative effects on flood risk are anticipated. The options in the preferred plan that involve the installation of rainwater harvesting systems could result in positive effects associated with attenuation of surface water runoff during rainfall events which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow.</p>

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
	3.4	To meet WFD objectives	0	0	0	++	<p>Noting the characteristics of most of the options included in the preferred programme and assuming the implementation of reasonable mitigation measures and the use of good construction practice, negative effects regarding WFD objectives are considered neutral. There may be indirect positive effects over the long term as a result of reduced pressure on the water environment.</p> <p>The catchment management option would improve surface water quality and may help address underlying causes for poor progress against WFD Good Ecological Status/Potential.</p>
Air Quality	4.1	To protect and enhance air quality	0	0	-	0	<p>There will be increases in vehicle movements associated with the options involved in the preferred programme. The significance of effect regarding emissions to air and air quality depends on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the effects on air quality are anticipated to be minor considering the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral after 2030 when it is assumed that electric vehicles will be used. It is noted that most of the options in the preferred</p>

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
							programme would be implemented in 2029 or later.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	---	0	Moderate to major negative effects are identified regarding greenhouse gas emissions. This includes those arising from embodied carbon associated with the materials involved (e.g., devices and pipework) across the range of options involved. There are also the greenhouse gas emissions associated with the use of vehicles over the period of the plan.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+++	Minor to major positive effects are identified with respect to improving resilience to climate change in relation to the reduction leakage and demand and resulting additional resource (>25Ml/d).
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+++	0	+++	Major positive effects are identified with respect to economic growth (noting that the effects were assessed using Capex as a proxy (as information regarding effects on jobs etc. are currently unknown). In operation, the improved continuity of supply and efficiency achieved by the options in the preferred programme, is expected to have a major positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	+	Noting the characteristics of most of the options included in the preferred programme and assuming the

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
							<p>implementation of reasonable mitigation measures and the use of good construction practice the potential for negative effects on tourism and recreation are considered neutral.</p> <p>The catchment management option may result in positive effects due to reduced risk of algal loads in the Mendip reservoirs. These reservoirs may provide opportunities for recreation, Therefore the improvements in water quality may result in minor positive effects on recreation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+++	<p>Based on the timing of implementation of the options in the preferred programme the cumulative impact of any noise/vibration disturbance and nuisance resulting from installation or transportation associated with the options involved are not expected to result in any significant effect on human health. In operation the reduction in leakage and demand achieved by the preferred programme of options will ensure continuity of supply of safe and secure drinking water. In light of this a moderate to major positive effect on human health and wellbeing is identified.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	--	0	0	+	<p>The options in the preferred programme would together result in an increase in resource use and some construction waste. However, in</p>

SEA Topic	SEA Objective		Construction impacts - negative	Construction impacts – positive	Operation impacts - negative	Operation impacts - positive	Effect Description
							operation the reduction in leakage and demand and increased water efficiency resulting from the options involved will together result in minor positive effects. These are associated with savings from the reduced treatment and pumping of water (e.g., chemical usage).
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	Noting the characteristics of most of the options included in the preferred programme and assuming the implementation of reasonable mitigation measures and the use of good construction practice the effects on cultural heritage assets is considered neutral.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	Noting the characteristics of most of the options included in the preferred programme and assuming the implementation of reasonable mitigation measures and the use of good construction practice effects on the local landscape or townscape are considered neutral.

8.2 CUMULATIVE EFFECTS ASSESSMENT

As the options in the preferred plan are the same as those assessed in the assessment of alternative programmes, the cumulative effects assessment is considered the same as that reported in Section 7.5.1. As such, the preferred plan is likely to have cumulative beneficial effects due to the demand management options acting in-combination to increase the overall demand savings and associated wider benefits. There is a small risk that simultaneous implementation of the leakage and demand management options could lead to cumulative adverse effects regarding disturbance to human health, air quality and greenhouse gas emissions as a result of certain activities occurring simultaneously. However, any such cumulative impacts are not considered significant, as most of these activities would be localised, small in scale and could be effectively mitigated through careful project management and best practice construction methods.

The demand management options included in the preferred plan would complement the demand management measures included in Bristol Water's Drought Plan and any cumulative effects are likely to be beneficial. Similarly cumulative effects of the Bristol Water WRMP24 with other water resource related plans are likely to be beneficial.

The potential for cumulative effects with other relevant programmes, plans and strategic projects are limited mainly because the location of other projects identified being some distance from the Bristol Water supply area. There are a number of significant development projects, identified in the Spatial Strategies of relevant Local Plans, which if implemented at the same time and location as options in the Bristol Water WRMP24 could result in cumulative effects. However, as is the case with the potential for cumulative effects between options in the Bristol Water WRMP24, such cumulative effects are not considered significant as most of the WRMP24 activities would be localised, small in scale and could be effectively mitigated through careful project management and best practice construction methods.

8.3 HRA, WFD ASSESSMENT AND BIODIVERSITY NET GAIN FINDINGS

As the WRMP24 preferred programme involves leakage reduction and demand options, with continuation of catchment management activities representing the only supply side option, there is limited potential for negative effects to the environment and the options fall out of the scope of the assessment for HRA, WFD and BNG assessments.

The conclusion of the HRA of the WRMP24 is that the plan will have no likely significant effects on any European site, either alone or in combination with any other projects or plans. Further details including assessment of the constrained list of options are provided within the HRA report¹⁰ which accompanies this Environmental Report and WRMP24. Similarly, no WFD assessment is required of the preferred plan as the options fall out of the scope of the WFD assessment. The preferred plan is therefore assessed as WFD compliant. Further details including assessment of the constrained list of options are provided within the WFD Assessment report¹¹ which accompanies this Environmental Report and WRMP24. No further BNG and NCA assessments are required beyond what is needed for the feasible option assessments, as stipulated within the WRPG.

9. MITIGATION AND MONITORING

9.1 OVERVIEW

Key stages of the SEA process include Task B5: Mitigating adverse effects, Task B6: Proposing measures to monitor the environmental effects of plan or programme implementation and Stage E: Monitoring the significant effects of the plan or programme on the environment. The sections below describe how these tasks have been addressed and how Bristol Water intends to ensure that mitigation measures are implemented for any adverse effects that are identified and the means by which the environmental performance of the WRMP24 can be assessed.

9.2 MITIGATION AND ENHANCEMENT

Mitigation may be defined as a measure to limit the effect of an identified significant impact or, through the most successful application, avoid the adverse impact altogether, the latter being the preferred option.

Consideration of mitigation measures has been an integral part of the SEA process and has informed development of the WRMP24. The SEA appraisals set out in Sections 6 and 7 above have been based on the assessment of residual impacts, i.e. those impacts likely to remain after the implementation of reasonable mitigation measures. Certain assumptions have been made regarding mitigation in carrying out the assessments, notably:

- Where suitable mitigation measures have been identified, these have been taken into account, such that the resultant residual impact has been determined in this SEA; and
- In line with recommendations made in the UKWIR SEA Guidance⁶, the SEA appraisals have assumed the implementation of reasonable mitigation measures such as operation of water sources in line with regulatory requirements, the use of good construction practice and mitigation measures such as:
 - Best practice mitigation measures;
 - Resources for construction of the scheme would be sourced locally where possible;
 - Footpath diversions established regarding construction work including pipelines; and
 - Siting of temporary and permanent works to minimise impacts on setting of heritage and landscape features.

The mitigation measures to address adverse residual effects as discussed further below, would, in some cases, be implemented through the planning process. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals. Mitigation measures for the SEA topic areas under which negative residual effects have been identified are summarised below:

9.2.1 Air Quality

With regard to the potential for effects on air quality, the following measures should be considered:

- Bristol Water should consider the use of fuel efficient or diesel-free plant and the implementation of a Dust Management Plan;
- Works in AQMAs should be avoided wherever possible.

9.2.2 Effects on Human Health and Socio-Economics

Bristol Water and all associated contractors are enrolled in the Considerate Constructors Scheme, a voluntary scheme which commits those contractors in the Scheme to be considerate and good neighbours, as well as clean, respectful, safe, environmentally conscious, responsible and accountable. The following measures should be considered:

- care should be taken to avoid works near to the most sensitive health receptors;
- routing of traffic to avoid sensitive receptors and the timing and phasing of HGV movements to avoid peak traffic hours;
- construction work should not occur outside of sociable hours as defined by the Local Authority (usually 0800-1800 Monday-Friday and 0800-1300 Saturday).
- Construction should prevent impacts on recreational assets as far as it reasonably practicable.

To maximise economic benefits in the Bristol Water area, it is recommended that, where possible, work is carried out by local firms and contractors or by those with a policy for training and skills development that could help contribute to the local economy and meet employment needs. Where possible, Bristol Water should seek to use locally-sourced materials.

9.2.3 Effects on Climate Change and Material Assets

To help Bristol Water respond to the challenges of reducing greenhouse gas emissions, a Carbon Management Plan should be developed. This should be consistent with the Water UK Net Zero 2030 Route Map³⁴ and could include:

- Green electricity generation;
- Encouraging customers to reduce their energy usage;
- Consideration of routes for carbon dioxide removal.

Design measures should be adopted to ensure the long-term resilience of infrastructure to the effects of climate change. Where significant raw materials are required for options, this can be mitigated by utilising recycled and locally sourced materials. Construction and operational wastes should also be reused/recycled where appropriate.

9.3 MONITORING

A key stage of the SEA process with regard to monitoring is Stage E: Monitoring the significant effects of the plan or programme on the environment. The sections below describe how this task has been addressed and how Bristol Water proposes to monitor the effects of implementation of the WRMP24, noting that range and significance of effects are limited due to the nature of the options involved in the preferred plan.

Once the WRMP24 is implemented and specific options deployed, its effects on the environment and people will need to be taken into account. In this regard, it is a requirement of the SEA Regulations to establish how the significant effects of the WRMP24 will be monitored. Monitoring can help to answer questions such as:

- Were the SEA predictions of effects accurate?
- Are mitigation measures performing as well as expected?
- Are there any adverse effects? Are these within acceptable limits, or is remedial action desirable?

It is not necessary to monitor everything or monitor an effect indefinitely. Instead monitoring should be focussed on:

- significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused; and
- significant effects where there was uncertainty in the SEA and where monitoring would enable preventative or mitigation measures to be undertaken.

Bristol Water expects to monitor the effects of the WRMP24 alongside the other impacts of its operations, and as such, is likely to rely on existing sources of information that are collected either by Bristol Water or by other relevant organisations such as the Environment Agency or Natural England. For example, Bristol Water collects data for the annual review process (the Annual Performance Report submitted to Ofwat) on an ongoing basis.

Table 9-1 lists the key receptors identified by the SEA of the WRMP24 as potentially being impacted and therefore should be included within the monitoring programme where it is practicable to do so. Extensive primary data collection is neither feasible nor appropriate for this programme level of monitoring, and use should be made where possible of existing datasets and monitoring regimes.

³⁴ Water UK – Net Zero 2030 Routemap: <https://www.water.org.uk/routemap2030/wp-content/uploads/2020/11/Water-UK-Net-Zero-2030-Routemap.pdf>

Table 9-1: Proposed SEA monitoring parameters – strategic WRMP monitoring

Impacted receptor	Proposed strategic indicators
Water resources	River flows, river levels, lake and reservoir levels. Groundwater levels. Surface and ground water quality (including proportion of surface water and groundwater bodies at 'Good; WFD status)
Climate Change	Net greenhouse gas emissions per million litres (MI) of treated water (kg CO ₂ equivalent emissions per MI) for Bristol Water supply area Energy use used in the operation of options. Renewable energy generated or purchased by Bristol Water.
Transport	Transport fleet fuel consumption, emissions and business mileage, as monitored by Bristol Water
Nuisance/ Community/ Local Economy	Scheme level community disruption of capital works would be monitored through an Environmental Monitoring Plan if required. Number of nuisance-related complaints (e.g., noise, dust) logged with Bristol Water and Local Authority EHOs. Responses gauged through Bristol Water customer satisfaction surveys. Community investment, employee volunteering and match funding by Bristol Water.
Waste and resource use	Leakage Water saved through demand management / water efficiency measures. Amount of recycled / re-used materials. Proportion of waste sent to landfill. Chemical usage in water treatment.
Air Quality	Scheme related issues of capital works would be monitored through an Environmental Monitoring plan if required. Changes in air quality are monitored by the Automatic Urban and Rural Network ³⁵ administered by Bureau Veritas, and this data would be available if required to inform a baseline

The SEA Regulations states that monitoring must enable appropriate remedial action to be taken. For the monitoring programme to be effective, there must therefore be a mechanism in place to detect trends and to ensure that action is taken where trends are progressively adverse.

Five-yearly assessment of monitoring and any measures taken would be included within the SEA for the subsequent WRMP development. Through the proposed monitoring and analysis of the results obtained over the five-year period, the SEA will inform and influence the development of the WRMP for future periods.

³⁵ Accessed at <http://www.bv-aurnsiteinfo.co.uk/>

10. CONCLUSIONS AND NEXT STEPS

10.1 CONCLUSIONS

The preferred plan is focused on the delivery of government policy targets and regulatory expectations for leakage reduction and demand reduction, resulting in a resilient water supply service to customers. A set of leakage and demand policy delivery options maintain the supply-demand balance deficit for the planning period (to 2080). These options result in limited negative effects to the environment and society. Negative effects that have been identified are associated with the material use and carbon emissions involved in producing the component parts and transport required to implement the options. Positive effects of the preferred plan are associated with economic and social wellbeing in local communities and the abstraction of less water from the environment. The only supply side option included in the plan is the Catchment Management of the Mendip Lakes option, which provides a wide range of environmental effects, for example regarding nutrient management, soil management and water resources. This results in predominantly positive, localised effects.

Noting the characteristics of the options in the preferred plan, the WRMP24 is compliant with regards to the Habitats Directive and associated national Habitats Regulations, WFD Regulations and associated objectives, and Bristol Water's responsibilities under the Environment Bill with respect to biodiversity enhancement.

10.1.1 Quality Assurance

ODPM Guidance on SEA³ contains a quality assurance checklist to help ensure that the requirements of the SEA Regulations are met. The checklist is reproduced in Appendix 5, demonstrating how this Environmental Report meets the requirements.

10.2 NEXT STEPS

Public consultation on the dWRMP24 was run for a period of 12 weeks from 28th November 2022 to 17th February 2023. Feedback from the consultation on the Environmental Report has been considered by Bristol Water and incorporated into a formal Statement of Response, setting out how the feedback has been used in the finalisation of the WRMP24 and where relevant in this updated SEA Environmental Report. The Statement of Response was published in August 2023. A rdWRMP24 and updated supporting environmental assessments, including this Environmental Report, was submitted to the regulators in April 2024. Bristol Water received permission to publish its plan as final in a letter from Defra dated 21 August 2024. This Environmental Report supports the Final WRMP24 which will be published in October 2024.

In accordance with the requirements of SEA Regulation 16 (4)), an SEA Post Adoption Statement will be published alongside the final WRMP24, (to meet. This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have influenced the final plan.

APPENDICES

A1 Appendix 1 Consultation Responses

The Bristol Water WRMP SEA Scoping Report was published by Bristol Water March 15th 2022. This was issued as a consultation document to statutory consultees. Once responses were received, the scope and approach was edited where necessary, and this Environmental Report was edited in response to many. Table A- 1 contains a complete list of every consultation comment received in response to the consultation, and a subsequent response from the authors of the Scoping Report / Environmental Report, including where an edit to the environmental report has been made in response.

Table A- 1: Consultation responses to the BW WRMP SEA ER Scoping Report, from statutory consultees

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Historic England	<p>Section 3 identifies a number of key Plans, Policies and Programmes relevant to the Archaeology and Cultural Heritage SEA Topic supplemented by Appendix A. While we are in broad agreement with the thrust of the key messages and objectives, this list is out of date in places and could do with a refresh. Here are some examples:</p> <ul style="list-style-type: none"> • Ancient Monuments and Archaeological Areas Act 1979 not mentioned; • Marine and Coastal Access Act 2009 not mentioned; • National Planning Policy Framework (NPPF) 2021 is the latest version; • Heritage Statement: One Year On; • Heritage Statement: One Year On (2018) is the most recent document setting out the Government’s vision and strategy for the historic environment; • Several more development plans with relevant historic environment policies are now adopted within the WRMP area as well as the adopted South West Marine Plan (2021); • Historic England has a new climate change land page on our website with extensive advice – there are also updated pages on climate change impacts, effects and responses available here; • Our publication GPA2: Managing Significance in Decision Taking in the Historic Environment (2015) and HEAN 12: Statements of Heritage Significance (2019) could be usefully mentioned; • Heritage at Risk register (2021) is the latest version; and • It would be worth mentioning the Historic Environment Records within the WRMP area, including the Bristol HER. <p>Some of the publications mentioned above in respect of the pre-consultation letter may also be of assistance.</p>	<p>Appendix 2 of the Environmental Report has been edited to include these recommendations. We note that the South West Heritage at Risk Register has already been included in our Policies, Plans and Programmes List.</p>

³⁶ References to passages of text in this column are in reference to text in the Bristol Water WRMP24 SEA Scoping Report

³⁷ Reference to passages of text in this column are in reference to text in this Environmental Report

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Historic England	Section 4.8 contains the baseline information for cultural heritage. In 4.8.1, we really welcome the appreciation that the implementation of WRMP options could affect historic landscape and townscape character as well as heritage assets and their settings. We are particularly pleased to see mention of how some archaeological sites and remains can be particularly sensitive to changes in water quality and water levels, including waterlogged archaeological deposits and remains that may be of paleoenvironmental interest. Some examples could be included here, e.g., Somerset Levels and Moors, which are referred to in 4.9.1. There are, of course, strong inter-relationships between landscape/townscape character and the historic environment, and hence between sections 4.8 and 4.9 of the Scoping Report.	Noted with thanks. Section A3.8 of the Environmental Report has been edited to include these suggestions.
Historic England	Drawing upon some of the Historic England advice mentioned above, you may also wish to give slightly greater consideration to parts of the existing water supply system being heritage assets, e.g., the Gloucester and Sharpness Canal. Parts of this are in conservation areas and the Canal is also home to several individually designated and related listed buildings.	Section A3.8 of the Environmental Report has been edited to include this recommendation
Historic England	We would also prefer to see the use of the NPPF terms 'designated' and 'non-designated heritage assets' in section 4.8.1. The latter term encompasses both 'known' non-designated heritage assets, such as locally listed buildings and assets of archaeological interest, as well as 'unknown' archaeological sites, remains and deposits, including those found in areas of high potential. The NPPF is also clear that heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments should be considered as if they were designated heritage assets. Local Authority websites and HERs can be useful information sources for non-designated heritage assets, as well as the Intertidal and Coastal Peat Database.	Comment has been accepted and section A3.8 of the Environmental Report has been edited to include this change.
Historic England	Section 4.8.2 needs a minor update to reflect the NPPF 2021. Key paragraphs to mention would 189, 190 and 199-203. This section would also benefit from more updated Historic England information and advice on climate change impacts and responses available here in addition to the reference to effects already included.	Comment has been accepted and section A3.8 of the Environmental Report has been edited to include this change.
Historic England	In respect of 4.9 (baseline information for landscape and visual amenity), we welcome much of the content and in particular we are pleased to see the need to protect and improve the character of landscapes and townscapes identified as a key issue at 4.9.3.	Noted with thanks.
Historic England	Section 5.1 sets out the proposed SEA objectives and associated key questions. In relation to cultural heritage SEA Topic, we welcome objective 8.1. We would, however, suggest some minor wording changes to better reflect the terminology used in the NPPF 2021 as follows:	Comment has been accepted and objective 8.1 has been edited to include this change.

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
	To conserve and enhance the significance of designated and non-designated heritage assets and their settings.	
Historic England	We largely agree with the associated key questions but suggest again that the term 'heritage assets' is used instead of 'historic assets'.	The comment has been accepted and the term 'heritage assets' is used instead of 'historic assets' in the key questions (shown in table 5.1).
Historic England	We are happy with the wording of SEA objective 9.1 and the associated key questions for landscape and visual amenity. You may just wish to consider where Registered Parks and Gardens and other historic parks and gardens are going to be considered – either under 8.1 as heritage assets and / or under 9.1 as areas of landscape. Perhaps they could be included as examples under 8.1?	After consideration, Registered Parks and Gardens will be addressed as heritage assets under objective 8.1
Historic England	Section 5.2 outlines the proposed framework for the assessment of the WRMP options. We do not have detailed comments to make on this. Given the last paragraph of 5.2.1.1, however, we recommend that SEA process considers the likely effects of the options on the significance of all types of designated heritage assets and non-designated heritage assets, including those of heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments. You may need consultant archaeological advice to help with this, depending on the options under consideration. Local authority conservation and archaeology advisers may also be able to assist.	The SEA process is not limited to identifying the likely effects of the options on designated heritage assets. However, it is a strategic level assessment of alternative options based on available open-source information. Consultation to gain archaeological advice on non-designated heritage assets is considered beyond the scope of the SEA.
Environment Agency	Percentage values provided of water taken from surface water, groundwater and canal differs in these locations in the report	Sections A3.3.1.1 and A3.3.1.3 of the Environmental Report have been edited to correct this inconsistency.
Environment Agency	Section 0, this should be Section 4.	This has been noted. Section 4 of the Scoping Report is predominantly in Appendix B of this Environmental Report.
Environment Agency	Report says 'Following comments on the on the draft WRMP and SEA Environmental Report' one of the 'on the' needs removing	Noted this has been corrected for the Environmental Report. Change made in Section 2.1
Environment Agency	Could information on baseline flows be included – e.g., a map of areas already under flow stress, what flows currently are, where flow is being measured (data availability), how are flows predicted to change in the future given climate change, any additional restrictions on flow in the future (e.g., increased environmental protection) etc	Comment has been accepted and an appropriate figure (Figure A-6) has been included in Section A3.3.1.2.
Environment Agency	Intermittent storm overflows are mentioned as a key pressure. There is a consultation currently open on the Storm Overflows Discharge Reduction Plan. Does this need to be taken into account?	Comment has been accepted and section A3.3.3 of the Environmental Report includes this suggestion regarding the future baseline.

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Environment Agency	One of the Key Questions is 'Will the option result in changes to river flows?' when assessing this you will require flow data. What methods are you going to use for this? Also, if there is an impact on flows what will you use as acceptable reductions?	The SEA will use information from the WFD assessment for this Key question and commentary for the related objective. The method used is outlined in the WFD Assessment Report ¹¹ . The assessment will be made against available data. That will be either a bespoke study (e.g. WINEP investigation, SRO investigation), where that is not available against measured information on gauged river flows. The assessment in the WFD assessment is of potential for risk of hydro-ecological change (for WFD biological status) and risk of physico-chemical water quality change based on changes to pressures (including those identified by the RBMP RNAG assessment). The hydrological effect against CAMS EFI will not be presented as that does not convey adequate information from which to assess WFD compliance risk.
Environment Agency	Provide clarity on which key issues are to be scoped in or out of the SEA. If no issues are to be scoped out at this stage, then it would be helpful for the reader to state this clearly.	Noted, based on the fact that all SEA topics are relevant and the options had not been confirmed at the time of writing no issues are to be scoped out. Section 1.2 of the Environmental Report includes a statement to highlight this for clarity.
Environment Agency	Are the Internal Drainage Board involved in conversations with you? How they manage their system could impact upon water availability / flows.	The Internal Drainage Board were contacted as part of the consultation process, but no response was received. However, conversations are ongoing through the WINEP regarding sources which affect flows on the Somerset Levels and Moors. This is to understand how flows are managed through structures and whether Bristol Water abstractions have an influence on those flows.
Natural England	Biodiversity, flora and fauna: We acknowledge that a thorough list of 'policies, plans and programme key	Comment has been accepted and Appendix 2 of the

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
	<p>messages’ has been included in section 3.1 for biodiversity. However, whilst we acknowledge that Bristol Water PLC have considered the requirements of the Water Resource Management Plan linked to the Environment Act 2021, we advise that this should also be referenced in the table of Appendix A of the Water Resource Management Plan SEA Scoping Report.</p>	<p>Environmental Report includes this reference.</p>
<p>Natural England</p>	<p>Biodiversity, flora and fauna: There seems to be some disparity between the SEA objectives and the baseline key issues and indicator questions. For example, climate change is mentioned in the baseline key issues – but this is not translated into the SEA objectives. Climate change poses a significant risk to the water environment and water resources. As such, Bristol Water PLC may need to consider the exacerbation of water resource stresses from climate change and how this may influence the scale of risk from its activities. Natural England has prepared a Climate Change Adaptation Manual to help partners to identify and support habitats and species to adapt to climate change. This document could be useful when assessing the scale of potential additional risk water resource options could have, particularly during a drought.</p>	<p>The SEA objectives provide a means by which the environmental performance of the plan and alternatives can be assessed, they therefore allow for a large range of potential effects to be identified and for that reason are relatively broad according to each SEA Topic. However, the key issues have been updated and additional key questions included for appropriate Biodiversity, flora and fauna objectives to ensure that all the relevant aspects are considered.</p>
<p>Natural England</p>	<p>Biodiversity, flora and fauna: We note in the separate ‘Climate Change’ SEA topic area, there is reference to the UK Climate Change Risk Assessment (CCRA3) which recognises climate change risk to sensitive habitats, however this does not appear to be fully captured within the SEA baseline, particularly when considering protected sites.</p>	<p>Comment has been accepted and sections A3.1.5, A3.3.2 and A3.5.1.2 of the Environmental Report now better capture this.</p>
<p>Natural England</p>	<p>Biodiversity, flora and fauna: Throughout the other SEA topics there is mention of how the plan will contribute to their resilience in an uncertain future. Natural England would encourage Bristol Water PLC to identify areas where habitat improvement works may help to provide resilience to increased stress from abstraction pressure. Whilst we acknowledge the report mentions in section 6.1 how ecosystem resilience is considered in light of biodiversity net gain, the plan should also consider how designated sites and priority habitats affected by abstraction can be protected from droughts and climate change.</p>	<p>Bristol Water are working on their WINEP for PR24 and currently proposed to include Environmental Destination investigations at all of their abstractions to determine the long-term water resources needs of the environment in the context of climate change and to understand the potential impacts on abstractions.</p>
<p>Natural England</p>	<p>Biodiversity, flora and fauna: Within the key messages and objectives of Table 5-1, it states “enhance coherent ecological networks, including provision for fish passage and connectivity for migratory / mobile species” as well as “A need to protect the green infrastructure network”. Whilst Natural England are supportive of this sentiment, we advise the key questions are not restricted to addressing SEA objective 1.2 but looks into complimenting objectives 1.1 and 1.3 to support designated sites and priority habitats.</p>	<p>Comment has been accepted and the key questions of relevant objectives have been updated to accept this.</p>

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Natural England	<p>Soil, geology and land use: Impacts from new water resource options including SROs should be considered in light of the Government's policy for the protection of the best and most versatile (BMV) agricultural land as set out in paragraph 170 of the NPPF. We also recommend that soils should be considered in the context of the sustainable use of land and the ecosystem services they provide as a natural resource, as also highlighted in paragraph 170 of the NPPF.</p>	<p>Soils and BMV land will be considered (there is an existing key question to guide the assessment in light of this: 'Will the option maintain the quality of Best and Most Versatile Agricultural Land?').</p>
Natural England	<p>Soil, geology and land use: We are aware of options for large infrastructure development within Bristol Water's supply zone including Cheddar II and Mendip Quarries. Whilst we know these projects do not solely belong to Bristol Water, they should still be included within the SEA if there is a potential they will be used to supply their customers.</p>	<p>Consideration of these schemes will be included in the SEA. If they form part of the plan to maintain a balance between reliable supply and demand supply to Bristol Water customers, they will be assessed with the other feasible options Bristol Water identified.</p>
Natural England	<p>Water: Natural England advise that water dependant SSSIs, European sites and Ramsar sites will need to be considered within this section of the SEA to ensure that requirements contained within the relevant legislations are met. We mention this as WFD is referenced within this section, but nature conservation designations appear not to be.</p>	<p>The actual effects to sites designated for nature conservation will be captured under the SEA Biodiversity topic (specifically objective 1.1) not the water topic. There is the need to avoid double counting effects.</p> <p>An additional key question has been added to objective 3.1 under the SEA Water topic to capture the potential for effects regarding the attainment of objectives for WFD protected areas, which include water dependent SSSIs, SACs and SPAs.</p>
Natural England	<p>Water: We advise that this section mentions that water resource required to achieve / maintain favourable condition for SSSIs as well as restoring the ecological function and ecosystem services provided by peatlands / wetlands.</p>	<p>Comment has been accepted and section A3.3.1.5 of the Environmental Report now highlights this. In terms of assessment and considering any effects on SSSIs as well as restoring the ecological function and ecosystem services provided by peatlands / wetlands, this will be captured under other relevant SEA topics (Biodiversity, flora and fauna). There is the need to avoid double counting effects.</p>

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Natural England	<p>Water: There should be an ambition within the SEA objectives to establish more natural flow regimes in the rivers affected by Bristol Water’s operations. Compensation flows should reflect natural seasonal variations to allow natural river processes to occur and create suitable habitat for aquatic flora and fauna including migratory fish species.</p>	<p>The SEA of Bristol Waters WRMP24 informs the consideration of each option and the programme appraisal process, as well as development of the overall WRMP. While Bristol Water are investigating and trialling options to establish more natural flow regimes in the rivers affected by their operations (downstream of Chew and Blagdon Reservoir) including it as an ambition within the objectives is beyond the scope of the SEA.</p>
Natural England	<p>Climate Change: Natural England reiterate the comments that we made in reference to climate change adaptation under ‘Biodiversity, flora and fauna’. Section 4.7.1.3 discusses climate change in more detail, but Natural England does not consider that this section fully captures the impacts that climate change could have on water dependant habitat resilience. For example, the last baseline key issue mentions “The need to increase environmental resilience to the effects of climate change.” Natural England would prefer this to have additional focus on natural ecosystems and be reflected in the SEA objectives. We advise the need to enhance the resilience of natural ecosystems to climate change now, prior to engaging in new business activities for the benefit of wildlife as well as the human population.</p>	<p>Key questions of relevant objectives under the Biodiversity, flora and fauna Topic have been updated (as described in responses above). The objective “The need to increase environmental resilience to the effects of climate change” under the Climate Change Topic has been kept broad to ensure capture of a wide range of potential effects. There is also the need to avoid double counting effects.</p>
Natural England	<p>Climate Change: We note that Bristol Water PLC has acknowledged there are current threats due climate change as the first paragraph in Section 4.7.1.3 states “The UK Climate Change Risk Assessment (CCRA) 2021..., ...draws together and interprets evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100”. However, in Table 5-1, there is little mention of current threats apart from “The need to increase environmental resilience to the effects of climate change”. This is slightly misleading as it implies that climate change is mainly a future issue. The reality is that we are seeing the effects of climate change now, and all sectors need to acknowledge this and take action, not only in terms of carbon mitigation, but also to actively enhance and adapt ecosystems to tackle the contemporary issues they are facing. We advise that this is expanded on within the Water Resource Management Plan’s SEA, especially given the risk that climate change puts on water resources and the need to balance sustainable water abstraction with environmental health.</p>	<p>Key questions of relevant objectives under the Biodiversity, flora and fauna Topic have been updated (as described in responses above). The objective “The need to increase environmental resilience to the effects of climate change” under the Climate Change Topic has been kept broad to ensure capture of a wide range of potential effects. There is also the need to avoid double counting effects.</p> <p>Text in Section A3.5.3 of the Environmental Report has been amended to make it clearer that the assessment considers both present and</p>

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
		future effects of climate change.
Natural England	<p>Climate Change: It is not clear whether the key questions for climate change in Table 5-1 capture to the impact which future water resource options, including SROs have on carbon sequestration, for instance; the loss of peatland or woodland. Natural England want to reiterate the importance of including these measures in the assessment.</p>	<p>The assessment of options, including SRO's as appropriate, will capture the potential effects on carbon sequestration by objective 5.1 in terms of construction for example the key question "Will the option reduce or minimise greenhouse gas emissions?" will prompt the assessor to identify the potential for carbon emissions associated with disturbance of peatland and woodland. In operation the key question will prompt the assessor to identify any residual loss of habitat and associated adverse effects regarding net carbon storage and sequestration capabilities.</p>
Natural England	<p>Climate Change: The following may be useful resources that Bristol Water PLC could use in order help with climate change assessments: Committee on Climate Change Net Zero Report and the Met Office 2018 UK Climate Predictions (UKCP18)</p>	Comment noted.
Natural England	<p>Landscape and visual amenity: The SEA will need to undertake a Landscape and Visual Impact Assessment (LVIA) for any future water resource options which may result in significant infrastructure development in or in the setting of an Area of Outstanding Natural Beauty (AONB). This will only be necessary if there is any work that may be required as part of the Water Resource Management Plan that would influence an AONB.</p>	<p>Landscape and Visual Impact Assessment is beyond the scope of the SEA which in general aims to identify potential environmental concerns associated with plans and programmes at a strategic level to help assess a range of potential alternatives. It is not designed to provide a detailed assessment of impacts at the project level.</p>
Natural England	<p>Proposed Framework for Assessment: Natural England has reviewed the proposed assessment framework as outlined in section 5.2 of the Water Resource Management Plan Scoping Document. We consider that the proposal seems appropriate and should ensure that all water resource options are suitably reviewed against the SEA objectives outlined.</p>	Comment noted. No response required.
Natural England	<p>Proposed Framework for Assessment: The significance matrix provided in figure 5.1 and explained in paragraph 5.2.1.1 is very clear as is the visual evaluation (VE) matrix provided in table 5.4 and Natural England consider that this will help summarise the results of the SEA very clearly per water resource option.</p>	Comment noted. No response required.

Author	Consultation Comment ³⁶	Amendment in Environmental Report ³⁷
Natural England	<p>Secondary, Cumulative and Synergistic Environmental Effects</p> <p>Natural England broadly agree with the cumulative assessments proposed in section 5.2.2 of the Water Resource Management Plan scoping document. However, we would advise that the following should also be considered when reviewing the Water Resource Management Plan and the options therein:</p> <ul style="list-style-type: none"> We advise that point 2 and 3 expands to identify any relevant plans and projects that may be put in place during the period projected in WRMP24, including other Water Company Plans, Local Authority Plans and reviews how development and agriculture over the plan period may change local water budgets. <p>While we acknowledge that the Water Resource Management Plan will not directly contribute to the creation of Nature Recovery Networks (NRNs), it is likely that local boroughs and districts will start investing in this work over the coming years, and as such these plans will need to be considered in tandem with any actions taken.</p>	<p>Comment has been accepted and section 7.5 and 8.2 of the Environmental Report includes these additional considerations regarding Secondary, Cumulative and Synergistic Environmental Effects.</p>
Natural England	<p>Other Comments: Whilst Natural England acknowledge it is the remit of the West Country Water Resource Group (WCWRG) to implement actions for Environmental Destination, this should be referred to within Bristol Water's WRMP24 and the SEA where necessary. This may be particularly relevant as the Bristol Avon is one of the focus catchments selected by them.</p>	<p>Comment has been accepted and actions for Environmental Destination are highlighted in section 2.3.2 of the Environmental Report (as well comprehensively documented in the draft WRMP24).</p>
Natural England	<p>Other Comments: In relation to the previous comment, we also advise there is reference to water resource need for the recovery of peatlands, particularly those of the Somerset Levels and Moors and North Somerset Levels and Moors. Although the restoration will fall within the remit of WCWRG through their environmental destination work, we advise that Bristol Water's Water Resource Management Plan takes consideration for this water resource requirement and reflect it within the SEA.</p>	<p>The water resource need for the recovery of peatlands, particularly those of the Somerset Levels and Moors and North Somerset Levels and Moors, will be considered in the SEA regarding any options that have the potential to result in adverse (or beneficial) effects.</p>
Natural England	<p>Other Comments: Some of the language used in the SEA objectives should be more ambitious. For example, within the 'Material Assets' topic "Maintain a reliable public water supply..., ...whilst seeking to maintain a healthy water environment." Typically, water environments are not in a suitably healthy condition to be maintained but are in desperate need of improvement. See also within the topic of 'Human Health and Socio-economics' one objective states "Prevent deterioration of water quality status" among other examples of where environmental gain should be the target, not maintaining the status quo or preventing further deterioration.</p>	<p>Comment has been accepted and a number of updates have been made in the Environmental Report where appropriate.</p>

A2 Appendix 2 Review of Policies, Plans and Programmes

The findings of the review of policy, plans and programmes are set out below. The purpose of the review and a summary of the key findings are set out in Section 3 of this Report. Table A-2 sets out the purpose and objectives of the policy, plans and programmes, their potential relationship with Bristol Water's Water Resource Management Plan and the potential implications for the objectives of the SEA.

Table A-2: Policies, plans and programmes reviewed during the writing of the SEA and ER

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
International	
<i>Ramsar Convention (1971) The Convention on Wetlands of International Importance</i>	
<p>The Convention on Wetlands (Ramsar, Iran, 1971) (the "Ramsar Convention") is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. Ramsar sites within Bristol Water's SEA Assessment area include the Severn Estuary and the Somerset Levels.</p>	<p>The impacts of the Water Resource Management Plan options on important wetland habitats must be considered as part of the SEA.</p>
<p>The World Heritage Convention (UNESCO) 1972 – a global instrument for the protection of cultural and natural heritage.</p>	
<p>A global instrument for the protection of cultural and natural heritage. Signatories commit themselves to refraining from 'any deliberate measures which might damage, directly or indirectly, the cultural and natural heritage' of their World Heritage Sites. The city of Bath is the closest UNESCO designated site.</p>	<p>The Water Resource Management Plan and SEA should take account of the need to protect scheduled monuments and archaeological areas.</p>
<p>The Bern Convention (1979) <i>The Convention on the Conservation of European Wildlife and Natural Habitats</i></p>	
<p>International convention which aims to ensure conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices.</p> <p>Enforced in European legislation through the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).</p>	<p>The implementation of the Water Resource Management Plan may influence biodiversity in the south west of England and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
<p>The Bonn Convention (1983) <i>The Convention on the Conservation of Migratory Species of Wild Animals</i></p>	
<p>Aims to conserve terrestrial, marine and avian migratory species by protecting endangered, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger such species.</p> <p>Enforced in European legislation through the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).</p>	<p>The implementation of the Water resource management Plan may influence biodiversity in the south west of England and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
<p>Granada Convention (1985) <i>Convention for the Protection of the Architectural Heritage of Europe</i></p>	
<p>To reinforce and promote policies for the conservation and enhancement of Europe's heritage.</p>	<p>The SEA should take into account the need to conserve heritage.</p>
<p>The European Convention on the Protection of Archaeological Heritage (Valetta Convention) (1992)</p>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>This Convention sets out a revised body of new basic legal standards for Europe to the previous Granada Convention, to be met by national policies for the protection of archaeological assets as sources of scientific and documentary evidence. It makes the conservation and enhancement of the archaeological heritage one of the goals of urban and regional planning policies.</p>	<p>The SEA should take into account the need to conserve heritage.</p>
<p>European Commission (1991), <i>Urban Waste Water Treatment Directive (1991/271/EC)</i></p>	
<p>The Directive’s objective is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of domestic waste water, mixture of waste water and waste water from certain industrial sectors.</p>	<p>The SEA should seek to maintain, protect and improve water quality across the region.</p>
<p>European Commission (1991) <i>The Nitrates Directive (91/676/EEC)</i></p>	
<p>The Nitrates Directive is designed to reduce water pollution caused by nitrate from agriculture. The directive requires Defra and the Welsh Assembly Government to identify surface or groundwaters that are, or could be, high in nitrate from agricultural sources.</p> <p>Once a water body is identified as being high in nitrate all land draining to that water is designated a Nitrate Vulnerable Zone. Within these zones, farmers must observe an action programme of measures which include restricting the timing and application of fertilisers and manure and keeping accurate records.</p>	<p>The Water resource management Plan should be consistent with the aim to reduce water pollution caused by nitrate from agriculture.</p> <p>The SEA assessment framework should include water quality.</p>
<p>Valletta Convention (1992) <i>Convention on the Protection of Archaeological Heritage of Europe (revised)</i></p>	
<p>The Valletta Convention is one of a series of Conventions for the protection of the cultural heritage produced by the Council of Europe over the last fifty years.</p>	<p>The SEA should take into account the need to conserve heritage.</p>
<p>European Commission (1992) <i>Habitats Directive (1992/43/EC)</i></p>	
<p>The aim of the Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance.</p>	<p>The impacts of the Water resource management Plan options on internationally designated sites and species must be considered as part of the SEA.</p>
<p>United Nations (1992), <i>Convention on Biological Diversity (CBD)</i></p>	
<p>The main objectives are:</p> <ul style="list-style-type: none"> • Conservation of biological diversity • Sustainable use of its components • Fair and equitable sharing of benefits arising from genetic resources 	<p>The commitment to conserving biological diversity must be considered in any Water resource management Plan options and the SEA should seek to promote the protection and enhancement of biodiversity.</p>
<p>United Nations Economic Commission for Europe (1998) <i>Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters</i></p>	
<p>The Aarhus Convention grants the public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning</p>	<p>The Convention is designed to improve the way ordinary people engage with government and</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>the local, national and transboundary environment. It focuses on interactions between the public and public authorities.</p> <p>The Aarhus Convention has been ratified by the European Community, which has begun applying Aarhus-type principles in its legislation, notably the Water Framework Directive (Directive 2000/60/EC).</p>	<p>decision-makers on environmental matters. It helps to ensure that environmental information is easy to get hold of and easy to understand.</p> <p>The SEA should seek to provide easily understood information to the public on the environmental implications of the Water resource management Plan and its constituent options.</p>
<p>European Commission (1998), <i>Drinking Water Directive (1998/83/EC)</i></p>	
<p>The objective of the Drinking Water Directive is to protect the health of the consumers in the European Union and to make sure the water is clean and of good quality.</p> <p>To make sure drinking water everywhere in the EU is healthy, clean and tasty, the Drinking Water Directive sets standards for the most common substances (so-called parameters) that can be found in drinking water. A total of 48 microbiological and chemical parameters must be monitored and tested regularly.</p>	<p>The SEA should seek to ensure that objectives address water quality in the region, particularly drinking water quality.</p>
<p>European Commission (2000), <i>The Water Framework Directive (2000/60/EC)</i></p>	
<p>This Directive establishes a framework for the protection of inland surface waters, transitional waters, coastal water and groundwater. It also encourages the sustainable use of water resources.</p> <p>Key objectives are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water.</p>	<p>The SEA should seek to promote the protection and enhancement of all water resources.</p>
<p>Council of Europe (2000) <i>European Landscape Convention (Florence Convention)</i></p>	
<p>The European Landscape Convention is an international convention focusing specifically on landscape. The UK Government signed the European Landscape Convention in 2006 and it became binding from March 2007.</p>	<p>The SEA should take landscape quality into account and include water quality in the assessment framework.</p>
<p>European Commission (2012) <i>A Blueprint to safeguard Europe's Water Resources</i></p>	
<p>This document outlines actions that concentrate on better implementation of current water legislation, integration of water policy objectives into other policies, and filling the gaps in particular with regard to water quantity and efficiency. This has a long-term aim to ensure sufficient availability of good quality water for sustainable and equitable use.</p>	<p>The implementation of the WRMP should seek to facilitate the ongoing reliable availability of good quality water.</p>
<p>United Nations (2002), <i>Commitments arising from the World Summit on Sustainable Development, Johannesburg</i></p>	
<p>The World Summit on Sustainable Development proposed broad-scale principles which should underpin sustainable development and growth.</p> <p>It included objectives such as:</p>	<p>These commitments are the highest level definitions of sustainable development. The Water resource management Plan should be influenced strongly by all of these</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<ul style="list-style-type: none"> • Greater resource efficiency • Work on waste and producer responsibility • New technology development • Push on energy efficiency • Integrated water management plans needed <p>Minimise significant adverse effects on human health and the environment from chemicals by 2020.</p>	<p>themes and should seek to take its aims into account.</p> <p>The SEA should seek to promote the achievement of the sustainable development objectives outlined in this plan.</p>
<p>Council of Europe (2003) <i>European Soils Charter</i></p>	
<p>Sets out common principles for protecting soils across the EU and will help.</p>	<p>The SEA should seek to ensure that the quality of the regions land, including soils, is protected or enhanced.</p>
<p>European Commission (2006) <i>Thematic Strategy for Soil Protection</i></p>	
<p>The Thematic Strategy for Soil Protection consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment.</p>	<p>The SEA assessment framework should include soils.</p>
<p>European Commission (2007), <i>Floods Directive (2007/60/EC)</i></p>	
<p>The Directive’s aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive shall be carried out in coordination with the WFD, notably by flood risk management plans and river basin management plans being coordinated, and through coordination of the public participation procedures in the preparation of these plans.</p>	<p>The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the Water resource management Plan.</p>
<p>European Commission (2006) <i>Fresh Water Fish Directive (2006/44/EC)</i></p>	
<p>The Directive seeks to protect those fresh water bodies identified by Member States as waters suitable for sustaining fish populations. For those waters, it sets physical and chemical water quality objectives for salmonid waters and cyprinid waters.</p> <p>The Directive is designed to protect and improve the quality of rivers and lakes to encourage healthy fish populations.</p>	<p>The SEA should seek to promote the protection of river and lake water quality in order to maintain and develop suitable environments that will sustain water fish populations.</p>
<p>European Commission (2008) <i>Ambient Air Quality Directive (2008/50/EC)</i></p>	
<p>The Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2). There are also indirect effects as these pollutants can combine in the atmosphere and contribute to greenhouse gases which can be transported great distances by weather systems.</p>	<p>The implementation of the Water resource management Plan may have some influence on air quality, either directly or indirectly, through construction or operational activities. The SEA should take account of the need to ensure that the region’s air quality is maintained or enhanced, and that emissions of air pollutants are kept to a minimum. Seek to help meet regional air quality targets.</p>
<p>European Commission (2009), <i>Birds Directive (2009/147/EC)</i></p>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State (in the UK delivery is via several different statutes).</p>	<p>The SEA should seek to protect and conserve important bird habitats.</p>
<p>European Commission (2009), <i>Promotion of the use of energy from renewable sources Directive (2009/28/EC)</i></p>	
<p>This promotes the use of energy from renewable sources.</p>	<p>The SEA should take account of the need to seek to promote the use of renewable energy.</p>
<p>European Commission (2020), <i>The EU Biodiversity Strategy for 2030</i></p>	
<p>The strategy aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. It reflects the commitments taken by the EU in 2010, within the international Convention on Biological Diversity.</p>	<p>The implementation of the Water resource management Plan may influence biodiversity in the Bristol Water area and as such the SEA should take account of the need to maintain or enhance the quality of habitats and biodiversity.</p>
<p><i>The Paris Agreement (2016), Cancun Agreement (2011) and Kyoto Agreement (1997)</i></p>	
<p>These agreements represent key steps forward in capturing plans to reduce greenhouse gas emissions and to help developing nations protect themselves from climate impacts and build their own sustainable futures. It includes a shared vision to control the global rise in temperature.</p>	<p>The SEA should consider the need for water companies to seek to promote a reduction in greenhouse gas emissions in carrying out its service activities.</p>
<p>European Commission, <i>Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive)</i></p>	
<p>This Directive ensures that individual Parties integrate environmental assessment into their plans and programmes at the earliest stages, whereby an SEA becomes mandatory for plans / programmes which are:</p> <ul style="list-style-type: none"> • Prepared for agriculture, forestry, fisheries, energy, industry transport, waste / water management, telecommunications, tourism, town & country planning or land use and which set the framework for future development consent of projects listed in the EIA Directive; Or • <u>Have been determined to require an assessment under the Habitats Directive.</u> <p>For any plans / programmes not included in the above, the Member States must carry out a screening procedure to determine whether the plans / programmes are likely to have significant environmental effects.</p>	<p>This directive provides the regulatory basis for an SEA being carried out as part of the WRMP.</p>
<p>European Commission (1999) <i>Landfill of Waste Directive (99/31/EC)</i></p>	
<p>The Directive aims at reducing the amount of waste landfilled; promoting recycling and recovery; establishing high standards of</p>	<p>The Water resource management Pan should take the effects on waste to landfill into account.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>landfill practice across the EU and preventing the shipping of waste from one Country to another.</p> <p>The objective of the Directive is to prevent or reduce as far as possible negative effects on the environment (in particular on surface water, groundwater, soil, air and human health) from the landfilling of waste, by introducing stringent technical requirements for waste and landfills.</p>	<p>The SEA assessment should consider the effects on water, soil, air, human health and waste.</p>
National	
<i>Salmon and Freshwater Fisheries Act, 1975</i>	
<p>The Act lays down the present basic legal framework within which salmon and freshwater fisheries in England are regulated.</p> <p>Proposals have been made to extend the legislation to apply to more fish species e.g. coarse fish, eel and lamprey species. These proposals are currently under review.</p> <p>The Act covers legislation on fishing methods and related offences, obstructions to fish passage, salmon and freshwater fisheries administration and law enforcement. Proposed extensions to the legislation (under review) include the provision of fish passes and screening of water abstraction and discharge points for coarse fish, eel and lamprey species.</p>	<p>The Act Provides statutory requirements for maintaining fish passage. The SEA will cover fish passage as an element of at least one sustainability objective. The SEA should seek to address any potential issues or effects on existing measures to address fish passage.</p>
<i>The Environmental Assessment of Plans and Programmes Regulations 2004 (the SEA Regulations)</i>	
<p>This represents the transposition of the Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive).</p>	<p>This regulation provides the UK regulatory basis for an SEA being carried out as part of the WRMP.</p>
<i>Water Resource Management Plan Regulations 2007</i>	
<p>These regulations prescribe how water undertakers in England and Wales are to prepare and publish water resources management plans in accordance with Section 37 of the Water Industry Act. This prescribes the method of publication of a draft water resources management plan, and how water undertakers are to deal with representations received in relation to a draft water resources management plan.</p>	<p>This is the UK regulatory basis against which all water undertakers must be compliant in the production of their individual WRMPs.</p>
<i>Wildlife and Countryside Act (as amended) (1981)</i>	
<p>The Act is the principal mechanism for providing legislative protection of wildlife in Great Britain.</p> <p>Species listed in Schedule 5 of the Act are protected from disturbance, injury, intentional destruction or sale. Other provisions outlaw certain methods of taking or killing listed species. This Act is brought up to date regularly to ensure the most endangered animals are on the schedule.</p> <p>The Act also improved protection for the most important wildlife habitats.</p>	<p>Some aspects of the Water resource management Plan may have effects on habitats and species. The SEA should seek to maintain or enhance the quality of habitats and biodiversity and take regard of protected species and habitats.</p>
<i>Planning (Listed Buildings and Conservation Areas) Act 1990</i>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>This Act addresses listed buildings including the prevention of deterioration and damage and preservation and enhancement of conservation areas.</p>	<p>The Water resource management Plan and SEA should take account of the need to protect listed buildings and conservation areas.</p>
<p>Water Resources Act, 1991 (Amendment) Regulations 2009 SI3104</p>	
<p>Amends Water Resources Act 1991 by extending the use of Water Protection Zones and Works Notices, in particular to deal with harm to aquatic ecosystems caused by the physical characteristics of a water course or lake, such as quantity, structure and substrate of river/lake bed.</p> <p>Aligns the Water Resources Act with the hydromorphological requirements of the WFD.</p>	<p>The SEA should include objectives that cover hydromorphological aspects and seek to ensure that hydromorphological features within the plan are maintained or enhanced.</p>
<p><i>Water Industry Act 1991 was amended by the commencement of Section 36 of the Flood and Water Management Act 2010</i></p>	
<p>This makes provision for general duties of water undertakers including those associated with water resources management plans and sets out supply duties.</p>	<p>The Water resource management Plan must take into account this legislation.</p>
<p><i>The Countryside and Rights of Way (CROW) Act, 2000</i></p>	
<p>The Act provides for increased public access to the countryside and strengthens protection for wildlife.</p> <p>The main provisions of the Act are as follows:</p> <ul style="list-style-type: none"> • Extends the public’s ability to enjoy the countryside whilst also providing safeguards for landowners and occupiers • Creates new statutory right of access to open country and registered common Land Use Consultants • Modernises Right of Way system • Gives greater protection to SSSIs • Provides better management arrangements for AONBs <p>Strengthens wildlife enforcement legislation.</p>	<p>The SEA should include objectives that take into account public access, protection of SSSIs and the management of relevant landscape designations.</p>
<p>Department for Culture, Media and Sport (2001) <i>The Historic Environment – A Force for the Future</i></p>	
<p>This strategy outlines the Government’s policy regarding the historic environment. The strategy has key aims and objectives that demonstrate the contribution the historic environment makes to the country’s economic and social well-being.</p>	<p>The implementation of the Water resource management Plan may have an influence on the heritage of the region, in particular if options affect surface water levels. The SEA should seek to ensure any adverse effects on heritage assets are minimised or avoided.</p>
<p><i>The Energy Act 2013</i></p>	
<p>This provides the legislative framework for delivering secure, affordable and low carbon energy. It includes provision for decarbonisation.</p>	<p>The implementation of the WRMP may have an influence upon the Bristol Water area’s total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
	change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.
<i>Environment Act 1995</i>	
<p>The Environment Act set up the EA to manage resources and protect the environment in England and Wales</p>	<p>The SEA should seek to promote the protection and enhancement of all water resources without having negative effects on other aspects of the environment.</p>
<i>The Water Act (2003) (as amended)</i>	
<p>The Water Act 2003 is in three Parts, relating to water resources, regulation of the water industry and other provisions. The four broad aims of the Act are:</p> <ul style="list-style-type: none"> • The sustainable use of water resources • Strengthening the voice of consumers • A measured increase in competition • The promotion of water conservation. 	<p>The implementation of the Water resource management Plan may have an effect through its role in maintaining supplies of water. The SEA should seek to promote sustainable use of water resources.</p>
<i>The Water Environment (Water Framework Directive) Regulations (England and Wales) 2017</i>	
<p>These Regulations implement the WFD and set out a range of statutory actions to secure and maintain Good Ecological Status or Potential for all water bodies designated under WFD.</p>	<p>The Water resource management Plan should seek to maintain, protect and improve ecological status across the region and prevent any deterioration of WFD status. The SEA will be informed by the parallel WFD compliance assessment of the Water resource management Plan.</p>
<i>Defra (2004) Rural Strategy</i>	
<p>The strategy sets out rural and countryside policy and draws upon from lessons learnt following the rural white paper. Objectives include supporting economic and social regeneration across rural England and enhance the value of the countryside and protect the natural environment for this and future generations.</p>	<p>The implementation of certain Water resource management Plan options may have an effect upon rural communities and the countryside. The SEA should also seek to ensure that the quality of the region's landscapes, natural resources and biodiversity are maintained or enhanced.</p>
<i>Defra (2004) The First Soil Action Plan for England</i>	
<p>This plan is a comprehensive statement on the state of the UK's soils and how Government and other partners were working together to improve them. It aims to ensure that England's soils will be protected and managed to optimise the varied functions that soils perform for society (e.g., supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development.</p>	<p>The SEA should seek to ensure that the quality of the region's land, including soils, is protected or enhanced.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<i>Defra (2005) Securing the Future: Delivering UK Sustainable Development Strategy</i>	
<p>The strategy for sustainable development aims to enable all people to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. The strategy places a focus on protecting natural resources and enhancing the environment.</p>	<p>The SEA must seek to ensure that objectives relating to sustainable development, sustainable resource use and protecting the natural environment, are considered when assessing the potential impacts of the Water resource management Plan.</p>
<i>Defra (2005) Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England</i>	
<p>The strategy outlines how to manage the risks from flooding and coastal erosion in the UK. The strategy aims to reduce the threat of flooding to people and their property, and to deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.</p>	<p>The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the Water resource management Plan.</p>
<i>Natural Environment and Rural Communities Act (2006)</i>	
<p>This Act makes provision about bodies concerned with the natural environment and rural communities in connection with wildlife, SSSIs, National Parks and the Broads.</p> <p>The Natural Environment and Rural Communities Act is designed to help achieve a rich and diverse natural environment and thriving rural communities.</p>	<p>The SEA should seek to maintain or enhance the quality of habitats and biodiversity. The impacts of the Water resource management Plan on any designated features, as highlighted in the Natural Environment and Rural Communities Act, should be addressed.</p>
<i>Environment Agency (2007) Soil: A Precious Resource</i>	
<p>The soil strategy identifies the Environment Agency's priorities, sets out their role and says what action is to be taken to protect, manage and restore soil. Damaged soil structure can lead to flooding, water pollution and can affect the landscape and archaeological features. The strategy also outlines the part managing soils can play in mitigating climate change.</p>	<p>The Water resource management Plan should ensure the sustainable management of soil resources. SEA objectives should reflect and consider relevant priorities from the Soil: A Precious Resource publication.</p>
<i>Department for Business, Energy and Industrial Strategy (2020) Energy White Paper</i>	
<p>The Energy White Paper provides puts in place a strategy for the wider energy system that:</p> <p>Transforms energy, building a cleaner and greener future. Supports a green recovery, supporting thousands of green jobs across the country in new green industries and leveraging new green export opportunities. Creates a fair deal for consumers, protecting the fuel poor. It includes the goal that by 2050, emissions from industry will need to fall by around 90 per cent from today's levels.</p>	<p>The implementation of the Water resource management Plan may have an influence upon Bristol Water's total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.</p>
<i>Defra (2007), Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt</i>	
<p>The guiding principles described in this document summarise current thinking on how to reduce the impacts of climate change on</p>	<p>The SEA must consider the impacts on biodiversity whilst also taking into</p>

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<p>biodiversity and how to adapt existing plans and projects in the light of climate change. The guidance is intended to inform implementation of the UK Biodiversity Action Plan, taking account of climate change is relevant to the fulfilment of many international agreements and obligations affecting the UK.</p>	<p>account the potential for future climate change.</p>
<p><i>Defra (2011) Future Water: The Government’s water strategy for England</i></p>	
<p>This strategy is the high level Government document which outlines how the Government wants the water sector to look by 2030, considering issues of water demand, water supply, water quality in the natural environment, surface water drainage, river and coastal flooding, greenhouse gas emissions and charging.</p> <p>It states that “by 2030 at the latest, we have:</p> <p>Improved the quality of our water environment and the ecology which it supports, and continued to provide high levels of drinking water quality from our taps.</p> <p>Sustainably managed risks from flooding and coastal erosion, with greater understanding and more effective management of surface water.</p> <p>Ensured a sustainable use of water resources, and implemented fair, affordable and cost-reflective charges.</p>	<p>The SEA should seek to ensure that the themes included in the strategy objectives are also reflected in the SEA objectives, particularly around water quality in the region, the quality of aquatic ecology, drinking water quality, resource use, energy use and greenhouse gas emissions, and adaptation to climate change.</p>
<p><i>The Climate Change Act 2008 & The Climate Change Act 2008 (2050 Target Amendment) Order 26 June 2019</i></p>	
<p>This act sets carbon targets for 2050. Originally the target was for net carbon account for 2050 at least 80% lower than 1990 baseline, however, this was revised in 2019 to be at least 100% lower in line with the net zero ambition.</p> <p>The 2019 amendment changed the UK carbon emissions reduction target from an 80% to a 100% reduction.</p>	<p>This target needs to be taken into account by the SEA.</p> <p>The new target from 2019 needs to be taken into account by the SEA objective for energy use and greenhouse gas emissions, and adaptation to climate change.</p>
<p><i>Defra (2008) England Biodiversity Strategy –climate change adaptation principles</i></p>	
<p>Government strategy presenting five principles that are fundamental to conserving biodiversity during climate change. The precautionary principle underlies all the principles.</p>	<p>The SEA must consider the impacts on biodiversity whilst also taking into account the potential for future climate change.</p>
<p><i>The Eels Regulations 2009</i></p>	
<p>Implement European Council Regulations 1100/2007 establishing measures for the recovery of the stock of European eel. The Regulations will help implement delivery Eel Management Plans. They address eel records and re-stocking, close season and reduction of fishing effort, passage of eels and entrainment.</p> <p>The key objective is to ensure that at least 40% of the potential production of silver eels returns to the sea to spawn. This will be achieved by reducing exploitation of all life-stages of the eel and restoration of their habitats.</p>	<p>The SEA should seek to maintain the quality of habitats and biodiversity and take regard of protected species identified. This should include migratory fish species and their migratory passage.</p>

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<i>Defra (2009) Safeguarding our soils – A Strategy for England</i>	
<p>The new Soil Strategy for England – Safeguarding our Soils – outlines the Government’s approach to safeguarding our soils for the long term. It provides a clear vision to guide future policy development across a range of areas and sets out the practical steps that we need to take to prevent further degradation of our soils, enhance, restore and ensure their resilience, and improve our understanding of the threats to soil and best practice in responding to them.</p> <p>The Governments vision is that: By 2030, all England’s soils will be managed sustainably, and degradation threats tackled successfully. This will improve the quality of England’s soils and safeguard their ability to provide essential services for future generations.</p>	<p>The SEA should seek to ensure that the quality of the regions soils and their management is protected or enhanced.</p>
<i>Environment Agency (2009), Water Resources Strategy for England and Wales</i>	
<p>Launched on 30 March 2009, covering the actions that the Environment Agency believes need to be taken to ensure that there is enough water for people and wildlife in the face of future pressures. These include:</p> <ul style="list-style-type: none"> • climate change • population growth • diffuse pollution • water for wildlife and wetlands 	<p>The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives, particularly around water resource use and availability in the region.</p>
<i>Defra (2010) Making Space for Nature: A Review of England’s Wildlife Sites and Ecological Network</i>	
<p>This independent review of England’s wildlife sites and the connections between them sets objectives and recommendations to help achieve a healthy natural environment that will allow our plants and animals to thrive.</p>	<p>The SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
<i>Environment Agency (2010), Water Resources Action Plan for England and Wales</i>	
<p>The strategy has four main aims:</p> <ul style="list-style-type: none"> • Adaptation to and mitigation of climate change; • A better water environment; • Sustainable planning and management of water resources; • People valuing water and the water environment. 	<p>The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives particularly regarding the sustainable management of water resources and protecting the environment.</p>
<i>Flood and Water Management Act (2010) as amended</i>	
<p>The Flood and Water Management Act 2010 aims to provide better, more comprehensive management of flood risk for people, homes and businesses. It aims improve efficiency in the water industry, improve the affordability of water bills for certain groups and individuals, and help ensure continuity of water supplies to the consumer.</p>	<p>The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the Water resource management Plan and that water supplies across the region are maintained.</p>
<i>Historic England (2021) Heritage at Risk</i>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>Heritage at risk is a national programme that aims to identify the endangered sites (historic buildings and places with increased risks of neglect and decay) and then help secure them for the future. Regional Heritage at Risk Registers were most recently published in 2019.</p>	<p>The SEA should seek to protect and enhance and landscape.</p>
<p>Defra (2014) <i>UK National Ecosystems Assessment Follow on, Synthesis of Key Findings</i></p>	
<p>Ecosystems services from natural capital contribute to the economic performance of the nation.</p> <p>Information and tools to enable decision makers to understand the wider value of ecosystems and their associated services.</p>	<p>For the purposes of the readership integrating an ecosystems services approach into the SEA is not being undertaken. However, it is realised that through the 'Objective-led' approach, many of the services relevant to the Water resource management Plan can be considered through the objectives and key questions for example:</p> <ul style="list-style-type: none"> • Provisioning Services: Freshwater • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic <p>The SEA should ensure the Water resource management Plan effects the related provisioning services in the least damaging way through informing the Water resource management Plan formulation and selection of Water resource management Plan options during times of Water resource management.</p> <p>In the event of further guidance being issued on incorporating ESA into SEA, the anticipated approach is sufficiently flexible that it should be able to accommodate this (subject to timing).</p>
<p>Defra (2011) <i>Water for Life – Water White Paper</i></p>	
<p>This sets out market reform in the water sector.</p>	<p>The Water resource management Plan should take into account the contents of this paper.</p>

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<p>Defra (2011) <i>The Natural Choice: securing the value of nature, The Natural Environment White Paper</i></p> <p>Addresses the Government’s approach to valuing economic and social benefits of a healthy natural environment while continuing to recognise nature’s intrinsic value. It describes the vision of the Government for this to be the first generation to leave the natural environment of England in a better state than it inherited, requiring placing the value of nature at the heart of decision-making – in Government, local communities and businesses. Approaches to mainstream the value of nature across society include:</p> <ul style="list-style-type: none"> • facilitating greater local action to protect and improve nature; • creating a green economy, in which economic growth and the health of our natural resources sustain each other, and markets, business and Government better reflect the value of nature; • strengthening the connections between people and nature to the benefit of both; and <p>showing leadership in the European Union and internationally, to protect and enhance natural assets globally</p>	<p>The Water resource management Plan supports the provisioning service of freshwater through ensuring security of supply during times of water resource management. The media campaigns that form part of the Demand side Water resource management Plan options may contribute towards increasing the awareness of the population to the value the provisioning services of water. Other related ecosystem services may include:</p> <ul style="list-style-type: none"> • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic <p>The SEA should ensure the Water resource management Plan effects the related provisioning services in the least damaging way through informing the Water resource management Plan formulation and selection of Water resource management Plan options during times of Drought.</p>
<p>Defra (2011) <i>Biodiversity 2020: A Strategy for England’s Wildlife and Ecosystem Services</i></p> <p>The objective for the next decade is: ‘to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.’ Four action areas are:</p> <ul style="list-style-type: none"> • A more integrated large-scale approach to conservation on land and at sea • Putting people at the heart of biodiversity policy • Reducing environmental pressures • Improving our knowledge. 	<p>The SEA must consider impacts on biodiversity. The implementation of the Water resource management Plan may influence biodiversity in the area and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity and take regards of priority species.</p>
<p>Defra (2011) <i>Government Review of Waste Policy in England 2011</i></p>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>The review is guided by the “waste hierarchy”, EU obligations and targets on waste management, carbon impacts, environmental objectives and the costs and benefits of different policy options.</p> <p>The Governments vision include a move beyond the current throwaway society to a “zero waste economy” in which material resources are re-used, recycled or recovered wherever possible, and only disposed of as the option of very last resort.</p>	<p>The Water resource management Plan may involve options that involve the generation of waste (e.g. either through construction requirements or operation of supply side options). The SEA should seek to enhance recycling and minimise the amount of waste going to landfill.</p>
<p>Department of Energy and Climate Change (2011) <i>National Policy Statements for Energy Infrastructure</i></p>	
<p>The energy National Policy Statements (NPSs) set out national policy against which proposals for major energy projects will be assessed and decided on by the Infrastructure Planning Commission. The purpose of the NPSs is to develop a clear, long-term policy framework which facilitates investment in the necessary new infrastructure (by the private sector) and in energy efficiency. It highlights that the construction, operation and decommissioning of infrastructure can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment.</p>	<p>The SEA should consider the cumulative effects of the Water resource management Plan and any major energy proposals which may affect the availability of water in the Bristol Water supply area.</p>
<p>Environment Agency (2011) <i>National Flood and Coastal Risk Management Strategy for England</i></p>	
<p>This strategy provides the overarching framework for future action by all risk management authorities to tackle flooding and coastal erosion in England, building on existing approaches. Risk should be managed in a co-ordinated way within catchments and along the coast and balance the needs of communities, the economy and the environment. This strategy will form the framework within which communities have a greater role in local risk management decisions and sets out the Environment Agency’s strategic overview role in flood and coastal erosion risk management (FCERM).</p>	<p>The SEA should consider how the Water resource management Plan may affect flood and coastal risk across the region.</p>
<p>Natural England (2011) <i>UK Geodiversity Action Plan</i></p>	
<p>The UKGAP sets out of framework for geodiversity action across the UK. It provides a shared context and direction for the protection and enhancement of geodiversity through a common aim, themes, objectives and targets which link national, regional and local activities. The UKGAP consists of six broad themes:</p> <ol style="list-style-type: none"> 1. Furthering our understanding of geodiversity 2. Influencing planning policy, legislation and development design 3. Gathering and maintaining information on our geodiversity 4. Conserving and managing our geodiversity 5. Inspiring people to value and care for our geodiversity 6. Sustaining resources for our geodiversity 	<p>The Water resource management Plan should have regard to the aims and objectives of the UKGAP.</p> <p>The SEA framework should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.</p>
<p>Defra (2012) <i>The UK Evidence Report</i></p>	
<p>Five themes are identified that form the priorities for adaptation in the UK.</p>	<p>The SEA should take into account the need for climate change adaptation.</p>

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<i>Defra (2012) National Policy Statement for Waste Water</i>	
National Policy Statement (NPS) sets out Government policy for the provision of major wastewater infrastructure. It will be used by the Infrastructure Planning Commission (IPC) to guide its decision making on development consent applications for wastewater developments that fall within the definition of Nationally Significant Infrastructure Project (NSIP) as defined in the Planning Act 2008.	The SEA should seek to ensure the Water resource management Plan considers any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the Bristol Water area.
<i>Environment Agency (2013), Managing Water Abstraction</i>	
This sets out how the EA manages water resources in England.	The SEA should consider the range of impacts that changes to abstractions could have on the environment, including water bodies, biodiversity, and water users.
<i>Historic England (2013) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment</i>	
Guidance for addressing the historic environment in Strategic Environmental Assessment or river bas. It identifies the recommended list of plans, programmes and policies for review, approach to baseline review, potential sustainability issues.	The SEA should consider the potential effects of the Water resource management Plan on the historic environment, particularly designated assets and their settings, and to important wetland areas with potential for palaeo-environmental deposits. Historic characterisation can supplement information about designations. Sustainability issues, objectives and indicators identified in this document should be taken into account in the SEA.
<i>Defra and Welsh Government (2014) River Basin Planning Guidance</i>	
Aims to give guidance on practical implementation of the WFD. The river basin planning process involves setting environmental objectives for all groundwater and surface waters (including estuaries and coastal waters) within the river basin district and devising programmes of measures to meet those objectives.	The Water resource management Plan should take into account the contents of this statutory guidance
<i>Defra (2015) The Great Britain Invasive Non-native Species Strategy</i>	
The Strategy is intended to provide a strategic framework, updated from the 2008 framework, within which the actions of government departments, their related bodies and key stakeholders can be better co-ordinated. Its overall aim is to minimise the risks posed, and reduce the negative impacts caused, by INNS in Great Britain.	The implementation of the Water resource management Plan may influence biodiversity in the south east and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.
<i>Historic England (2015) Historic Environment Good Practice Advice in Planning Note 3</i>	
This provides guidance on managing change within settings of heritage assets. This includes archaeological remains, historic buildings, sites, areas and landscapes.	The SEA should take into account effects on settings of heritage assets.

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<p>Environment Agency (2017) <i>Drought response: our framework for England</i></p> <p>This framework describes how drought affects England and how the EA works closely with the government, water companies and others to manage the effects of drought on people, business and the environment. Specifically, the framework sets out:</p> <ul style="list-style-type: none"> • How drought affects different parts of England • Who is involved in managing drought and how they work together • How the agency and others take action to manage drought • How we monitor and measure the impacts of drought to advise senior management and government on the prospects and possible action <p>How we report on drought and communicate with others</p>	<p>The supply of water resources in the region may be affected by future drought, therefore this framework is linked closely with the Water resource management Plan.</p> <p>The Water resource management Plan and SEA need to take account of the guidance provided by the Environment Agency.</p>
<p>Defra, Environment Agency, Natural England, Forestry Commission England (2016) <i>Creating a great place for living</i></p> <p>Sets out a number of objectives linked to creating a great place for living. The objectives are related to the following topics:</p> <ul style="list-style-type: none"> • Environment – a cleaner, healthier environment, benefiting people and the economy; • Food and farming – a world-leading food and farming industry; • Rural – a thriving rural economy, contributing to national prosperity and wellbeing; • Protection – a nation better protected against floods, animal and plant diseases and other hazards, with strong response and recovery capabilities; • Excellent Delivery – Excellent delivery, on time and to budget with outstanding value for money; <p>An outstanding organisation – an organisation striving to be the best, focused on outcomes and constantly challenging itself.</p>	<p>The SEA must take into account impacts of the water resource management options (construction and operation) on the environment, as well as the population and human health and land use (which will impact on the food and farming and rural objectives).</p>
<p>HM Government (2016) <i>National Infrastructure Delivery Plan 2016-2021</i></p> <p>This plan updates and replaces the previous National Infrastructure Plan and takes a targeted approach to infrastructure investment and delivery across different sectors over five years. These are all critical to support economic growth through the expansion of private sector businesses across all regions and industries, to enable competitiveness and to improve the quality of life of everyone in the UK. The plan recognises the pressure on future water and waste services from population growth and climate change.</p>	<p>The Water resource management Plan could result in the production of additional waste. The SEA should seek to reduce the production of waste and ensure it is treated in line with the widely adopted ‘waste hierarchy’ and not sent to landfill. The Water resource management Plan can contribute to the providing resilient water services.</p>
<p>HM Treasury Infrastructure UK (2014) <i>National Infrastructure Plan</i></p> <p>The Plan focusses on economic infrastructure: the networks and systems in energy, transport, digital communication, flood protection, water and waste management. These are all critical to support economic growth through the expansion of private sector</p>	<p>The SEA objectives should take into account the objectives for the water sector presented in this plan.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>businesses across all regions and industries, to enable competitiveness and to improve the quality of life of everyone in the UK. The objectives for the water sector are ‘to secure a fair deal for customers while enabling water companies to continue to attract low-cost investment needed to provide the high quality, resilient water services customers want.’</p>	
<p>Historic England (2016) <i>Climate Change and the Historic Environment</i></p>	
<p>Sets out the current thinking on the implications of climate change for the historic environment. It is intended both for the heritage sector and also for those involved in the wider scientific and technical aspects of climate change; in the development of strategies and plans relating to the impact of climate change; or in projects relating to risk assessment, adaptation and mitigation.</p>	<p>The SEA should seek to assess the implications of the Water resource management Plan in combination with climate change and the potential impacts on heritage and the historic environment.</p>
<p><i>Conservation of Habitats and Species Regulations (as amended) 2017</i></p>	
<p>These regulations consolidate all the various amendments made to the Conservation (Natural Habitats) Regulations 1994 in England.</p> <p>The regulations provide for the designation and protection of ‘European sites’, the protection of ‘European species’, and the adaptation of planning and other controls for the protection of European Sites. They are the principal means by which the Habitats Directive is transposed in England as such its main objective is to promote the maintenance of biodiversity.</p>	<p>The Water resource management Plan must fully comply with the Regulations.</p> <p>The impacts of the Water resource management Plan options on biodiversity and protected species and sites must be considered as part of the SEA.</p>
<p>HM Government (2018) <i>A Green Future: Our 25 Year Plan to Improve the Environment</i></p>	
<p>This plan sets out government action to help the natural world regain and retain good health. It aims to deliver cleaner air and water in cities and rural landscapes, protect threatened species and provide richer wildlife habitats – using a natural capital approach to better-inform policy.</p> <p>By adopting the plan, the government aims to achieve clean air; clean and plentiful water; thriving plants and wildlife; a reduced risk of harm from environmental hazards such as flooding and drought; using resources from nature more sustainably and efficiently; and enhanced beauty, heritage and engagement with the natural environment. In addition, the plan will set out to manage pressures on the environment through; mitigating and adapting to climate change, minimising waste, managing exposure to chemicals and enhancing biosecurity.</p> <p>The six key areas for action are:</p> <ul style="list-style-type: none"> • Using and managing land sustainably, which includes embedding an ‘environmental net gain’ principle for development (including housing and infrastructure) • Recovering nature and enhancing the beauty of landscapes • Connecting people with the environment to improve health and wellbeing • Increasing resource efficiency, and reducing pollution and waste 	<p>The Water resource management Plan may influence the environmental benefits and pressures identified in the Environment Plan, such as:</p> <ul style="list-style-type: none"> • Clean air • Clean and plentiful water • Thriving plants and wildlife • Reducing risks of harm from environmental hazards • Using resources from nature more sustainably and efficiently • Enhancing beauty, heritage and engagement with the natural environment • mitigating and adapting to climate change • minimising waste • managing exposure to chemicals • enhancing biosecurity

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<ul style="list-style-type: none"> • Securing clean, productive and biologically diverse seas and oceans <p>Protecting and improving the global environment</p>	<p>The SEA should ensure that the impacts of any water resource management options on the 25-year goals set out in the Environment Plan are fully considered, whilst taking into account environmental net gain and natural capital approach, which the government have identified as principle themes.</p>
<p>HM Government (2023) Environment Improvement Plan 2023: <i>First Revision of the 25 Year Environment Plan</i></p>	
<p>This plan is in response to the commitment made to refresh the 25 Year Environment Plan every five years, a commitment set into law in the Environment Act 2021. This document represents the first such review. It reinforces the intent of the 25 Year Environment Plan building on the framework and vision with a plan to deliver. The ten goals of the 25 Year Environment Plan remain and progress made against each is identified. The goal of improving nature and halting the decline in our biodiversity to achieve thriving plants and wildlife is identified as the apex of the plan and all other goals will help to achieve it.</p>	<p>The SEA should ensure that the impacts of any water resource management options on the 25-year goals set out in the Environment Improvement Plan are fully considered.</p>
<p>Ministry of Housing, Communities and Local Government (2019) <i>National Planning Policy Framework</i></p>	
<p>The NPPF sets out the Government’s planning policies for England. The revision to the NPPF published in February 2019 broadly continues the guidance set out in the 2012 NPPF, with more emphases on housing, design, efficient use of land and continued reference to an objective of achieving net gains. It constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications. At the heart of the NPPF is a presumption in favour of sustainable development. However, the 'presumption in favour of sustainable development' is not applicable where any adverse impacts would significantly outweigh the benefits, when assessed against all policies in the NPPF or where specific policies indicate development should be restricted. This includes proposed developments that affect European designated sites, Green Belt or AONB land.</p> <p>It presents guidance under broad themes which include: Promoting healthy and safe communities; Meeting the challenge of climate change, flooding and coastal change; Conserving and enhancing the natural environment; and Conserving and enhancing the historic environment.</p>	<p>Any permanent construction activities in the Water resource management Plan should take account of the key components of the NPPF to ensure sustainable development and seek to promote biodiversity net gain.</p>
<p>Department for Energy and Climate Change (2020) <i>Energy White Paper: Powering our Net Zero Future</i></p>	
<p>The white paper outlines a series of policies and commitments made by the government as part of the transition to net zero carbon emissions. The strategies are threefold:</p> <p>Prioritisation of renewable sources energy generation and invest in low-carbon technologies</p>	<p>The implementation of the WRMP may have an influence upon the Bristol Water area’s total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>Supporting a green recovery from COVID-19 through investment in green industries</p> <p>Creating a fair deal for consumers through facilitating competition, enhanced regulation and strategies to improve the energy performance of homes.</p>	<p>emissions. The SEA should also promote the use of renewable energy, where relevant.</p>
<p>Environment Agency (2020) <i>Meeting our future water needs: a national framework for water resources</i></p>	
<p>The organisations responsible for England’s water supplies have understood the long term needs of sectors that depend on a secure supply of water – public water supply, agriculture, power generation, industry and the environment. These needs will be met through the development of regional water resources plans. Agreed what the regional plans should deliver and how, so they drive a step-change in water resources planning. The national framework identifies strategic water needs for England and its regions across all sectors up to and beyond 2050.</p> <p>Sets out a strategic direction for the work being carried out by regional water resources groups by exploring the range of approaches available to meet the likely pressures</p>	<p>The Water resource management Plan should consider the water resource framework and what it states should be included in a plan.</p>
<p>Environment Agency (various dates) <i>Abstraction Licensing Strategies</i></p>	
<p>Sets out how much water is available for abstraction within each key river catchment, taking into account the needs of the environment and existing abstractors.</p>	<p>The Water resource management Plan should consider relevant catchment strategies and any environmental protection measures of relevance to the Water resource management Plan options.</p>
<p>Defra (2020) <i>Enabling a Natural Capital Approach (ENCA)</i></p>	
<p>ENCA resources are a mixture of data, guidance and tools that enable individuals/ organisations to understand natural capital and know how to take it into account. The aims of ENCA are to:</p> <ul style="list-style-type: none"> • Build capacity among users to assess and value the natural environment by providing comprehensive information and resources • Reduce search costs for analysts and decision makers • Provide a platform to update tools and guidance as knowledge develops • Identify new evidence and areas for development <p>The guidance is a comprehensive document providing information and resources for Natural Capital, covering the natural capital framework, economic valuation of the environment, how project or policy appraisal can incorporate natural capital, natural capital accounting principles and methods, benefits and challenges and applying natural capital at a local level.</p>	<p>The SEA will help to inform future development by TWUL and therefore should consider the effect of the water resource management options on opportunities for natural capital.</p>
<p>Environment Agency (undated) <i>Hydroecology: Integration for modern regulation</i></p>	
<p>This paper describes clear way forward in terms of hydroecology and a strategic direction to its development and application.</p>	<p>The Water resource management Plan and SEA should ensure relevant ecological considerations</p>

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	are integral to water resource evaluation and management decisions across the range of temporal and spatial scales.
<i>The Environmental Damage (Prevention and Remediation) (England) Regulations 2015</i>	
<p>These regulations amend the 2009 regulations and provide additional protection to habitats and species identified on Annexes 1 and 2 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.</p> <p>Applies to the most serious categories of environmental damage, including;</p> <p>Contamination of land that results in a significant risk of adverse effects on human health.</p> <p>Adverse effects on surface water or groundwater consistent with a deterioration in the water’s status.</p> <p>Adverse effects on the integrity of an SSSI or on the conservation status of species and habitats protected by EU legislation outside SSSIs.</p>	The SEA should seek to ensure that the guidance is considered when assessing the WRMP.
<i>Environment Agency (undated), WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation</i>	
<p>This paper describes the method used to assess the likelihood of river water bodies achieving the relevant WFD objectives as a result of artificial influences on low river flows.</p>	Implementation of the Water resource management Plan may impact river water quality. The SEA should seek to promote the protection and enhancement of biodiversity and river water quality across the region.
<i>Defra (2007) The Air Quality Strategy for England, Scotland and Wales</i>	
<p>This strategy identifies air quality objectives and policy options to further improve air quality in the UK from into the long term. The options are intended to provide important benefits to quality of life and help protect the environment as well as the direct benefits to public health.</p>	The implementation of the Water resource management Plan may have some influence on air quality, either directly or indirectly through construction or operation activities. The SEA should seek to ensure that the region’s air quality is maintained or enhanced, and that emissions of air pollutants are kept to a minimum.
<i>Department of Energy and Climate Change (2011) Planning our electric future: a White Paper for secure, affordable and low carbon electricity</i>	
<p>This white paper outlines a package of reforms so that by 2030 there will be a flexible, smart and responsive electricity system, powered by a range of low carbon sources of electricity. This includes engaging with consumers on energy use. Decarbonisation is important in meeting the 2050 targets.</p>	The implementation of the Water resource management Plan may have an influence upon Bristol Water’s total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
	through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.
<i>Ancient Monuments and Archaeological Areas Act 1979</i>	
This Act make provisions for the investigation, preservation and recording of matters of archaeological or historical interest. Sites that warrant protection are due to their being of national importance as 'ancient monuments'. This includes sites such as scheduled monuments or any other monument which is of the opinion of the Secretary of State is of historic, architectural, traditional, artistic or archaeological interest.	The SEA should ensure the Water Resource Management Plan continues to protect and preserve Ancient Monuments and other sites of archaeological or historical interest.
<i>Marine and Coastal Access Act 2009</i>	
This Act makes provisions with respect to marine functions and activities; migratory and freshwater fish; establishment of English coastal walking routes; land rights of access near the English and Welsh coasts; and make provision in relation to works which are detrimental to navigation.	The implementation of the Water resource management plan may have an impact on coastal land, public access and marine functions & activities. The SEA should seek to ensure any impact to coastal access is limited.
<i>National Planning Policy Framework 2021</i>	
The framework sets out the Government's planning policies for England and how they should be applied.	The SEA should ensure the implementation of the Water resource management plan is applied within the context of the National Planning Policy Framework.
<i>Heritage Statement: One Year On (2018)</i>	
The 2018 update to the Heritage Statement highlights the Government's vision and strategy for heritage and the historic environment. The latest version sets out how funding and projects seek to better conserve and sustainably utilise heritage assets.	The Water resource management plan may have an impact on the setting of heritage assets. The SEA should seek to protect and conserve the setting of these sites.
<i>Historic England – Our Climate Change Strategy (2022)</i>	
This strategy outlines Historic England's response to the climate crisis. Historic England have been raising awareness of the impact of climate change on the heritage and historic environments in England and this strategy highlights Historic England's vision, aims and processes to combat climate change.	The implementation of the Water resource management plan should be in accordance with Historic England's aims and responses to combating the climate crisis.
<i>Managing Significance in Decision-Taking in the Historic Environment (2015)</i>	
The note provides information on good practice to assist in implementing historic environment policy in the National Planning Policy Framework. The guidance delivers information on assessing the significance of heritage assets.	The Water Resource management plan has the potential to have an impact on heritage assets. The SEA should ensure the guidance provided by Historic England is utilised to identify significance of heritage assets.
<i>Statements of Heritage Significance: Analysing Significance in Heritage Assets (2019)</i>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>This Historic England Advice note is to provide information on the analysis and assessment of heritage significance in line with the National Planning Policy Framework (NPPF). The note explores the assessment of significance of heritage assets to help in the decision making on the impact of proposals.</p>	<p>Where the water resources management plan has potential to impact upon heritage assets, the SEA should use the advice note to identify heritage significance.</p>
<i>Heritage at Risk Register 2021</i>	
<p>The Register is a yearly “health-check” of England’s most valued historic places and those most at risk of being lost due to neglect, decay or inappropriate.</p>	<p>The SEA should seek to utilise the Heritage at Risk Register to ensure the Water resource management plan does not impact upon those sites most at risk from being lost.</p>
<i>The Environment Act (2021)</i>	
<p>The Environment Act makes provisions about targets, plans and policies for improving the natural environment. Priority areas set out in the Environment Act are Water, Air Quality, Biodiversity and Resource Efficiency & Waste Reduction.</p>	<p>The SEA should ensure provisions regarding targets, plans and policies made in the Environment Act are maintained during the implementation of the water resource management plan.</p>
Regional and Local	
<i>West Country Water Resources Group (2023) Draft plan for Consultation and Comment</i>	
<p>The plan aims to develop a structure where water availability and sustainability within the West Country region is secured over the next 50 years and beyond. Covers the south west region (Avon, Cornwall, Devon, Dorset), serviced by Bristol Water, South West Water and Wessex Water.</p>	<p>The SEA should consider and account for the priorities set out in the proposed regional Plan and ensure the WRMP and the regional Plan align in the short, medium and long term.</p>
<i>Water Resources West (2022) draft Regional Plan</i>	
<p>The plan aims to develop a structure where water availability and sustainability within the West Midlands region is secured over the next 50 years and beyond. Covers the area serviced by Severn Trent Water, South Staffs Water, United Utilities and Welsh Water.</p>	<p>The SEA should consider and account for the priorities set out in the proposed regional Plan to determine the likelihood of cumulative or cross-boundary impacts.</p>
<i>Water Resources South East (2022) draft Regional Plan</i>	
<p>The plan aims to develop a structure where water availability and sustainability within the south east of England is secured over the next 50 years and beyond. Covers the area serviced by Affinity Water, Portsmouth Water, South East Water, Southern Water, Sutton & East Surrey Water and Thames Water.</p>	<p>The SEA should consider and account for the priorities set out in the proposed regional Plan to determine the likelihood of cumulative or cross-boundary impacts.</p>
<i>South West Water (2022) draft Water Resources Management Plan 2024</i>	
<p>South West Water’s Water Resource Management Plan sets out how they will manage the region’s supply and demand for the 25-year period from 2024.</p>	<p>The SEA should consider the preferred plan as outlined in South West Water’s WRMP24 to determine the likelihood of cumulative or cross-boundary impacts.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
Wessex Water (2022) draft Water Resources Management Plan 2024	
<p>Wessex Water’s Water Resource Management Plan sets out how they will manage the region’s supply and demand for the 25-year period from 2024.</p>	<p>The SEA should consider the solution as outlined in Wessex Water’s WRMP24 to determine the likelihood of cumulative or cross-boundary impacts.</p>
Severn Trent Water (2022) draft Water Resources Management Plan 2024	
<p>Severn Trent Water’s Water Resource Management Plan sets out how they will manage the region’s supply and demand for the 25-year period from 2024.</p>	<p>The SEA should consider the solution as outlined in Severn Trent Water’s WRMP24 to determine the likelihood of cumulative or cross-boundary impacts.</p>
Thames Water (2022) draft Water Resources Management Plan 2024	
<p>Thames Water’s Water Resource Management Plan sets out how they will manage the region’s supply and demand for the 25-year period from 2024.</p>	<p>The SEA should consider the solution as outlined in Thames Water’s WRMP24 to determine the likelihood of cumulative or cross-boundary impacts.</p>
Strategic Regional Water Resource Solutions (2023) Gate two submission Mendip Quarries. July 2023	
<p>The Mendip Quarries scheme involves repurposing a quarry in the Mendip Hills, after quarrying operations have been completed, and using the site to provide raw water storage, augmented by water abstracted from the River Avon. The scheme partners are Wessex Water and Bournemouth Water, a subsidiary of South West Water (SWW), who would benefit from the resource, although there are also opportunities for the scheme to be expanded to provide resources to other areas.</p> <p>The Mendip Quarries project is following a later timeline relative to the other strategic resource options in the region. Decisions about whether or not a solution goes ahead will be made through water resources planning and subsequently applications for local planning and environmental consents.</p>	<p>The SEA should consider the core scheme as outlined in the available published information to determine the likelihood of cumulative or cross-boundary impacts.</p>
Strategic Regional Water Resource Solutions (2022) Poole Effluent Recycling and Transfers. Standard Gate Two Submission. November 2022	
<p>The Poole water recycling and transfer scheme, which was formerly part of West Country South Sources and Transfers, is investigating the potential to recycle water from Poole water recycling centre for use as a water resource. The scheme will divert final effluent from Wessex Water’s Poole sewage treatment works to the River Stour via a new pipeline, water recycling plant and a wetland. The additional water discharged to the river will then be re-abstracted at Longham lakes from where it will integrate with Bournemouth Water’s existing supply system.</p> <p>Following approval by Owat, this project is now being progressed via the governments Green economic recovery process.</p>	<p>The SEA should consider the core scheme as outlined in the available published information to determine the likelihood of cumulative or cross-boundary impacts.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>Strategic Regional Water Resource Solutions (2022) Cheddar 2 Source and Transfer. Standard Gate Two Submission. November 2022</p>	
<p>A new reservoir at Cheddar was historically an option for additional resource to serve the Bristol Water area directly. During AMP5 the reservoir obtained outline planning permission, with a high level of approval and engagement from local stakeholders. However, a shift in focus for the company over recent years, to managing leakage and customer demand, means that there is no need for supply options in the Bristol Water area at the present time. This additional reservoir has however been selected as a preferred supply option within the WCWR regional plan following further analysis including consideration of the 2022 drought. As the reservoir does not provide a dry year benefit to Bristol water customers, it does not feature in the feasible option list, however it will be developed within Bristol Water’s supply area to serve the wider region as part of the RAPID gated process.</p>	<p>The SEA should consider the core scheme as outlined in the available published information to determine the likelihood of cumulative or cross-boundary impacts.</p>
<p>Bristol Water (2019) <i>Business Plan 2020-2025: Bristol Water For All</i>)</p>	
<p>The business plan sets out proposals from Bristol Water for customers, stakeholders and for Ofwat. It includes proposals for price controls for 2020-25, set in a longer-term context for the future of water services for all the communities Bristol Water serves. The plan outcomes were developed with customers’ priorities in mind:</p> <p>Outcome 1: Excellent Customer Experiences</p> <p>Outcome 2: Local Community and Environmental Resilience (which includes initiatives to deliver on the promise of building biodiversity and protecting the environment such as the performance commitment regarding Bristol Water’s biodiversity index and compliance with the Water Industry National Environment Programme (WINEP).</p> <p>Outcome 3: Safe and Reliable Supply of Water</p> <p>Outcome 4: Corporate and Financial Resilience</p>	<p>The Water resource management Plan should seek to support the Business Plan and the SEA framework should consider and echo the priorities set out in the Business Plan.</p>
<p>Bristol Water (2022) <i>Drought Plan 2022</i></p>	
<p>Bristol Water’s Drought Plan is an operational tactical manual detailing how they intend to manage a drought, what trigger levels can be used to identify when action is required, and what measures are available to support supplies when levels of service are compromised.</p>	<p>The SEA should account for the potential implications of the activities of the drought plan on the supply and demand management options and the preferred plan.</p>
<p>Wessex Water (2022) <i>Drought Plan 2022</i></p>	
<p>Wessex Water’s Drought Plan will set out the company’s tactical and operational response to extended periods of dry weather and drought. The Plan identifies the actions Wessex Water will take before, during and after a drought to maintain a secure supply of water and outlines how they will assess and mitigate against the environmental impacts of their actions.</p>	<p>The SEA should account for the potential implications of the activities of the drought plan on the supply and demand management options and the preferred plan.</p>
<p>South West Water & Bournemouth Water (2022) <i>Drought Plan 2022</i></p>	
<p>South West Water’s and Bournemouth Water’s Drought Plan sets out possible actions and interventions to reduce the demand for</p>	<p>The SEA should account for the potential implications of the activities</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>water and options for increasing access to water. It also details how they will communicate with the public and stakeholders in a clear and timely manner.</p>	<p>of the drought plan on the supply and demand management options and the preferred plan.</p>
<p>Severn Trent Water (2022) <i>Drought Plan 2022</i></p>	
<p>Severn Trent Water’s Drought Plan explains how the company will manage both supplies and demand for water during a drought in the region. The plan aims to balance the interests of customers, the environment and the economy.</p>	<p>The SEA should account for the potential implications of the activities of the drought plan on the supply and demand management options and the preferred plan.</p>
<p>Thames Water (2022) <i>Drought Plan 2022</i></p>	
<p>The Thames Water Drought Plan covers the following issues; Triggers for drought action, the options that would be used and when they would be implemented, how customers would be communicated with, and the impact upon the environment of the drought plan options.</p>	<p>The SEA should account for the potential implications of the activities of the drought plan on the supply and demand management options and the preferred plan.</p>
<p>Bristol Water (2019) <i>Final Water Resources Management Plan 2019</i></p>	
<p>The Water Resources Management Plan 2019 (WRMP19) presents Bristol Water’s approach to the management of water resources for the benefit of customers, the wider community and the environment in the period 2020 to 2045. The WRMP19 is closely linked with the findings of the process to develop the existing Bristol Water Drought Plan (2018).</p>	<p>The draft Water resources management Plan 2024 will take into account the objectives of Bristol Waters WRMP19.</p>
<p>Natural England Site Improvement Plans (2014-15): <i>South West (SIPs)</i></p>	
<p>SIPs have been developed as part of the Improvement plan for England’s Natura 2000 sites. These plans outline the current and predicted issues affecting the sites and the measures required to improve their condition. These are live documents intended to reflect changes in the evidence base. Objectives of site improvement plans include:</p> <ul style="list-style-type: none"> • Control of Invasive species • Management of public access and land use • Monitoring and action against diseases that affect trees. <p>Monitoring of species distribution and identifying any necessary action.</p>	<p>The SEA should seek to maintain or enhance the quality of habitats and biodiversity. The impacts of the Water resource management Plan on Natura 2000 sites should be addressed.</p>
<p>Environment Agency and Defra, (2015) <i>River Basin Management Plan for Severn and South West River Basin Districts</i></p>	
<p>River basin management plans provide a framework for protecting and enhancing the benefits provided by the water environment. Water and land resources are closely linked and so the plans also inform decisions on land-use planning. Environmental objectives include the following:</p> <ul style="list-style-type: none"> • Prevention of deterioration to the status of surface waters and groundwater. • To achieve objectives and standards for protected areas. 	<p>The Water resource management Plan will need to ensure that it is consistent with the principles of the River Basin Management Plan and that it does not adversely affect the issues identified as significant water management issues.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<ul style="list-style-type: none"> • To aim to achieve good status for all water bodies or, for heavily modified water bodies <ul style="list-style-type: none"> • and artificial water bodies, good ecological potential and good surface water chemical status. • Reversal of any significant and sustained upward trends in pollutant concentrations in Groundwater. • The cessation of discharges, emissions and losses of priority hazardous substances into surface waters. • To progressively reduce the pollution of groundwater and prevent or limit the entry of Pollutants. 	
<p>Bristol Avon Catchment Partnership (2016) <i>Catchment Plan</i></p>	
<p>The Bristol Avon Catchment Management Plan is the product of consultation with a range of stakeholders. The Bristol Avon Catchment Partnership have formulated a strategy to deliver a healthy river with high quality environment for both people and wildlife. It is also intended as a route to achieve WFD Objectives. It summarises key issues in the catchment and outlines a shared vision for how assets can be maintained and enhanced. The Partnership Actions are as follows:</p> <ul style="list-style-type: none"> • To improve public understanding about the value and services provided by the catchment. • To improve water and flood risk management. • Improve land management and sustainable agriculture. • To improve wastewater management. • To improve river management. • To Improve recreation management. <p>To Increase and better coordinate investment opportunities.</p>	<p>The Water resource management Plan operation may have the potential to affect several of the Catchment Management Plans objectives. The SEA will include objectives that take into account the objectives of the Plan where relevant</p>
<p><i>Local Plans and Core Strategy for impacted local authorities – Bristol, North Somerset, South Gloucestershire and Bath and North East Somerset</i></p>	
<p>Local plan forms part of each local authority’s statutory Development Plan. In their local plans each local authority identifies the main social, physical and economic characteristics and issues present. The plans then outline strategic objectives for future developments and a delivery strategy to accompany these. Strategic Objectives include:</p> <ul style="list-style-type: none"> • Ensuring a sustainable future and developing green capital. • Enabling ambitious and sustainable economic growth. • Appropriate housing provision and a high-quality built environment. • Fostering a pattern of development that improves health and wellbeing. 	<p>Options in the Water resource management Plan have potential to cause social, economic and environmental effects.</p> <p>The SEA assessment framework should consider the effects of the Water resource management Plan on the achievement of the strategy’s key priorities and the effects on water management, natural capital, landscape and biodiversity.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<ul style="list-style-type: none"> Effective waste management and minimisation of waste in new development. <p>Adapting to climate change and promotion of renewable energy.</p>	
<i>Bristol Health and Wellbeing Policy 2020-2025</i>	
<p>This strategy seeks to reduce the disparity in health outcomes between deprived and affluent areas of Bristol. It aims for citizens to thrive in a city that support mental and physical health and wellbeing.</p>	<p>The Water resource management Plan and SEA should take account of the aims of the strategy to promote health outcomes.</p>
<i>Historic England, Heritage at Risk Register: South West (2021)</i>	
<p>The Heritage at Risk register is produced annually and documents the buildings and structures, places of worship, archaeological sites, battlefields, wrecks, parks and gardens, and conservation areas known to be at risk in the region.</p>	<p>The WRMP should have special regard to heritage that is on the Heritage at Risk register for the South West.</p>
<i>Environment Agency (2009 and 2012) Catchment Flood Management Plans; Bristol Avon, Severn Tidal Tributaries, North and Mid Somerset</i>	
<p>Catchment flood management plans (CFMPs) explore all forms of inland flooding including fluvial groundwater, surface water and tidal flooding.</p> <p>In addition, CFMPs include:</p> <ul style="list-style-type: none"> Potential impacts of climate change The effects of current land use and land management. Sustainable management of flood risk areas and the preservation of vital assets. <p>CFMPs also help to establish effective management for future flood risk.</p>	<p>The Water resource management Plan links to this plan where it affects flood risk or land management, for example through changes in abstraction or water storage. The SEA should consider how the Water resource management Plan may affect flood risk across the region.</p>
<i>Environment Agency (2016) South West and Severn River Basin Districts, Flood risk management plans 2015-2021</i>	
<p>Over the 6-year period of implementation the Flood Risk Management Plan has sought to:</p> <ul style="list-style-type: none"> Reduce flood risk to people, property, infrastructure and services. Enable regeneration of existing communities and businesses. Increase resilience of South West transport infrastructure. Promote understanding of flood risk. Align the priorities of different River Management Authorities. Protect and work with natural river processes and restore watercourses to their natural state. Promote environmental benefits and achieve WFD objectives through Flood Risk Management activities. 	<p>The Water resource management Plan links to these plans where it affects flood risk or land management, for example through changes in abstraction or water storage. The SEA should consider how the Water resource management Plan may affect flood risk across the region.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<ul style="list-style-type: none"> Improve understanding of the influence of land use changes and support land use managers to deliver beneficial practices. 	
<p><i>The Cotswolds AONB Management Plan 2018-2023 & The Mendip Hills AONB 2019-2024</i></p>	
<p>Objectives include those associated with conserving and enhancing the condition of the AONBs.</p>	<p>The WRMP has the potential to affect several of the objectives for the Cotswolds and the Mendip Hills AONB. The SEA will include objectives that account for the objectives of the AONBs where relevant.</p>
<p><i>National Character Area (NCA) profiles for areas impacted by the Drought Plan</i></p>	
<p>NCA profiles are guidance documents intended to inform community decision making regarding each of the NCAs. They support the planning of conservation initiatives, inform the delivery of Nature Improvement Areas and encourage collaborative working through Local Nature Partnerships.</p> <p>Each profile contains Statements of Environmental Opportunity (SEOs) that offer guidance on critical issues within the area and promote sustainable growth.</p> <p>NCAs within the WRMP area are as follows: Avon Vales, Bristol Avon Valleys & Ridges, Cotswolds, Mendip Hills, Mid Somerset Hills, Severn & Avon Vales and Somerset Levels & Moors.</p>	<p>The Water resource management Plan may have an effect on NCAs. The SEA should include objectives that take into account the objectives of the NCAs where relevant (e.g. manage and enhance existing habitats).</p>
<p><i>Air Quality Annual Status Reports for Bristol City Council, South Gloucestershire District Council and North Somerset Council (2019)</i></p>	
<p>These reports provide an overview of air quality in each of the local authorities. They review the current standard of air quality in their areas and compare them to national statutory air quality objectives.</p> <p>The Annual Status Reports demonstrate the strategies employed by the council and any progress that has been made towards improving air quality.</p>	<p>The implementation of the Water resource management Plan may have some influence on air quality, either directly or indirectly, through construction or operational activities. The SEA should take account of the need to ensure that the region's air quality is maintained or enhanced, and that emissions of air pollutants are kept to a minimum. Seek to help meet regional air quality targets.</p>
<p><i>Bristol City Council Mayor's Climate Emergency Action Plan (2019), South Gloucestershire Council: Local Greenhouse Gas Report (2019/2020), North Somerset Climate Emergency Strategy 2019</i></p>	
<p>This plan outlines Bristol City Council's approach to management of the historic environment of the city. The objectives of the plan are to safeguard heritage for future generations, promote a sustainable urban environment and to ensure the effective use of limited council resources and community input.</p>	<p>The implementation of the Water resource management Plan may have an influence on the heritage of the region, in particular if options affect surface water levels. The SEA should seek to ensure any adverse effects on heritage assets are minimised or avoided.</p>
<p><i>Individual Conservation Area Appraisals</i></p>	

Objectives identified in the Policy, Plan or Programme	Influences on the Water Resource Management Plan and the SEA objectives
<p>Conservation Area Appraisals support the management of change in a way that conserves and enhances the character and appearance of historic areas. They interact with local and neighbourhood plans. Objectives include:</p> <ul style="list-style-type: none"> • Identification of new conservation areas or extensions to existing assets. • Appraisal of conservation areas. • Designation of sites. • Managing proposals in conservation areas. <p>Review of current conservation areas.</p>	<p>The Water resource management Plan and SEA should consider the need to protect conservation areas.</p>
<p>Bristol City Council: Our Inherited City: <i>Heritage Statement Guidance: 2020</i></p>	
<p>This plan outlines Bristol City Council's approach to management of the historic environment of the city. The objectives of the plan are to safeguard heritage for future generations, promote a sustainable urban environment and to ensure the effective use of limited council resources and community input.</p>	<p>The implementation of the Water resource management Plan may have an influence on the heritage of the region, in particular if options affect surface water levels. The SEA should seek to ensure any adverse effects on heritage assets are minimised or avoided.</p>
<p><i>South Gloucestershire Local Plan: Policies, Sites and Policies Plan Adopted November 2017</i></p>	
<p>The objectives of the South Gloucestershire Local Plan: Policies, Sites and Places Plan include:</p> <ul style="list-style-type: none"> • Responding to Climate Change and high-quality design. • Managing Future Development. • Tackling congestion and improving accessibility • Managing the Environment and Heritage. • Maintaining Economic Prosperity. • Providing Housing and Community Infrastructure. 	<p>The Water resource management Plan may influence local plan objectives. The SEA should include objectives that consider the objectives of the South Gloucestershire Plan where relevant.</p>
<p><i>South West Marine Plan (2021)</i></p>	
<p>The South West Marine Plan sets out to help businesses realise economic benefits available from the marine plan area, inform decision-making on activities taking place and how the marine environment can be developed, protected and improved over the next 20 years.</p>	<p>In areas covered by the South West Marine Plan, the SEA should inform the Water resources management plan so that the marine environment is developed, protected and improved as per the Plan's objectives.</p>
<p>Historic Environment Records – Bristol</p>	
<p>The Historic Environment Records is an information service which provides comprehensive resource related to the archaeological and historic built environment within a defined geographic area.</p>	<p>The SEA should utilise the Historic Environment Records to help identify archaeological and historic sites that may be impacted by Water resource management plan options.</p>

A3 Appendix 3 Environmental Baseline Review

A3.1 Biodiversity, Flora and Fauna

A3.1.1 Baseline

Biodiversity is the variety of plants (flora) and animals (fauna) in an area, and their associated habitats. The importance of preserving biodiversity is recognised from an international to a local level. Biodiversity has importance in its own right and has value in terms of quality of life and amenity.

The Bristol Water supply area comprises a large number of statutory designated sites important for biodiversity including Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites; these are listed in Table A-3 and shown in Figure A-1.

Table A- 4 provides numbers of SSSIs and National Nature Reserves (NNRs) within Bristol Water's supply area. SSSIs and NNRs relate to the county's best wildlife and geological sites. These national designations are shown in Figure A-2.

Table A-3: Ramsar sites, Special Areas of Conservation and Special Protection Areas within the Bristol Water supply area

Designation	Site
SPA	Chew Valley Lake
	Severn Estuary
	Somerset Levels & Moors
SAC	Avon Gorge Woodlands
	Severn Estuary
	Mendip Limestone Grasslands
	North Somerset & Mendip Bats
	Mendip Woodlands
Ramsar	Severn Estuary
	Somerset Levels & Moors

Table A- 4: Nationally Designated Wildlife Sites within the Bristol Water supply area

Number of SSSIs	Number of NNRs
195	24

In addition to the NNRs listed above, there are 67 Local Nature Reserves (LNRs) within the SEA Study Area. Figure A-2 identifies NNRs and LNRs together with areas of Ancient Woodland. A number of non-statutory designated sites are also present in the region such as sites managed by the Wildlife Trust or the Royal Society for the Preservation of Birds (RSPB).

There are a range of designated Natural Environment and Rural Communities (NERC) Act Section 41 habitats within the Bristol Water supply area. NERC habitats include rivers and streams, blanket bogs, reedbeds, fens and meadows. NERC priority species include:

- Otter
- Water vole
- Atlantic Salmon
- Fine-lined Pea Mussel
- Freshwater Pear Mussel
- Depressed River Mussel

- European eel
- Sea/Brown trout
- River lamprey
- White clawed crayfish
- Snakeshead Fritillary
- Loddon Lilly
- Creeping Marshwort
- Narrow-leaved water-dropwort
- River water-dropwort
- Greater Water Parsnip
- Club-tailed Dragonfly
- Tassel Stonewort
- Desmoulins Whorl Snail
- Snipe
- Lapwing
- Natterer's Bat
- Daubenton's Bat
- Pipistrelle Bat

The Avon Biodiversity Action Plan (BAP)³⁸ has identified that the west of England (Bristol, Bath and North East Somerset, North Somerset and South Gloucestershire) contains 28 UK BAP priority habitats and 19 of the 27 broad habitat types found in the UK as defined in UK BAP³⁹. The West of England supports 47 UK BAP species including dormice, water voles, white-clawed crayfish, otters, barn owls, horseshoe bats and a significant number of butterfly species. Rare plant species include round-headed leek (Bristol onion), Bristol rock-cress, the endemic Bristol whitebeam and nationally notable plants such as lizard orchid, adder's-tongue spearwort and Bath asparagus. Otters are recovering across much of the region and polecats are also making a recovery, spreading south from Gloucestershire.

A3.1.2 Ancient Woodlands

Ancient woodlands in England are important habitats that should be protected. An ancient woodland is any wooded area that has contained woodland continuously since at least 1600 AD. They tend to be more ecologically diverse and of a higher nature conservation value than those developed recently, or where cover on the site has been intermittent. They often also have cultural importance. Areas of ancient woodland are shown on Figure A-2.

A3.1.3 Water Framework Directive – ecological status

The WFD ecological status classification considers the condition of biological quality elements (e.g. aquatic invertebrates, plants and fish), the morphology of the habitat available in each water body (e.g. a defined stretch of river), and concentrations of supporting physico-chemical elements (e.g. oxygen or ammonia and concentrations of specific pollutants). See the 'Water' topic for details on water quality and ecological condition of water bodies.

Water abstraction and associated infrastructure can sometimes result in adverse effects on water-related sites. Impacts on biodiversity may be caused by the drying out of wetland habitats, lower water levels and slower flows in watercourses, deterioration in water quality, change in water temperature, or the transfer or proliferation of invasive species. The various WFD River Basin Management Plans (RBMPs) relevant to the study area identify changes to the natural flow and level of water as one of the major issues affecting the ecology of rivers – these being related to abstraction and flow regulation measures.

The Severn River Basin District experiences a number of pressures. 27% of watercourses are subject to physical modification, 29% experience pollution from wastewater, 12% experience pollution from towns, cities and transport, 40% experience pollution from rural areas, 2% experience pollution from abandoned mines, 7% experience changes to the natural flow and level of water, and approximately 1% experience negative effects from invasive, non-native species (INNS).

A3.1.4 Invasive Non-Native Species

There are approximately 2,000 non-native species established in Britain, predominantly in the terrestrial environment. Invasive species within the Bristol Water WRMP assessment area include well-established species such as mink and Japanese knotweed, as well as species that are present but less extensive, such as sunbleak fish and pennywort⁴⁰.

³⁸ Avon Biodiversity Partnership (2004) Biodiversity Action Plan. Available at: <http://www.avonwildlifetrust.org.uk/my-wild-city/my-wild-life> (Accessed 7th February 2022).

³⁹ UK BAP was published in 1994 and sets out a programme for conserving biodiversity in the UK. The UK Biodiversity Framework published in July 2012, succeeds the UK BAP.

⁴⁰ Severn Estuary Partnership (2014): Invasive Non-Native Species detected within the Severn Estuary Area: <https://severnestuarypartnership.org.uk/sep/estuary/physical-natural-environment/non-native-species/>

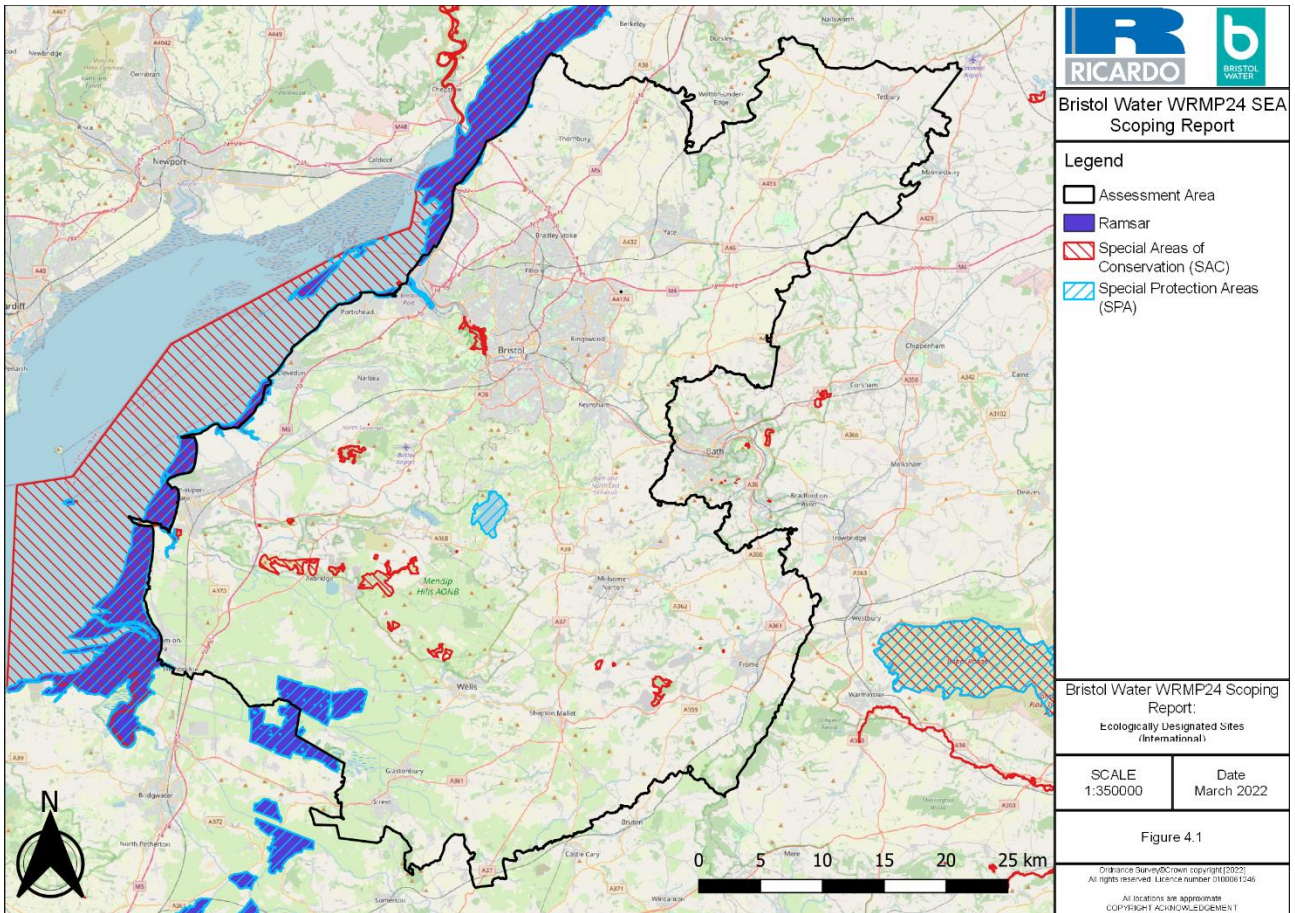


Figure A-1: International Ecological Designations within the study area

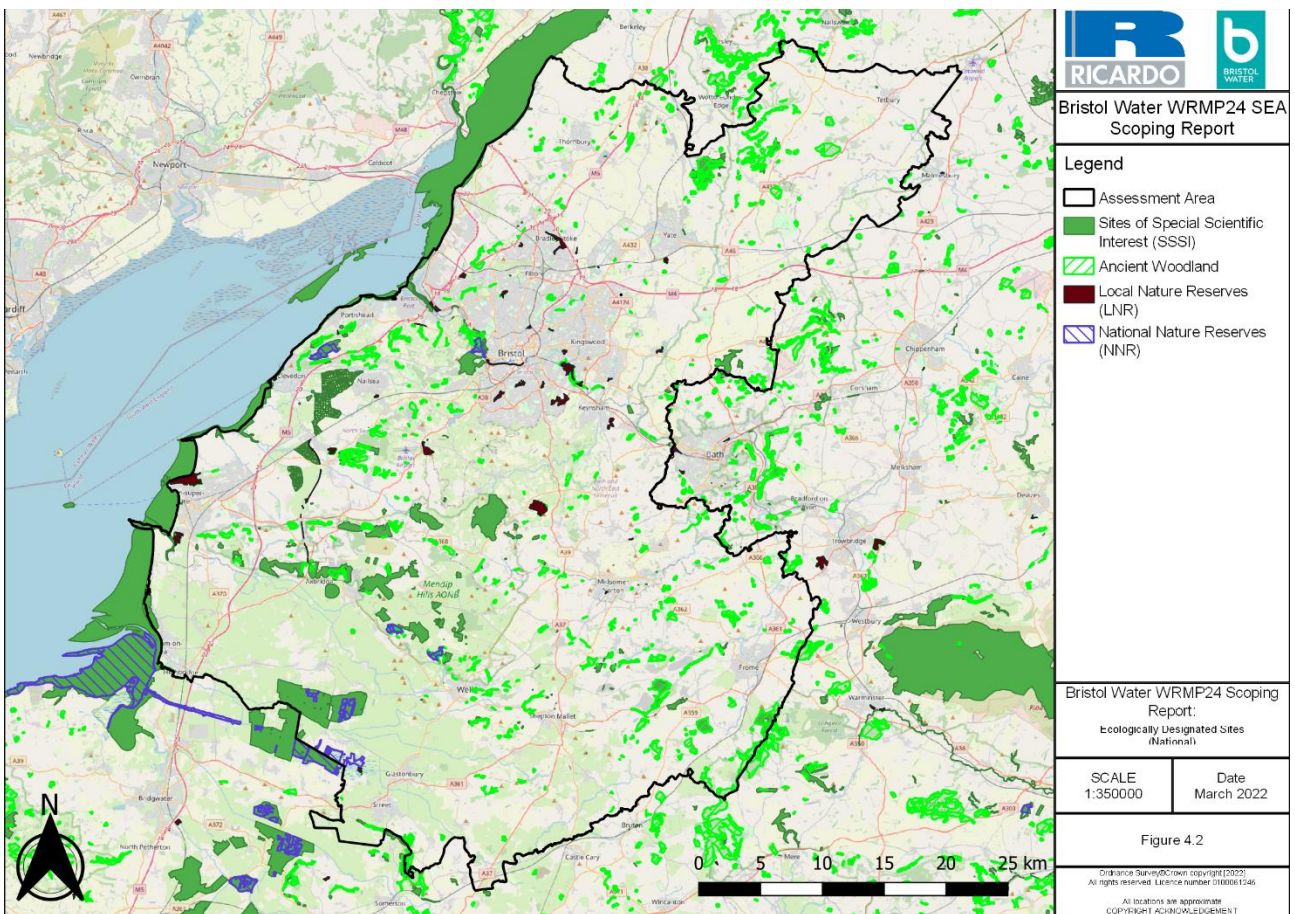


Figure A-2: National ecological designations within the Bristol Water study area

A3.1.5 Cross-boundary features

Outside of the assessment area but within 2km of the boundary, there are a number of other protected sites and areas of valuable habitat. Designated sites include;

- Ramsar sites (1x);
 - The Severn Estuary;
- Special Areas of Conservation (2x);
 - Bath & Bradford upon Avon Bats, The Severn Estuary.
- Special Protection Areas (1x);
 - The Severn Estuary
- National Nature Reserves (3x);
 - Bridgewater Bay, Huntspill River and Shapwick Heath.
- 5x Local Nature Reserves
- More than 20x SSSIs
- Large areas of Ancient Woodland, predominantly around Bruton, Bath and Wootton-under-Edge

A3.1.6 Future Baseline

The Defra 25 Year Environment Plan⁴¹ 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. The 25 Year Plan also proposed an adoption of a 'Biodiversity Net Gain' approach to development, an approach introduced into national planning policy in 2019. The Environment Act⁴² enacted in 2021 has now mandated the need for BNG assessment.

The 25-year Plan also includes a commitment to support land management at landscape and catchment level and to support the adoption of long-term sustainable land management practices to significantly expand wildlife habitat and provide opportunities for species and ecosystem recovery.

Climate change is anticipated to have an impact on wildlife in the future by exacerbating existing pressures such as changes to the timing of seasonal activity, and water scarcity. It is acknowledged that there is a need to allow wildlife to adapt to the impacts of climate change. Climate may limit species' distributions indirectly through the impact of invasive species on native species along climatic gradients. It will affect the abundance and diversity of natural enemies, competitors and species that constitute resources, as well as a species' ability to compete for resources or resist natural enemies. Climate change is also a threat to the network of designated wildlife sites in the UK. The boundaries of protected sites were often designed without climate change being accounted for, and are inflexible when the extents of habitats, or species populations, change in response to a changing climate. Some designated site boundaries, for example those surrounding wetlands, were drawn tighter to the valuable assets than advised, meaning these sites are less resilient than others⁴³.

The West of England Nature Partnership (WENP) is a cross-sector partnership working to restore the natural environment in the West of England through embedding the value of nature in decision making across spatial planning, public health and economic development. It is the designated Local Nature Partnership (LNP) for the West of England (Bristol City, South Gloucestershire, North Somerset and Bath & North East Somerset). LNPs are a key commitment from the 2011 Government White Paper, *The Natural Choice: Securing the Value of Nature*, which recognised the need for a more joined-up approach to reverse the loss of biodiversity and degradation of ecosystems. WENP is working to develop a regional Nature Recovery Network for the West of

⁴¹ UK Government (2018) 25 Year Environment Plan. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan> (Accessed 7th February 2022).

⁴² UK Government (2021) Environment Act. Available at: <https://www.legislation.gov.uk/ukpga/2021/30/part/1/enacted> (Accessed 7th February 2022).

⁴³ Berry, P. and Brown, I. (2021) National environment and assets. In: *The Third UK Climate Change Risk Assessment Technical Report* [Betts, R.A., Haward, A.B. and Pearson, K.V. (eds.)]. Prepared for the Climate Change Committee, London

England, aligning with shared principles developed across the south west of England to ensure coherence and strengthened networks across the wider region.

Bristol Water established the Biodiversity Index approach (a ranked assessment of biodiversity gain opportunities) in 2015 with the aim of ensuring a positive impact on the natural environment following operational activity/construction works. All Bristol Water owned sites have been assessed to inform a baseline Biodiversity Index score. The Biodiversity Index now forms the basis of a Performance Commitment under which Bristol Water have committed to improve the overall Biodiversity Index score over time.

Bristol Water has committed to a number of projects in the PR24 WINEP which will help to address issues at the Mendip reservoirs and associated designated sites, such as Blagdon Lake SSSI. These include Blagdon Macrophytes (08BW100032), Reservoir Operations and Nutrient Cycling (08BW100005), SSSI Condition Assessment (08BW100023) and INNS Monitoring (08BW100030). Bristol Water will also:

- Include the Blagdon licence in the cross company Environmental Destination investigation.
- Continue work on the River Congresbury Yeo and River Chew to mitigate impacts of the reservoirs on the downstream rivers, including consideration of interactions between flows and migratory barriers.
- Continue to deliver the catchment management programme which has seen phosphorus concentrations and algal bloom frequencies reduce in the Mendip reservoirs over the past ten years.

A3.1.7 Key Issues

The key sustainability issues arising from the baseline assessment for biodiversity are:

- The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation.
- The need to avoid activities likely to cause irreversible damage to natural heritage.
- The need to take opportunities to improve and not reduce connectivity between fragmented habitats.
- The need to control the spread of INNS.
- The need to consider the impact of climate change upon protected species and habitats when assessing water resource options.
- The need to recognise the importance of allowing wildlife to adapt to climate change.
- The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.

The need to deliver an increase in the Bristol Water biodiversity index.

A3.2 Soil, Geology and Land Use

A3.2.1 Baseline

A3.2.1.1 Geology

The Bristol Water supply area is geologically diverse and includes a number of Principal Aquifers such as the chalk aquifer. Geological sites may be sensitive to changes in water levels and quality, pollution, and land use.

The Severn and Avon Vales to the west and north of Bristol is a low-lying, undulating flood plain of the Rivers Severn and the Warwickshire Avon and therefore contains alluvial soils. Much of the land adjacent to the rivers floods regularly in winter and there are relict wetland sites and features such as old pollards, wet pastures, ditches and tall hedges. Woodlands tend to be fairly small and are scattered throughout the area⁴⁴.

The area is underlain by Triassic and Jurassic soft rocks, mostly consisting of Mercia Mudstones and Liassic Clays, which form heavy loam or clay soils. Several outliers of Cotswold Jurassic Limestone occur at Bredon Hill and near Gloucester.

⁴⁴ Natural England (2014) National Character Area Profiles (south west England). Available at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-south-west-england> (Accessed 7th February 2022).

The Bristol, Avon Valleys and Ridges toward the north and east of the Bristol Water supply area are underlain by Carboniferous and Jurassic Limestone with mudstones, clays and alluvium in the valleys. Land use is varied and includes the urban area of Bristol, the River Avon gorge and alternating ridges and broad valleys with some steep wooded slopes and open rolling farmland.

The Mendip Hills to the south are underlain by Carboniferous limestone and support species-rich grasslands and woodlands on thin soils. The Mendips are predominantly pastoral with much of the plateau traditionally being grazed by dairy cattle with beef or sheep on the escarpments. There has been significant horticultural use made of the lower slopes of the southern escarpment, particularly growing strawberries.

The Somerset Levels and Moors are located to the south of the Bristol Water supply area and are underlain by Triassic rocks, the most common of which is Mercia mudstone. It is the largest area of lowland wet grassland and associated wetland habitat remaining in Britain. The majority of the area is only a few metres above mean sea level and drains via a large network of ditches, rhynes and rivers. The area is mainly used for summer cattle grazing, often in conjunction with hay or silage production, although withy (willow) growing is also an important traditional activity.

Geological Conservation Review (GCR) Sites is the register of known nationally and internationally important Earth science (geological and geomorphological) sites in Great Britain⁴⁵. The GCR underpins designation of Earth science features in SSSIs. There are 91 GCRs within the Bristol Water supply area (Figure A-3).

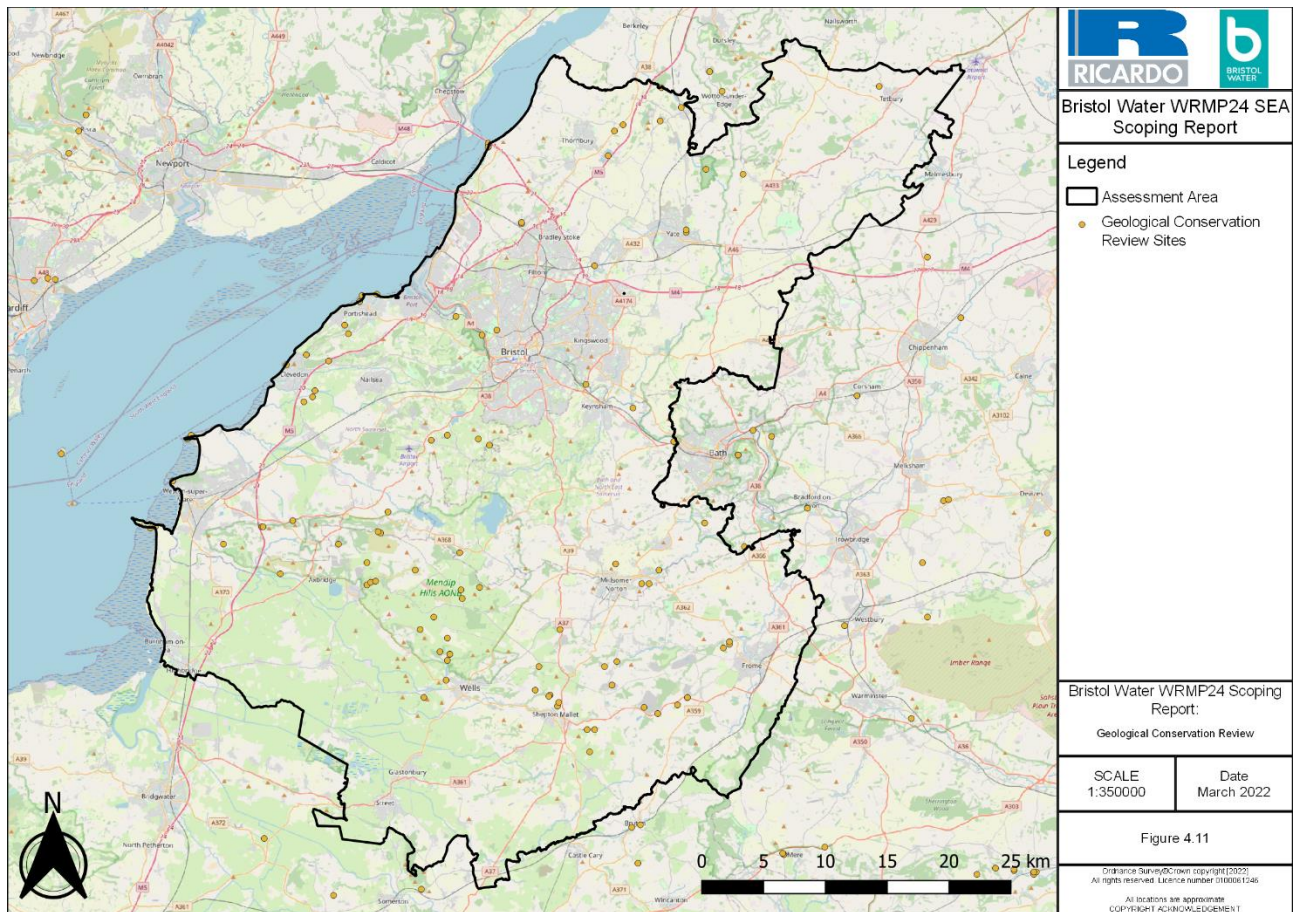


Figure A-3: Geological Conservation Review Sites

A3.2.1.2 Land Use

MHCLG data states that for both the South West and the UK, land that is not developed constitutes 93.2% and 91.5% respectively of total land area. The single largest land use in the South West is agriculture, constituting

⁴⁵ Geological Conservation Review. Available at: <http://jncc.defra.gov.uk/page-2947> (Accessed 7th February 2022).

68.5% of total land (this is considered to be land that is not developed). Within developed land, the single largest use is Transport & Utilities, which constitutes 3.8% of total land use⁴⁶.

Water equates to 4.9% of the total area of land within the West of England sub-region compared to 2.6% nationally and 2.0% regionally, with the Bristol City Council area having the largest proportion of land area within this land use typology (7.3%) and Bath & North East Somerset the lowest (1.9%).

Previously developed land (PDL) is defined as land that is or was occupied by a permanent structure (excluding agricultural or forestry buildings, landfills and parks) and associated fixed surface infrastructure. The proportion of new development built on PDL in the West of England varies across the four local authorities that comprise the sub-region. For example, between 2013 and 2016, 86% of new developments were constructed on PDL in the Bristol City Council area compared to 60% nationally, which in part reflects the urban nature of the area and limited opportunities for greenfield development. In contrast, only 37 to 42% of new dwellings in North Somerset, Bath & North East Somerset and South Gloucestershire were constructed on PDL over the same period⁴⁷.

In 2012, the South West had a total of 2,360 ha of vacant or derelict PDL that was unused or may be available for redevelopment, which was one of the lowest compared to other English regions (Table A-5). Of this, about 23% had some form of planning permission or was allocated for development in a local plan. Two thirds (1,800 ha) of PDL in the South West region was considered to be suitable for housing, with capacity for 29,910 homes⁴⁸.

Table A-5: Previously Developed Land available for redevelopment (2012)

Region	All vacant and Derelict PDL (ha)	Total Area Suitable for Housing (ha)
South West	2,360	1,800
<i>England</i>	<i>45,120</i>	<i>22,681</i>

Adopted and emerging local plans of the local planning authorities that comprise the West of England seek to maximise development of brownfield sites in addition to greenfield land to meet housing and economic development needs.

A3.2.1.3 Soils

The Agricultural Land Classification (ALC) was developed by Defra providing a means of assessing agricultural land suitability. The 'best and most versatile land' is generally defined as agricultural land that is Grades 1, 2 and 3a, with Grade 1 being the best (see Table A-6).

In the Bristol Water supply area, there are vast areas of Grade 1 quality agricultural land located in the area between Bristol and Radstock, and around Nailsea. Poorer quality land can be found in the Mendips and to the southeast of the Bristol Water supply area. Generally, land in the Bristol Water supply area is classified as 'Good/Moderate' (Grade 3). Whilst the proportion of land classified as 'Poor' (Grade 4) or 'Very Poor' (Grade 5) is less relative to England, the percentage within Grade 1 ('Excellent') or Grade 2 ('Very Good') is also less. Figure A-4: Agricultural Land Classifications shows the ALC of the Bristol Water supply area.

⁴⁶ [Live tables on land use - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

⁴⁷ Department for Communities and Local Government (2016) Land Use Change Statistics. Available at: <https://www.gov.uk/government/statistical-data-sets/live-tables-on-land-use-change-statistics> (Accessed 7th February 2022).

⁴⁸ University of the West of England, for the Campaign to Protect Rural England (2014) From Wasted Space to Living Spaces: The Availability of Brownfield Land for Housing Development in England.

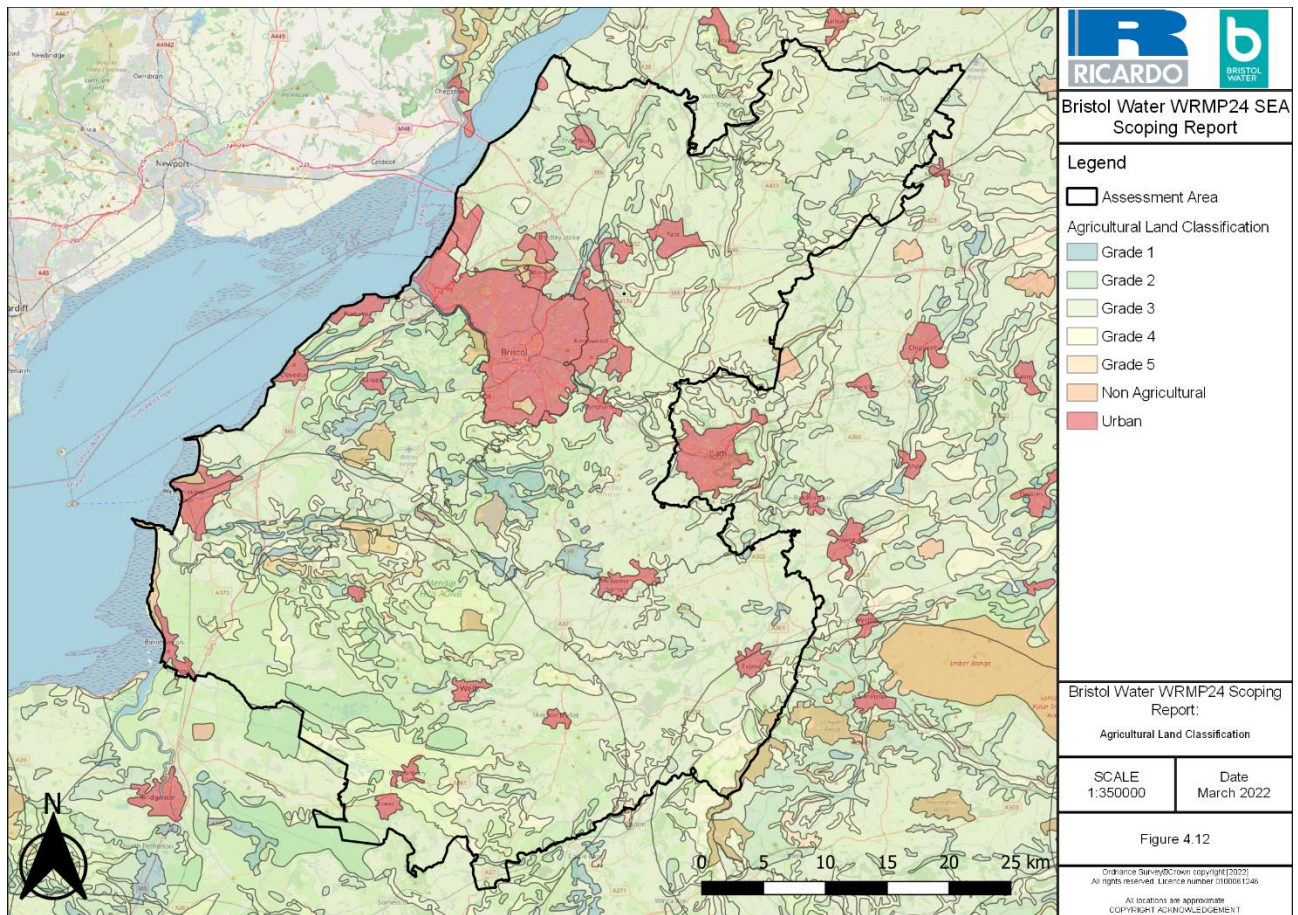


Figure A-4: Agricultural Land Classifications

Table A-6: Agricultural Land Classification percentage land cover for the Bristol Water supply area and England

Agricultural Land Classification	Bristol Water Supply Area (%)	England (%)
Grade 1 - Excellent	1.7	2.7
Grade 2 – Very Good	7.6	14.2
Grade 3 – Good / Moderate	69.9	48.2
Grade 4 - Poor	13.7	14.1
Grade 5 - Very Poor	0.35	8.4
Non-Agricultural	2.66	5
Urban	4.17	7.3

A3.2.2 Cross-boundary features

Within 2km of the Bristol Water Service area there are a further 12 geological conservation review sites. The majority of the land within 2km of the service area boundary is ALC Grade 3, with a large area of urban land comprising of the city of Bath.

A3.2.3 Future Baseline

One of the core planning principles of the National Policy Planning Framework (NPPF) is to encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is

not of high environmental value⁴⁹. The NPPF also places great importance with respect to Green Belt policy, the aim of which is to prevent urban sprawl by keeping land permanently open⁴⁹. Green Belt serves five purposes: to check the unrestricted sprawl of large built-up areas; to prevent neighbouring towns merging into one another; to assist in safeguarding the countryside from encroachment; to preserve the setting and special character of historic towns; and to assist in urban regeneration, by encouraging the recycling of derelict and other urban land. Although the NPPF promotes a presumption in favour of sustainable development, this does not apply where proposed developments may affect European or other designated sites covered by specific policies.

The 25 Year Environment Plan (2018) runs alongside the Industrial Strategy (2017) and outlines the government's approach to safeguarding the environment and sustainable management of the economy. It introduces reforms to incentivised land management following Brexit. The plan details the Environmental Land Management scheme (ELMs); the evolution of the Common Agricultural Policy (CAP) following exit from the EU. The ELMs include 3 new schemes designed to support the rural economy and the government's commitment to net zero emissions by 2050. The first of these schemes, the Sustainable Farming Incentive, will pay farmers to manage their land in an environmentally sustainable way. The scheme designates standards based on a feature e.g., hedgerows or grassland, and contains a series of actions required to meet the criteria. The scheme is currently being piloted but is due to launch in 2022. The Local Nature Recovery Scheme is intended to encourage collaboration between farmers and will pay for actions that support nature recovery which meet local environmental priorities. The Local Nature Recovery Scheme is due to launch in 2024. Finally, the Landscape Recovery scheme support long-term projects to recover landscape and ecosystems. Examples of projects include the restoration of peatland and salt marshes, large-scale tree planting and the re-wilding of landscapes where appropriate. Again, this scheme is due to come online in 2024.

A3.2.4 Key Issues

The key sustainability issues arising from the baseline assessment for soil, geology and land use are:

- The need to protect geological features of importance and maintain and enhance soil function and health.
- The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources).
- The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.
- The need to minimise development on Best and Most Versatile (BMV) agricultural land.

The need to minimise development on Green Belt land.

A3.3 Water

A3.3.1 Baseline

In the context of the WFD, the water environment includes rivers, lakes, estuaries, groundwater and coastal waters out to one nautical mile. The WFD brings together the planning processes of a range of other water-related European Directives. These Directives establish protected areas to manage water, nutrients, chemicals, economically significant species, and wildlife, and have been brought in line with the planning timescales of the WFD.

A3.3.1.1 Surface Waters: Rivers and Canals

The area under consideration lies within the Severn River Basin District and the South West River Basin District.

Bristol Water is a water only company that provides water supplies to 1.23 million people and all the associated businesses in an area of approximately 2,400 square kilometres centred on Bristol and the town and villages within approximately a 35-kilometre radius of the city. The water supply area stretches from Thornbury and Tetbury in the north, to Street and Glastonbury in the south, and from Weston-Super-Mare in the west to Frome in the east.

⁴⁹ [National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/policy-framework)

88% of the water supply managed by Bristol Water comprises surface waters while 12% comes from groundwater. A major abstraction is taken from the Gloucester and Sharpness Canal under agreement with the Canal & River Trust which is supplied by the Rivers Severn, Cam and Frome. This single abstraction provides approximately 50% of the water available to Bristol Water. Abstraction from the River Severn is controlled by statutory and abstraction licence conditions. In dry periods, use of water supplies from the River Severn is increased by Bristol Water to conserve water stored in reservoirs.

Surface water features in the study area are shown in Figure A-5.

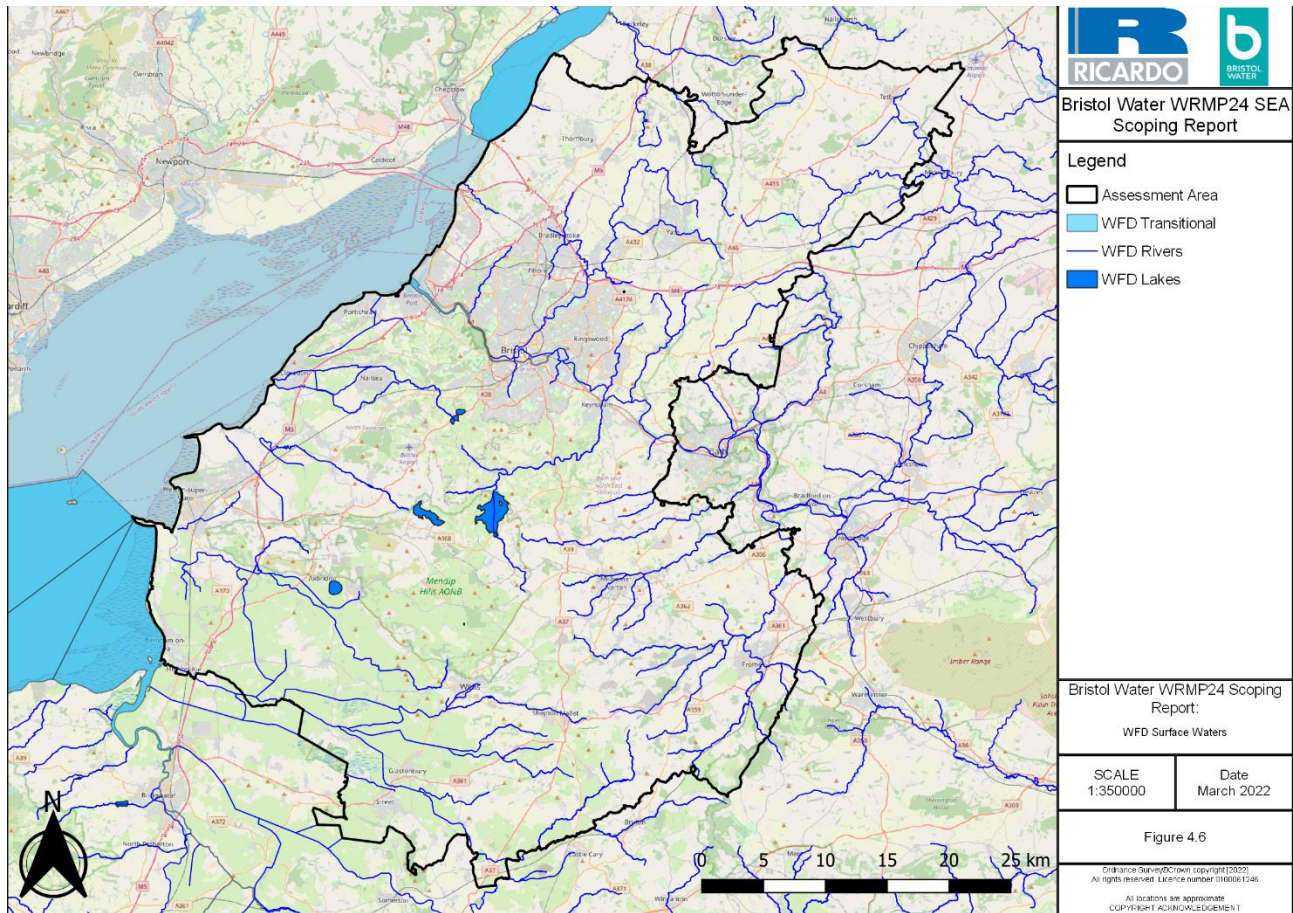


Figure A-5: WFD Surface Waters

A3.3.1.2 Surface Waters: Lakes and Riversides

There are three surface water impounding reservoirs (Cheddar, Blagdon and Chew Valley) collecting water from the Mendip Hills. Chew Valley Reservoir is the largest. There are also other smaller raw water reservoirs within the supply system.

Figure A-6 shows the current water resources availability for sustainable abstraction (Environment Agency Catchment Management Strategies data). This shows that the majority of the water resources within the Bristol Water WRZ are available to be abstracted at least 95% of the time. There is however a large area surrounding the Mendip Hills where water resources are available for abstraction less than 30% of the time (see Figure A-6). It is noted this information is consistent with the evidence used in the screening for the WFD assessment. The SEA is based on current water resources availability at this time and not future water resources availability, until further understanding has been developed.

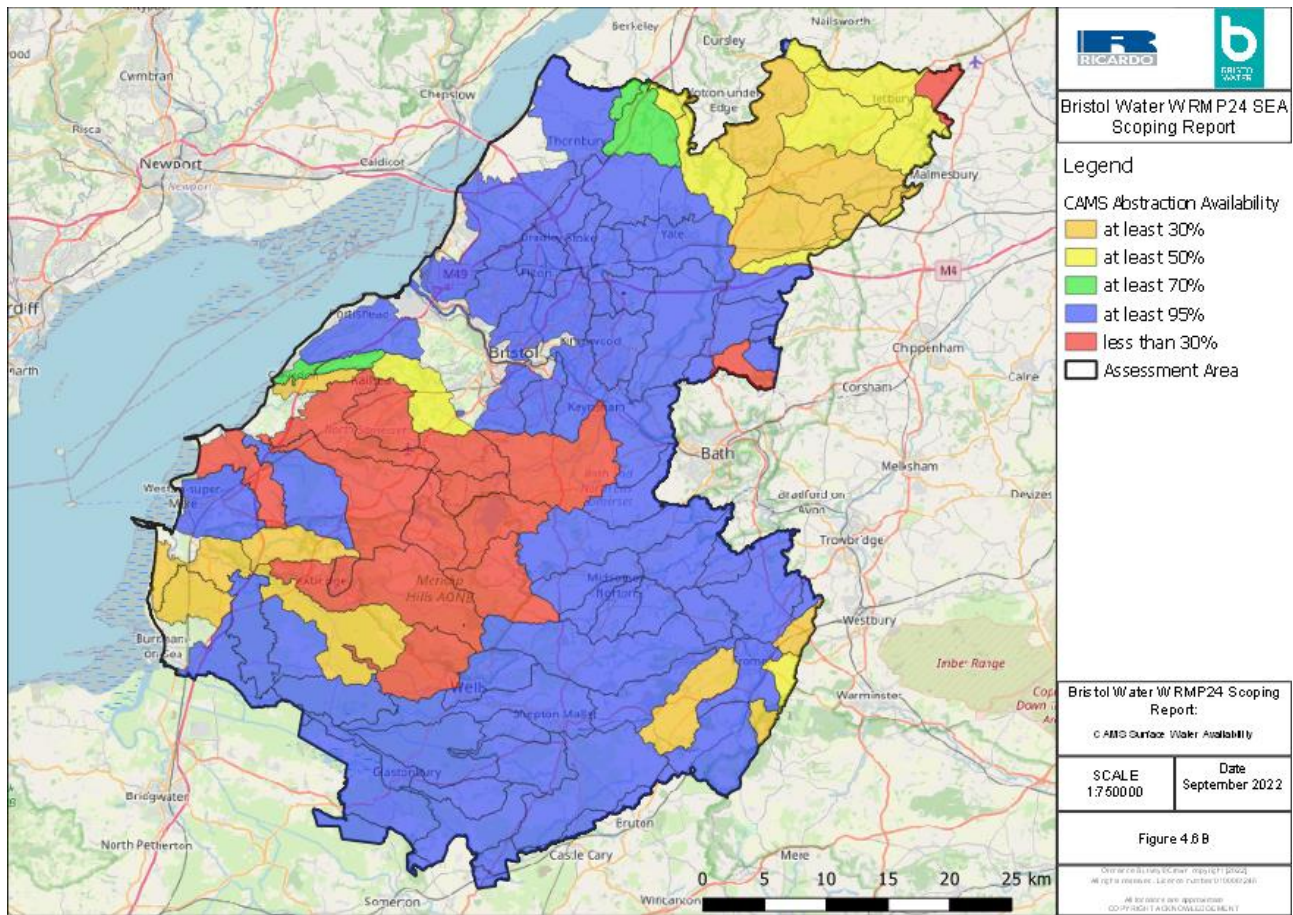


Figure A-6: CAMS Surface Water Availability

A3.3.1.3 Groundwater

Bristol Water operates 16 small groundwater sources such as springs, wells and boreholes which are used conjunctively and account for around 12% of the water available. The groundwater bodies are shown in Figure A-7.

Under the WFD, there are two separate classifications for groundwater bodies, chemical status and quantitative status. A groundwater body will be classified as having poor quantitative status in the following circumstances: where low groundwater levels are responsible for an adverse impact on rivers and wetlands normally reliant on groundwater, where abstraction of groundwater has led to saline intrusion, and where it is possible that the amount of groundwater abstracted will not be replaced each year by rainfall. For a groundwater body to be at good status overall, both chemical status and quantitative status must be good. In addition to assessing status, there is also a requirement to identify and report where the quality of groundwater is deteriorating as a result of pollution and which may lead to a future deterioration in status.

Source Protection Zones (SPZs) provide additional protection to safeguard drinking water quality. This is achieved through constraining the proximity of an activity that may impact upon drinking water abstraction. They are defined around large and public potable groundwater abstraction sites and take account of the groundwater travel time to an abstraction.

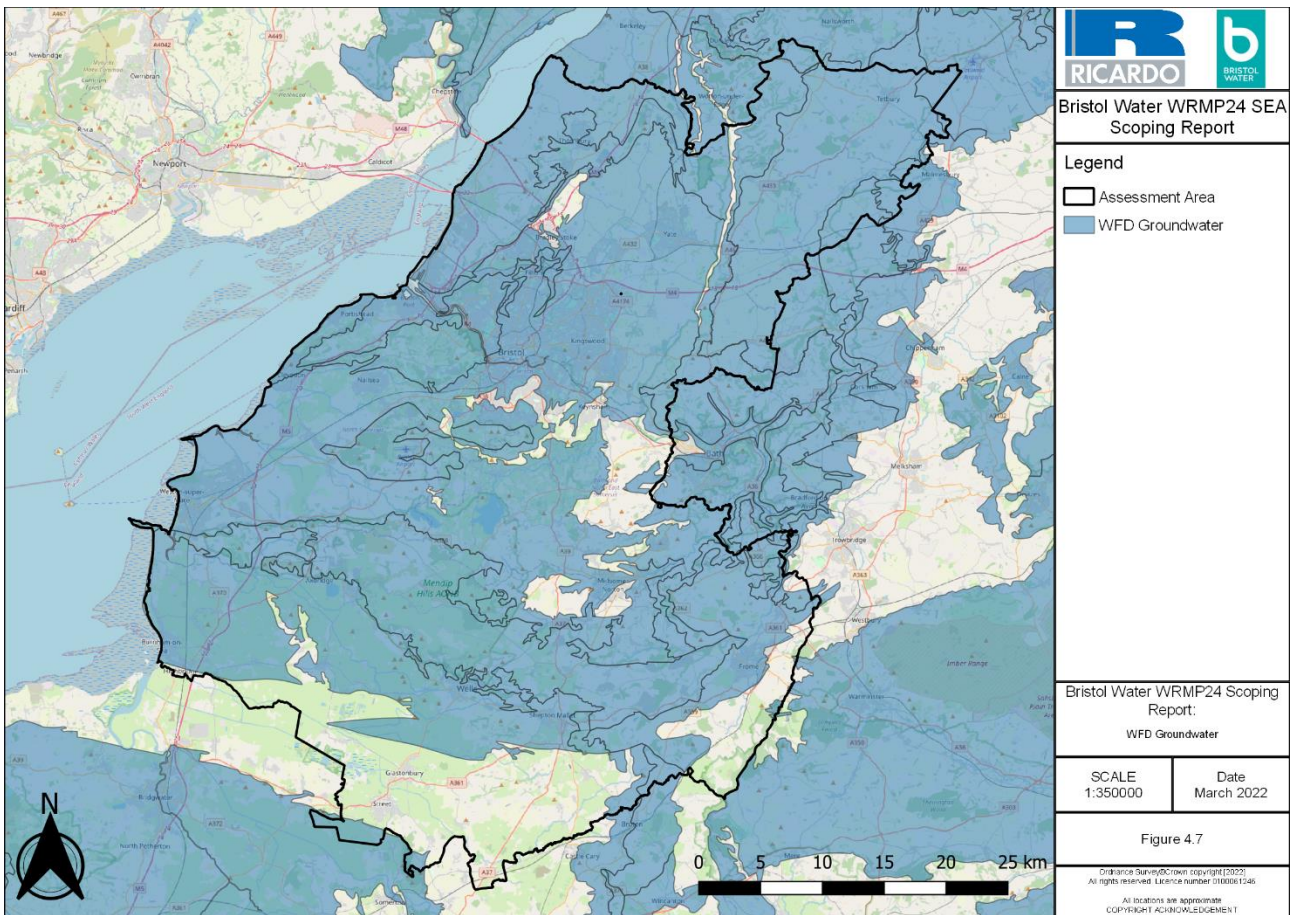


Figure A-7: WFD Groundwater Boodies within the Bristol Water supply area

A3.3.1.4 Estuaries

There are four WFD estuarine waterbodies associated with the assessment area: Bristol Avon, Severn Upper, Severn Middle and Severn Lower, with a combined area of over 50,000ha. They are all considered to have an ecological status of ‘moderate’ and a chemical status of ‘fail’.

A3.3.1.5 Water dependent designated sites

There are a number of designated sites, designated both at a national and international level, within the Bristol Water Area, that are dependent on the fluvial environment to maintain the standard of their qualifying features. These include (but may not be limited to). These are listed below but the pressures they are under, and how their baseline might change in future, is covered in greater detail in Section A3.1;

- Blagdon Lake SSSI
- Cheddar Reservoir SSSI
- The Severn Estuary Ramsar, SAC, SPA and SSSI;
- Bridgwater Bay SSSI
- Chew Valley Lake SPA and SSSI
- Avon Gorge Woodlands SAC
- Somerset Levels and Moors Ramsar and SPA.

A3.3.2 Key Pressures

The key pressures in the catchment, particularly affecting ecological and biological status are:

- Discharges from sewage treatment works releasing ammonia, phosphates, and other pollutants into the water environment. The major discharges in the catchment are from sewage treatment works and these can lead to signs of nutrient enrichment at times of low flows, for example the River Axe and North Somerset Streams⁵⁰;
- Intermittent discharges from sewage system overflows (pollution incidents);
- Diffuse runoff from agricultural land into watercourses (increasing nitrates and to a lesser extent pesticides);
- Impact of historical release of nitrates into groundwater (nitrates continue to accumulate in water many years after the sources of nitrates are removed); and

Surface water abstraction (public water supply and other abstractions impacting on low flows in the catchment).

A3.3.2.1 Aquifer Productivity

The hydrogeological map of aquifer productivity in the Bristol Water study area is shown in Figure A-8. A highly productive aquifer is distinguished from those that are only of importance or have no significant groundwater. Aquifer potential is identified using three divisions of geological formations⁵¹;

- those in which intergranular flow in the saturated zone is dominant
- those in which flow is controlled by fissures or discontinuities

less permeable formations including aquifers concealed at depth beneath covering layers.

⁵⁰ Environment Agency (2015). River Basin Management Plan Severn River Basin District.

⁵¹ British Geological Survey (2020) Hydrogeology 625K digital hydrogeological map of the UK. Available at: [Hydrogeology 625K digital hydrogeological map of the UK - British Geological Survey \(bgs.ac.uk\)](https://www.bgs.ac.uk/hydrogeology/625K/)

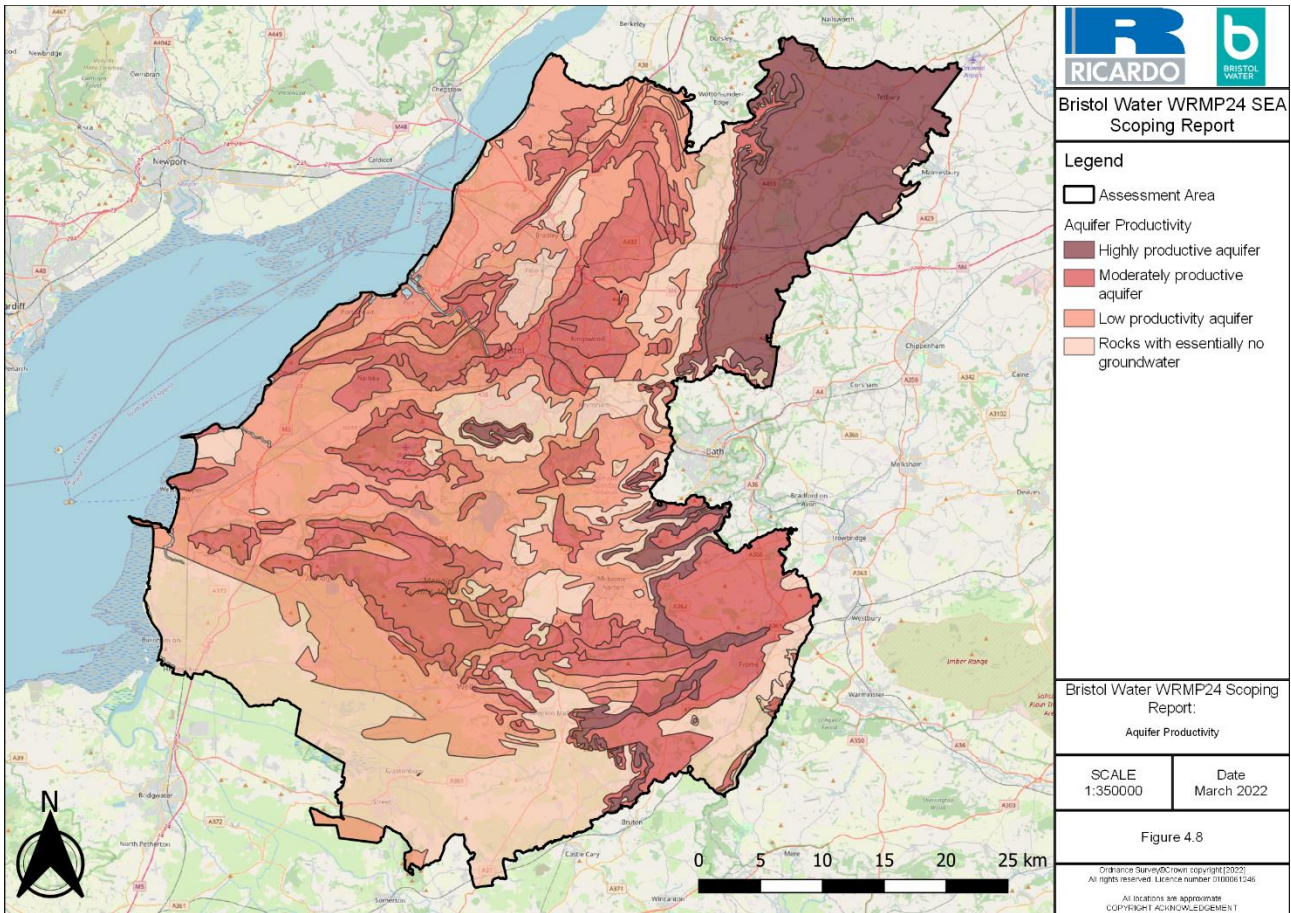


Figure A-8: Aquifer Productivity in the Bristol Water supply area

A3.3.2.2 Water Framework Directive Classification

Since 2000, the health of waterbodies has been classified using a status based approach according to quality elements defined within Annex V of the WFD.

Surface water status is awarded on a 5 point scale (High, Good, Moderate, Poor, Bad), and overall scores are split into scores for ecological status and chemical status. For a waterbody to be in overall 'good' status, both ecological and chemical status must be at least 'good' (i.e., the lowest score out of ecological and chemical status also constitutes the waterbody's overall score). Ecological status classification considers the condition of biological quality elements (e.g., aquatic invertebrates, plants and fish), hydromorphological quality elements (the morphology of the habitat available). Chemical status considers the general chemical and physico-chemical quality elements (concentrations of supporting physico-chemical elements; and concentrations of specific pollutants).

The Bristol Water SEA area falls within two management catchments, Avon Bristol & Somerset North Streams and Somerset South and West. Table A-7 shows the ecological and chemical status of waterbodies in these management catchments.

The WFD ecological classification for river catchments in the Bristol Water study area are shown in Figure A-9.

Table A-7: Ecological and Chemical status of waterbodies within the respective management catchment

Ecological Status or Potential						
Management Catchment	Bad	Poor	Moderate	Good	High	Total
Avon Bristol and Somerset North Streams	0 (0%)	22 (20%)	73 (68%)	13 (12%)	0 (0%)	108
Somerset South and West	1 (1%)	19 (17%)	85 (76%)	7 (6%)	0 (0%)	112
Chemical Status or Potential						
Management Catchment	Bad		Good			
Avon Bristol and Somerset North Streams	108 (100%)		0 (0%)			
Somerset South and West	112 (100%)		0 (0%)			

A3.3.2.3 Flood Risk

Flooding can arise from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources. The Environment Agency's Flood Risk Maps available on its website show areas at risk of flooding, including people, economic activity and the environment⁵².

Flooding impacts on people, the economy and the environment. Areas at risk include Burnham-on-Sea, Weston-Super-Mare and Bristol (Severn)⁵³. Approximately 156,000 people (14% of the study area's population) live along the coast⁵⁴ and flood risk is mitigated by flood defences where urban areas are present (i.e., Burnham-on-Sea, Clevedon, Portishead and Weston-Super-Mare). The Flood Risk areas in the Bristol Water study area are shown in Figure A-10.

⁵² [Flood Risk Maps for Rivers and Sea in England - December 2019 \(arcgis.com\)](https://arcgis.com)

⁵³ Bristol (Severn) Flood Risk Area comprises the Royal Edward Docks, land surrounding the River Trym, Hazel Brook, the River Frome, the River Malago, Bristol Floating Dock, Siston Brook, Brislington Brook, Longmoor Brook, Pigeonhouse Stream and Warmley Brook.

⁵⁴ The Centre for Towns Data Tool: <https://www.centrefortowns.org/datatool>

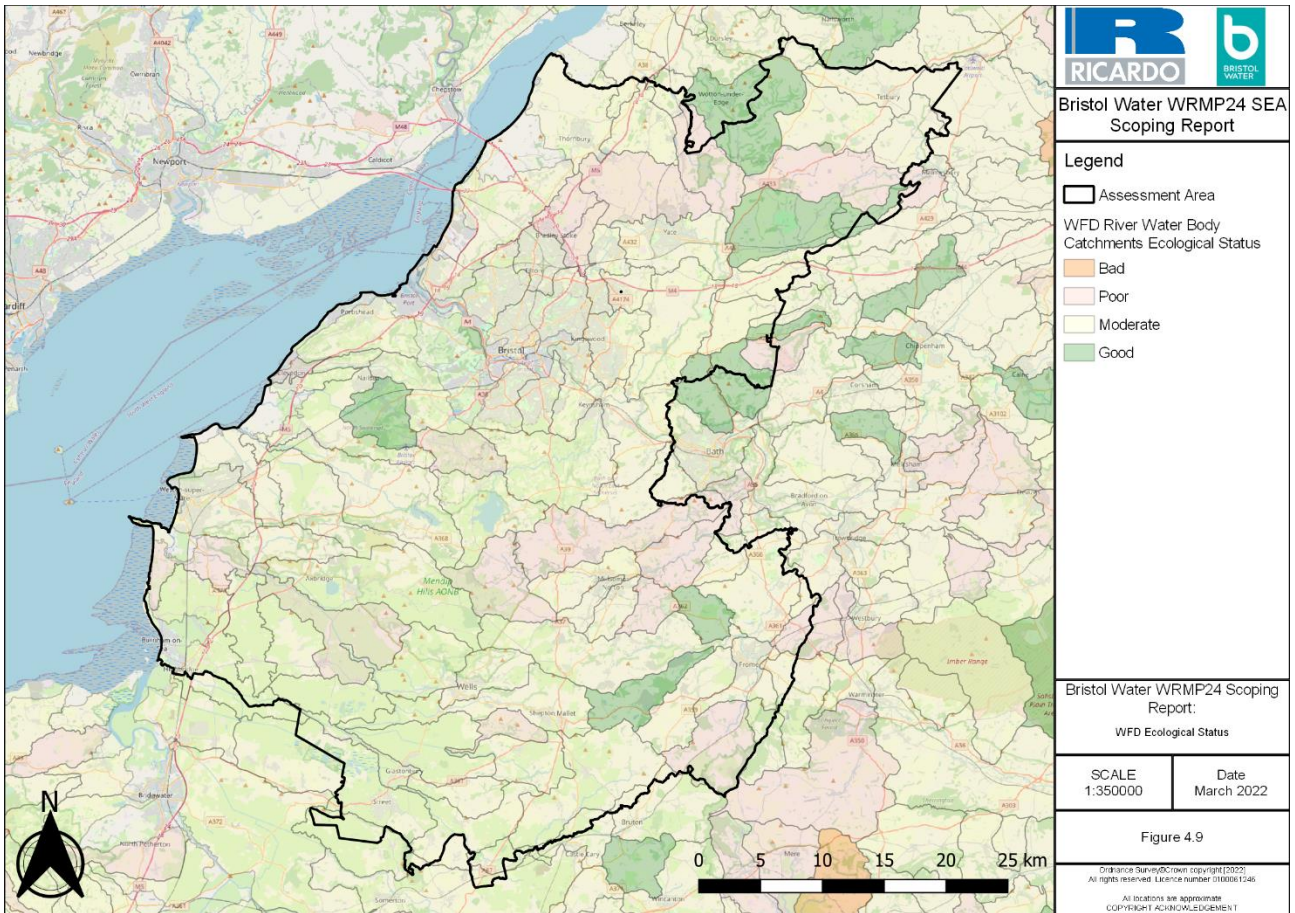


Figure A-9: WFD River Water Body Catchments Ecological Status

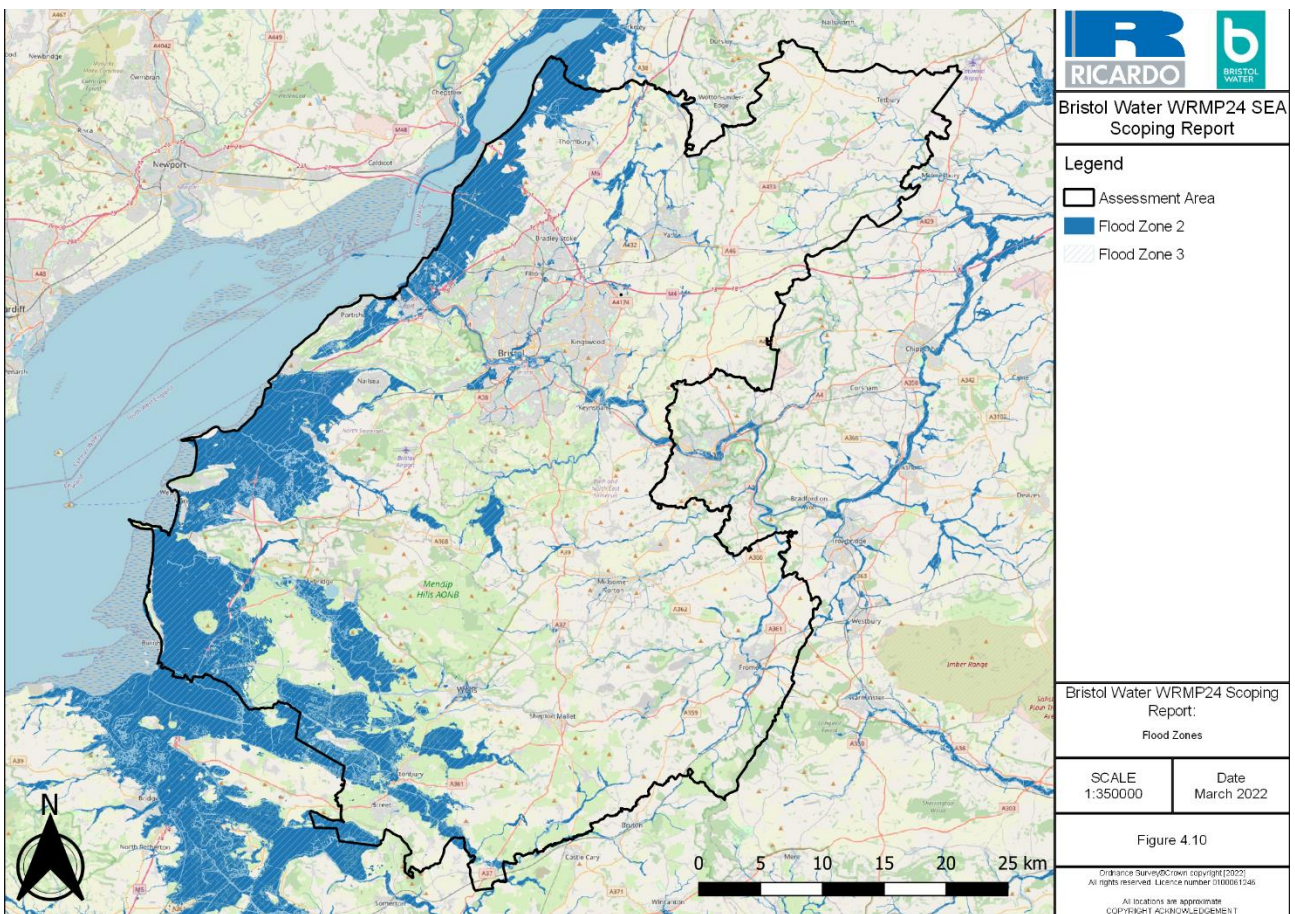


Figure A-10: Flood Zones

A3.3.3 Cross-boundary features

As shown on Figures A-1 to A-9, the area immediately surrounding the Bristol Water supply area does not change significantly.

A3.3.4 Future Baseline

The national framework for water resources⁵⁵ highlights that if no action is taken between 2025 and 2050, around 3,435 million extra litres of water per day will be needed to address future pressures in England. Five regional groups have been set up each tasked with pulling together a regional plan to build resilience to a range of uncertainties and future scenarios. These include water companies and other water users. The south west region's (termed as the west country in the national framework) increased consumption, driven by population growth, is the largest driver of future water need by 2050. Increasing public water supply resilience to extreme droughts is also a significant component of additional water need, with increased protection for the environment also driving a notable component of the future water need. The West Country Water Resources Group (comprising Bristol Water, South West Water and Wessex Water) has a priority to make the region more efficient by achieving the ambitious reductions in customer water use and leakage, and to explore the potential to transfer water to other regions – particularly the neighbouring south east.

Defra has published its Storm Overflows Discharge Reduction Plan, consultation of which ended on the 12th May 2022. Implementation of this plan. The aims of the plan are to ensure a continuous reduction in adverse impacts of discharges from storm overflows. Water companies should have the long-term aim of complete elimination of all harm from sewage discharges as a result of storm overflows. Implementation of this plan should mean the situation continues to improve regarding storm overflow events.

Originally, the WFD set a target of aiming to achieve at least 'good status' in all waterbodies by 2015. However, provided that certain conditions are satisfied, it was acknowledged that in some cases the achievement of good status may be delayed until 2021 or 2027. The primary objective in the short-term is to ensure no deterioration in status between status classes: the 2015 water body classification is the baseline from which deterioration between classes is assessed; no deterioration between status classes is permitted unless certain and specific conditions apply.

The UK Climate Change Risk Assessment (CCRA3) 2021 Evidence Report⁵⁶ draws together and interprets the evidence gathered CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Findings of all CCRA assessments include:

- Changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion)
- Increasing pressure on the UK's water resources due to changes in hydrological conditions and regulatory requirements to maintain good ecological status
- Increases in water demand for irrigation of crops
- A reduction in public water supplies due to increasing periods of water scarcity
- Lower summer river flows across the UK due to warming and drying conditions
- An increase in precipitation in winter months due to a combination of greater depths and more frequent heavy rainfall events – suggesting larger volumes of runoff with potential negative impacts on flood risk and sewer overflows in urban environments
- Flash-flooding associated releases from combined sewer overflows (CSO) could in turn increase associated illnesses at the coast due to the varying occurrence of microbial pathogens in the marine environment.

⁵⁵ Environment Agency (2020) Meeting our future water needs: a national framework for water resources. March 2020

⁵⁶ Defra (2016) The UK Climate Change Risk Assessment 2017 Evidence Report

A3.3.5 Key Issues

- The need to further improve the quality of the region's river, estuarine and coastal waters taking into account WFD objectives and designated sites objectives (i.e. assessment against Common Standards Monitoring Guidance, where relevant).
- The need to maintain, and where possible enhance, the quantity and quality of groundwater resources taking into account WFD objectives.
- The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change on surface waters and groundwaters.
- The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply.
- The need to ensure that people understand the value of water.

A3.4 Air Quality

A3.4.1 Baseline

A3.4.1.1 Local Air Quality

WRMP options may involve the operation of abstraction and treatment facilities at a greater level of intensity and / or in locations where such operations do not normally take place, with the potential for negative effects, although generally only in the short term.

The local air quality baseline situation can be best described through reference to the local authorities that have declared Air Quality Management Areas (AQMA). A local authority declares an AQMA when UK National air quality objectives are unlikely to be met. The local authorities in the area which have declared an AQMA within their boundaries are illustrated in Figure A-11. The majority of the AQMAs have been declared because of emissions from road transport. There are 5 AQMAs in total within the study area, alongside 2 *Air Quality Management Area Order (2018)* designations listed below;

- Bristol AQMA
- Keynsham AQMA
- Kingswood – Warmley AQMA
- Saltford AQMA
- Staple Hill AQMA
- Farrington Gurney Air Quality Management Area Order 2018
- Temple Cloud Air Quality Management Area Order 2018.

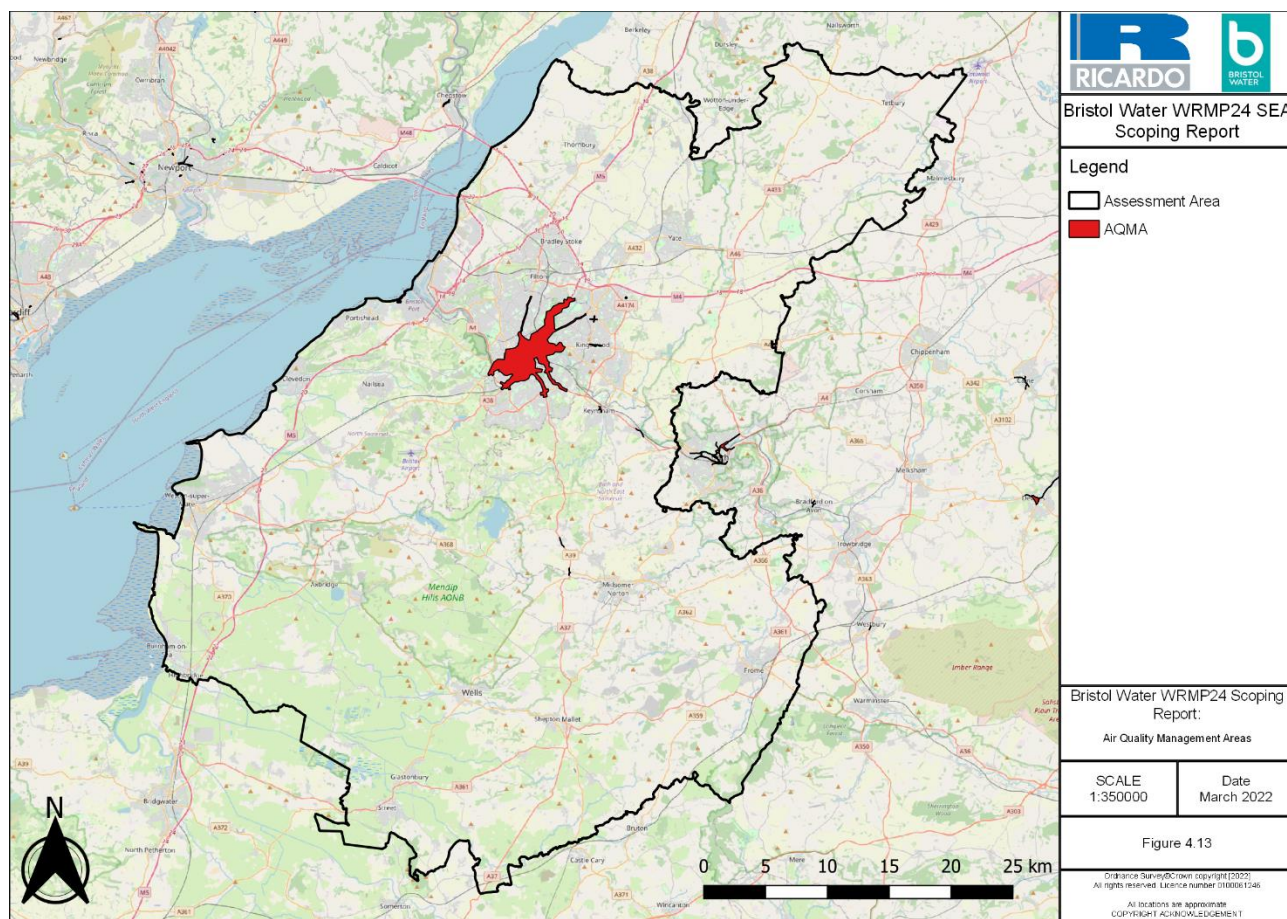


Figure A-11: Air Quality Management Areas within the Bristol Water supply area

The most recent Clean Air Strategy contains a set of objectives focused on the reduction of traffic emission impacts⁵⁷. In April 2015, the Supreme Court ruled that the UK Government must redraft the national nitrogen dioxide (NO₂) air quality action plan, as well as 16 regional action plans, including Greater London, with the aim of ensuring that these areas reach compliance with legal NO₂ limits as soon as possible. In response, the Government published an updated plan in 2017 along with individual zone plans for the 37 zones identified as having air quality issues with NO₂, including the South West⁵⁸. It is expected that the South West region will be compliant by 2022.

Air quality compliance data in 2019 for the South West and Bristol urban area zones is summarised below⁵⁹:

- The limit value for hourly mean nitrogen dioxide (NO₂) was met but the limit value for annual mean NO₂ was exceeded (along with eleven other UK zones).
- The target values for ozone based on the maximum daily eight-hour mean, based on the AOT4040 statistic were met.
- The long-term objective for ozone, set for the protection of human health (maximum daily eight hour mean) was exceeded (along with all other UK zones);
- The limit value for annual and daily mean concentration of PM₁₀ particulate matter was met compared to 2015 when it was not met.
- The target value for annual mean concentration of PM_{2.5} particulate matter, the Stage 1 limit value (which came into force on 1 January 2015), and the Stage 2 limit value (which must be met by 2020) were met.

⁵⁷ Defra (2019) Clean Air Strategy 2019.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/cleanair-strategy-2019.pdf

⁵⁸ [AQplans_UK0030.pdf \(defra.gov.uk\)](#) (accessed 9 February 2022)

⁵⁹ DEFRA (2020) Annual Report 2020. Available at: [Annual Report 2020 Issue 1 Online Viewer - Defra, UK](#)

- The limit values for nickel, benzo[a]pyrene, sulphur dioxide, carbon monoxide, lead and benzene were met.

In recent years, several key air pollutants have shown major decreases in atmospheric concentrations across the UK, while others have remained constant⁶⁰:

- Atmospheric concentrations of SO₂ have continued to decrease, in line with long-term trends across the UK. These reductions are a result of decreasing dependence on coal for energy and reductions in the sulphur content of fuels.
- Overall emissions of NO_x have decreased over the last 20 years, falling 57% between 2009 and 2019. Emissions from road transport also decreased by 31% between 2009 and 2019 as a result of tighter emissions standards for petrol and diesel cars. The monitored atmospheric concentrations did not show such a notable decrease, potentially due to continued high levels of NO_x emissions from older vehicles.
- Atmospheric concentrations of particulate matter (PM_{2.5} and PM₁₀) decreases in emissions have been partially offset by increases in emissions from residential burning with PM_{2.5} emissions increasing by 28% between 2009 and 2019.
- Carbon monoxide (CO) concentrations were reduced as a result of reductions in emissions from road transport, iron and steel production and the domestic sector.
- Levels of ozone have remained relatively constant since the mid-1990s, with a possible increase observed within significant annual variation as a consequence of primary NO emission reductions. The distribution of ozone across the UK shows highest concentrations over upland and rural locations with annual average concentrations of >60µg m⁻³ over rural areas in the UK including the South West⁶¹.

A3.4.2 Cross-boundary features

The Bath AQMA, covering a number of the largest roads within the city, is within 2km of the Bristol Water supply area. It is designated for elevated levels of NO₂ caused by road traffic. Depending on the nature of the preferred plan, there is the potential for cross-boundary effects on this designation.

A3.4.3 Future Baseline

Emissions of PM₁₀ and PM_{2.5} have been relatively stable since 2009. The Government's aim is to reduce emissions of PM_{2.5} against the 2005 baseline by 30% by 2020, and 46% by 2030, emissions of NO₂ against the 2005 baseline by 55% by 2020 and 73% by 2030 and to reduce emissions of sulphur dioxide against the 2005 baseline by 59% by 2020, increasing to 88% by 2030⁵⁷.

A3.4.4 Key Issues

The key sustainability issues relevant to the WRMP and the SEA, arising from the analysis of the air quality and climate baseline are:

- the need to minimise emissions of pollutant gases and particulates and enhance air quality;
- the need to reduce the need to travel and promote sustainable modes of transport;

A3.5 Climate Change

A3.5.1 Baseline

A3.5.1.1 Greenhouse Gases and Climate Change

Greenhouse gases including carbon dioxide (CO₂) emitted from human actions are a major contributor to climate change. The South West emitted approximately 7.5% of the UK's greenhouse gas emissions in 2019⁶². The amount of CO₂ emitted in the South West of England sub-region between 2015 and 2019 is shown in Table A- 8 and highlights that emissions have reduced since 2015 by 11% to 25.8 MtCO₂ in 2019, principally

⁶⁰ DEFRA (2021) Emissions of air pollutants in the UK – Summary. Available at: [Emissions of air pollutants in the UK - Summary - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/94422/20210127-air-pollutants-uk-summary.pdf)

⁶¹ Air Quality Expert Group (2021) Ozone in the UK – recent trends and future projections. Available at: [2112200932 Ozone in the UK Recent Trends and Future Projections.pdf \(defra.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/94422/20210127-air-pollutants-uk-summary.pdf)

⁶² BEIS (2021) UK Local authority carbon dioxide emissions estimates 2019. Available at: [UK local authority carbon dioxide emissions estimates 2019 \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/94422/20210127-air-pollutants-uk-summary.pdf)

because of declines in emissions from the industry and commercial and domestic sectors. Domestic and transport sectors remained the largest source of CO₂ emissions in the region.

Table A- 8: End User Estimates of Carbon Emissions, South West England 2015-2019⁶³

End User	2015	2016	2017	2018	2019
Industry (MtCO ₂)	5.2	4.9	4.7	4.6	4.4
Commercial (MtCO ₂)	3.3	2.8	2.6	2.6	2.3
Public Sector (MtCO ₂)	1.2	1.0	0.9	0.9	0.8
Domestic (MtCO ₂)	8.8	8.3	7.8	7.8	7.6
Transport (MtCO ₂)	11.2	11.6	11.7	11.5	11.4
LULUCF Net Emissions	0.6	0.7	0.8	0.8	0.8
Total	29.1	27.9	26.9	26.6	25.8
<i>Per capita emissions (t)</i>	5.9	5.6	5.4	5.3	5.2

On a local authority (LA) basis within South West England, every LA experienced a reduction in per capita emissions between 2014 and 2019⁶³. The average percentage decrease across the south west LAs was 17.5% across the six years. Exeter had the highest percentage decrease in emissions with 27.1%.

The predominant greenhouse gas of interest is carbon dioxide (CO₂). Bristol Water is a large user of energy due to the energy needed to treat and pump water. Mid-year 2021/22, 8.81kgCO_{2e} per customer were produced by Bristol Water, this rate of consumption is down from 19kgCO_{2e} in 2019/2020. Bristol Water's emissions figure per megalitre of water supplied was 375kg/CO_{2e}/MI in 2016; this has been reduced to 277kgCO_{2e}/MI by 2021⁶⁴. In the last 6 years, carbon emissions from Bristol Water have fallen 53%.

Forecasts for future climate change are likely to influence processes within the hydrological cycle such as runoff and evapotranspiration. The impact of climate change on the water environment and water-related infrastructure is summarised in Table A-9.

Table A-9: Potential impact of climate change on the water environment and water-related infrastructure

Sector	Impact
Water Resources (i). Water Supply (ii). Water demand	<i>Reduction in yields, either in total or at certain times of the year. Increased evaporation losses from surface water stores Increased sediment and pollution runoff into watercourses. Increased risk of algal blooms and pollution in reservoirs. Increase in demands in summer months leading to increase in average and peak requirements. Increased pressure on treatment and distribution system. Increased requirements for agriculture.</i>
Flood Management	<i>Increased riverine storm occurrence and flood risk. Improvements and higher specifications required for flood defences, urban drainage and rainwater disposal.</i>
Water Quality Management	<i>Lowered water quality in lowland rivers, with implications for instream</i>

⁶³ BEIS (2021) UK Local authority and regional carbon dioxide emissions national statistics: 2005 to 2019. Available at: [UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019)

⁶⁴ Bristol Water (2021) Annual Performance Report 2020/2021. Available at: [BW APR-2021 Web\(Linked\).pdf \(hubspotusercontent30.net\)](https://www.bristolwater.co.uk/annual-performance-report-2020-2021)

Sector	Impact
	<i>ecosystems and water abstractions. Altered potential for polluting incidents. Increased potential for combined sewer overflows due to an increase in extreme storm occurrences.</i>
Navigation	<i>Lower summer flows leading to reduced navigation opportunities in rivers and canals.</i>
Aquatic ecosystems	<i>Altered habitat potential, with species at their environmental margins most affected.</i>
Water-based recreation	<i>Impacts through changes in river flows and water quality.</i>

A3.5.1.2 Adaptation to Climate Change

The UK Climate Change Risk Assessment (CCRA3) 2021 Evidence Report, which is required to conduct its assessment every five years⁶⁵, draws together and interprets evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Overall, the findings of the CCRA3 have identified eight priority areas for Government and other organisations to address within the next five years:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards
- Risks to soil health from increased flooding and drought
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions
- Risks to crops, livestock and commercial trees from multiple hazards
- Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks
- Risks to people and the economy from climate-related failure of the power system
- Risks to human health, well-being and productivity from increased exposure to heat in homes and other buildings
- Multiple risks to the UK from climate change impacts overseas.

The UK Climate Change Act 2008 set legally binding targets for the UK to reduce greenhouse gas emissions by at least 80% by 2050, and CO₂ emissions by at least 26% by 2020, both set against a 1990 baseline. Under the requirements of the Act, the Government has set five year carbon budgets to set out a trajectory for emissions reductions to 2050. Budgets have been set covering the periods 2008-12, 2013-17, 2018-22, 2023-27 and 2028-32, equivalent to 22%, 28%, 34%, 50% and 57% reductions in carbon emissions compared to 1990 levels respectively. The National Adaptation Programme (NAP) is currently in its second period [2018-2023] which sets out the actions that government and others will take to adapt to climate change challenges in England. The NAP addresses climate risks which could affect the natural environment, critical infrastructure, communities and businesses and consequently explains associated actions and future responses on risks such as flooding and coastal change, risks to health from high temperatures, and risk of public water supply shortages⁶⁶.

⁶⁵ Defra (2021) The UK Climate Change Risk Assessment 2021 Evidence Report. Available at: <https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf>

⁶⁶ DEFRA (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting. Available at: [national-adaptation-programme-2018.pdf \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/724443/national-adaptation-programme-2018.pdf)

A3.5.2 Cross-boundary features

Climate change is a global issue that, due to its nature, is not contained within defined boundaries or borders. As a result, any water resource option that results in elevated emissions of greenhouse gases, during either construction or operation, is likely to cause cross-boundary effects.

A3.5.3 Future Baseline

Government and international targets will require significant cuts in greenhouse gas emissions by 2027. The UK met the first and second carbon budgets with headrooms of 36 and 384 MtCO_{2e} respectively and is currently projected to meet the third carbon budget with a headroom of around 26 MtCO_{2e} (until 2022)⁶⁷. Objectives are being achieved for many air pollutants (lead, benzene, 1,3-butadiene and carbon monoxide (CO)). However, measurements show that long-term reducing trends for NO₂⁶⁸ and PM₁₀⁶⁹ are flattening or even reversing at a number of locations, despite current policy measures.

Future climate change is projected (UKCP18) to cause a change in the seasonality of extremes through an extension of the convective season from summer to autumn, with increases in heavy rainfall intensity in the autumn. Although an overall summer drying trend is to be expected in the future, data from the Met Office's UK Climate Projections (UKCP18 [Local 2.2km] projections) suggest increases in heavy summer rainfall event intensity⁷⁰. The UKCP18 also estimates that summers in central England are likely to be between 1.1°C to 5.8°C warmer, 57% drier and 9% wetter⁷¹.

A3.5.4 Key Issues

- the need to reduce greenhouse gas emissions arising from implementation of the WRMP;
- the need to take into account, and where possible adapt to, the potential effects of climate change;
- the need to increase environmental resilience to the present and future effects of climate change.

A3.6 Human Health and Socio-Economics

A3.6.1 Baseline

The Bristol Water service area has a population of approximately 1.23 million people, with the population centred around the city of Bristol, which also has many populous suburbs. The service area also includes other towns, the largest being Weston-Super-Mare, Yate and Frome. The city of Bath lies just outside of Bristol Water's supply area.

A3.6.1.1 Population

The population of the greater West of England area (the Local Authorities of Bath & North East Somerset, the City of Bristol, North Somerset and South Gloucestershire, that represents significant crossover with the Bristol Water service area) is projected to grow substantially over the WRMP period. Based on 2018 figures (the most recent year for which projections are available), between 2022 and 2043 the population of this area is projected to grow by 14.0% (158,000 people), compared to an England-wide average of just 7.8%⁷².

⁶⁷ DECC (2020) Updated energy and emissions projections 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931323/updated-energy-and-emissions-projections-2019.pdf

⁶⁸ Nitrogen dioxide

⁶⁹ Particulates with a diameter of 10µm or less

⁷⁰ Met Office (2021) UK Climate Projections: Headline Findings

⁷¹ Defra, BEIS, the Met Office and the Environment Agency (2018) – UKCP18 Climate Change Over Land: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographicheadline-findings-land.pdf>

⁷² [Population projections for local authorities: Table 2 - Office for National Statistics](#)

Table A-10: Population and Household Statistics and Projections (millions)

Region	2022		2043		% Change 2022-2043	
	Population	No. Households	Population	No. Households	Population	No. Households
Greater West of England	1.20	0.50	1.36	0.58	+14.0%	+16.3%
South West	5.77	2.49	6.39	2.89	+10.7%	+15.9%
England	57.28	23.87	61.74	26.95	+7.8%	+12.9%

Population change is the function of natural change (difference between births and deaths) and net migration (the difference between the number of people moving into and out of an area). The balance of factors underlying population change varies by region. Table A-10 above presents the projected population change in the greater West of England Area, alongside the South West of England (the Greater West of England area, as well as the counties of Cornwall, Devon, Dorset, Gloucestershire, Somerset and Wiltshire) and England to show a comparison. Both internal migration (movement of people within the UK) and external migration (movement of people into the UK from other countries) are expected to substantially contribute to population growth to the West of England over the plan period⁷³.

A3.6.1.2 Human Health and Deprivation

The WRMP has the potential to influence quality of life, including human health, wellbeing, amenity and community, through actions to maintain essential water supplies for public use. There could be beneficial (e.g., actions to provide additional supply of water will help safeguard public health) or adverse impacts (e.g. noise and disruption from the construction of infrastructure).

In comparison to other areas of England (which has an overall life expectancy of 81.3), the local authorities that fall within the Bristol Water area. had relatively high life expectancies (Bath & North East Somerset 83.7, Bristol 80.6, Mendip 82.6, North Somerset 82.6, Sedgemoor 81.7, South Gloucestershire 83.0)⁷⁴.

It has been shown that, in some cases, people in disadvantaged areas experience greater exposure to negative impacts on human health including air pollution, flooding, and proximity to large industrial and waste management sites⁷⁵. The Index of Multiple Deprivation combines a number of indicators, chosen to cover a range of economic, social and housing issues⁷⁶, into a single deprivation score for each Lower Super Output Area⁷⁷ in the UK. This allows each area to be ranked relative to one another according to their level of deprivation. The indices are used widely to analyse patterns of deprivation, identify areas that would benefit from special initiatives or programmes and as a tool to determine eligibility for specific funding streams. How the LSOA's within each of the aforementioned Local Authorities score within the Index of Multiple Deprivation is shown in Figure A-12. The Index of Multiple Deprivation shown geographically is represented in Figure A-13.

⁷³ Bristol City Council (2020): The Population of Bristol - [69aa0aa1-290a-ccf2-ec4f-13a7376b41a8 \(bristol.gov.uk\)](https://www.bristol.gov.uk/69aa0aa1-290a-ccf2-ec4f-13a7376b41a8)

⁷⁴ [Life expectancy estimates, all ages, UK - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/life-expectancy-estimates-all-ages-uk)

⁷⁵ Defra (2006) Air Quality and Social Deprivation in the UK: an environmental inequalities analysis.

⁷⁶ Income Deprivation, Employment Deprivation, Health Deprivation and Disability, Education, Skills and Training Deprivation, Barriers to Housing and Services, Living Environment Deprivation, and Crime.

⁷⁷ Super Output Areas (SOAs) are a set of geographical areas developed following the 2001 census. The aim was to produce a set of areas of consistent size, whose boundaries would not change, suitable for the publication of data such as the Indices of Deprivation. They are an aggregation of Output Areas with similar social characteristics. Lower Layer Super Output Areas (LSOAs) typically contain 4 to 6 OAs with a population of about 1,500.

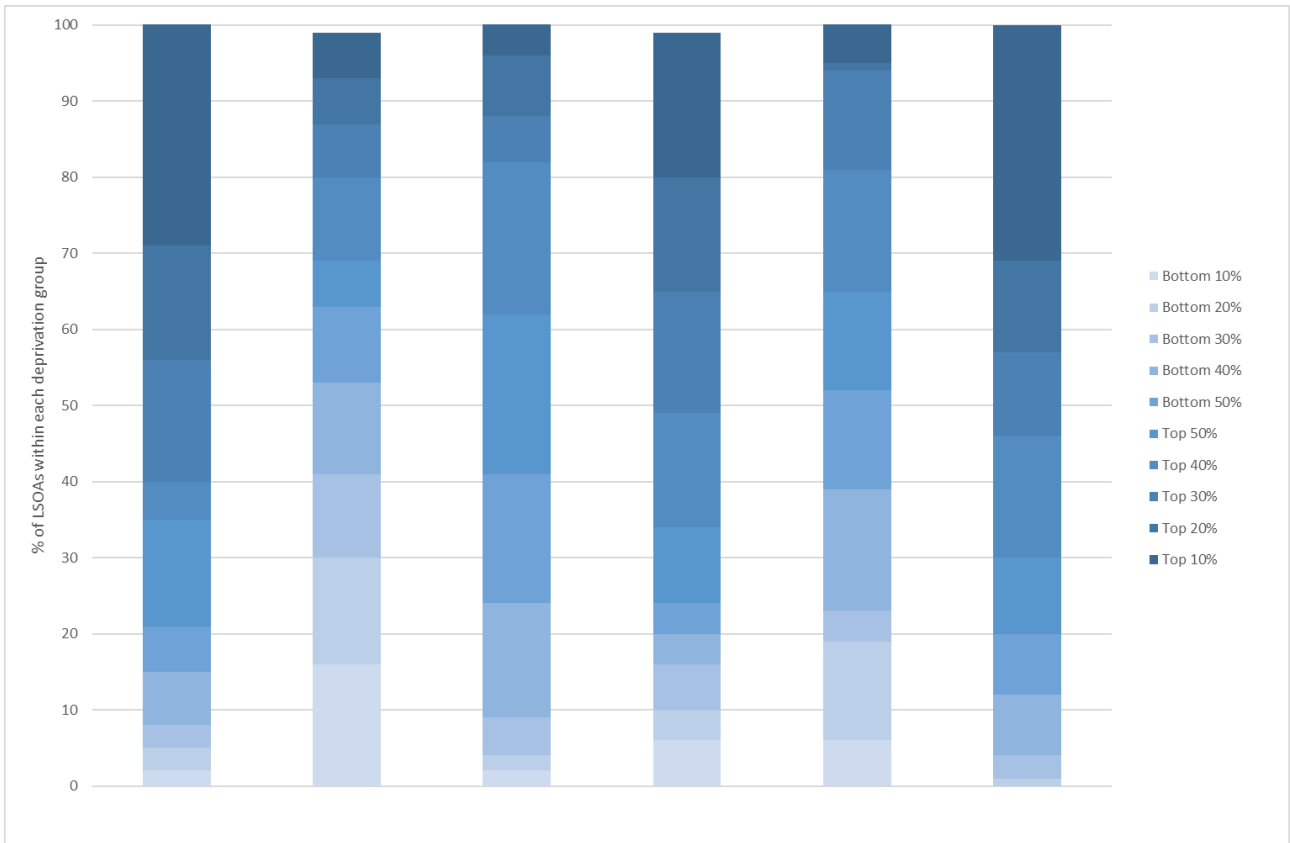


Figure A-12: Percentage of LSOAs within each deprivation band, for local authorities within Bristol Water's service area⁷⁸

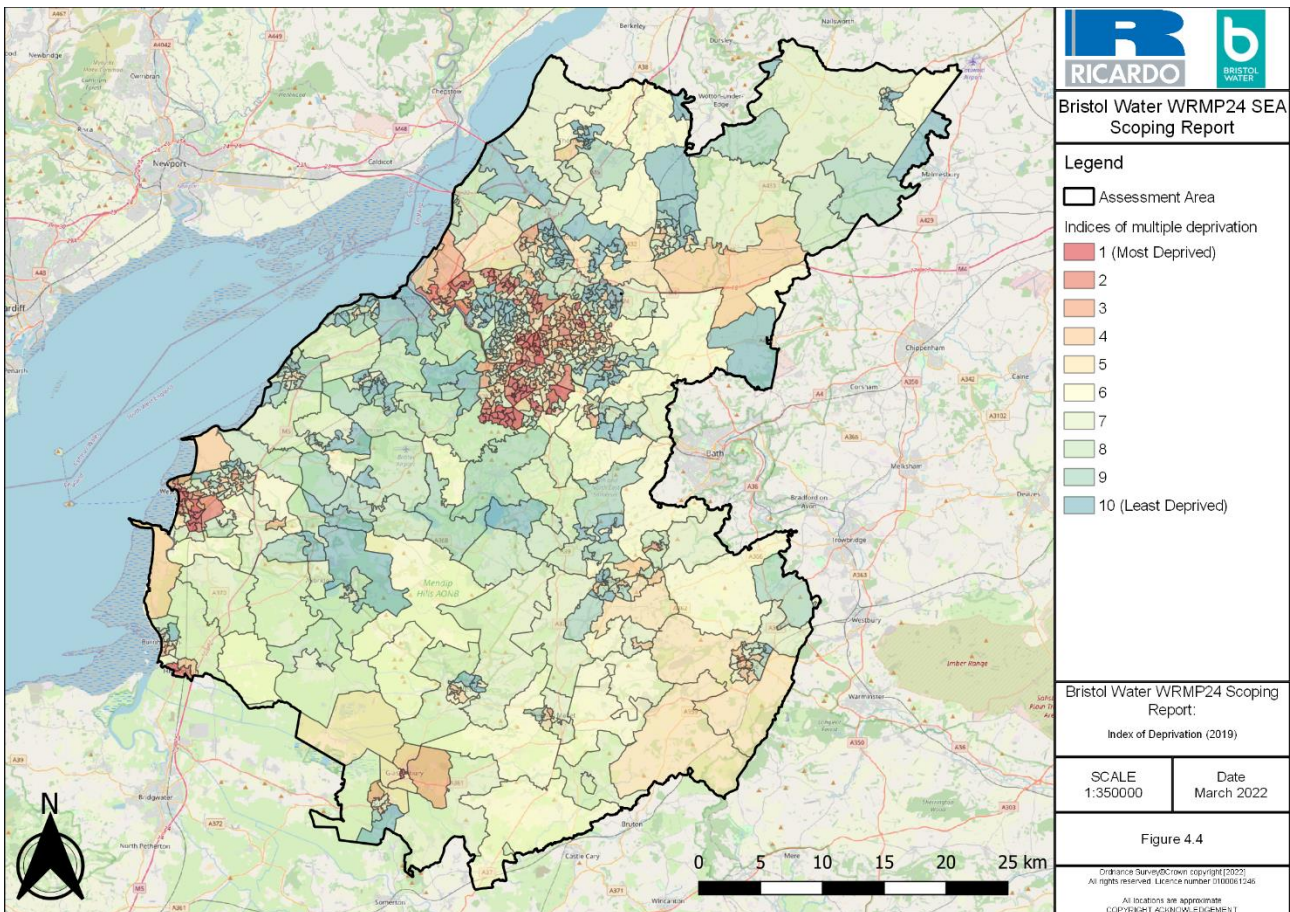


Figure A-13: Index of Multiple Deprivation

A3.6.1.3 Recreation and Tourism

In 2019, 18.9 million UK domestic overnight trips were made to the south west of England, accounting for 19% of overnight trips in England and generating a total spend of £4.13 billion⁷⁹ (data collected pre-COVID19). With specific regard to water resources, large seasonal fluxes in tourist numbers create additional demand on water resources in summer months when demand is already at its highest. Bristol Water owns land and reservoirs in scenic areas of south west England. These reservoirs are accessible to the public and provide a range of recreation facilities, including birdwatching, walking, sailing or fishing. Some sections of rivers and canals in the area are of particular importance with respect to navigation (e.g., the Kennet and Avon Canal) and angling (e.g., Bristol Harbour). Figure A-14 shows recreation areas within the Bristol Water region.

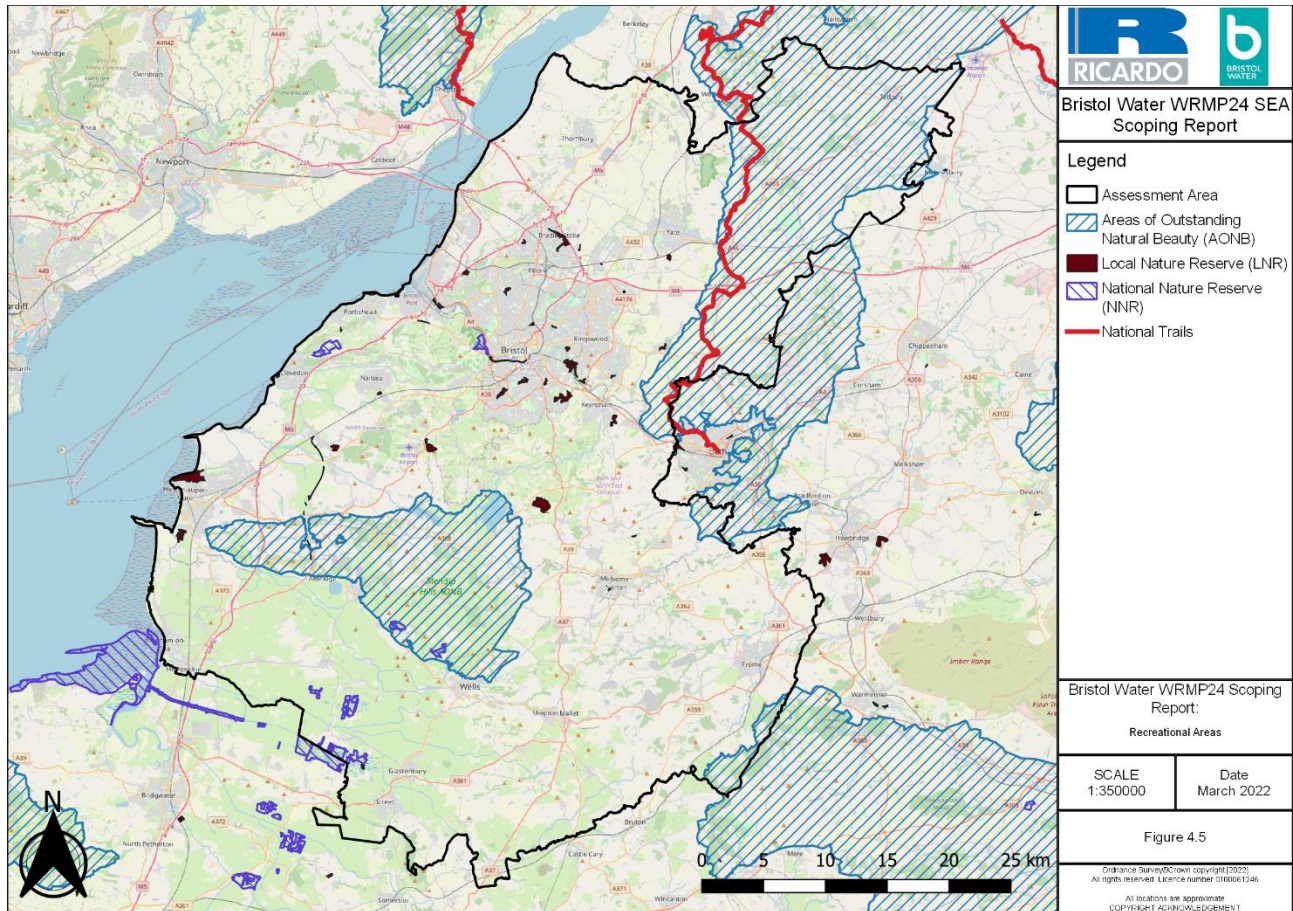


Figure A-14: Tourism and recreational assets within the Bristol Water supply area

A3.6.2 Economy and Employment

The Bristol Water service area has a varied economy that is centred around the city of Bristol, and to a lesser extent, the city of Bath. Within the West of England Combined Authority (which contains the majority of the Bristol Water customer population) 81% of the population between 16 and 64 are employed, compared to 78.5% in Great Britain. Of the 118,000 individuals who are not employed, 45,100 (28%) are full-time students. The largest industries by workforce numbers in the West of England are Human Health & Social Work (70,000 people), Wholesale & Retail Trade (66,000 people) and Professional, Scientific & Technical Activities (57,000 people)⁸⁰.

⁷⁸ [English indices of deprivation 2019 - /GOV.UK \(www.gov.uk\)](https://www.gov.uk)

⁷⁹ Visit Britain (2020) *England - All Trip Purposes 2019*. Available at: <https://www.visitbritain.org/gb-tourism-survey-2019-overview> (Accessed 7th February 2022).

⁸⁰ [Labour Market Profile - Nomis - Official Labour Market Statistics \(nomisweb.co.uk\)](https://www.nomisweb.co.uk)

The West of England Combined Authority had a GDP of £40.8 billion in 2019, or £35,257 per worker. It also had a GVA per hour worked of £34.60. 96.5% of households had access to Superfast Broadband, approximately in line with the rest of the UK⁸¹.

A3.6.3 Cross-boundary features

The area just outside of the assessment area is predominantly rural, but contains the settlements of Malmesbury, Wotton-under-Edge and the city of Bath. It contains areas with varying levels of deprivation (as measured by the Index of Multiple Deprivation). Predominantly, the area immediately to the south of the assessment area is relatively deprived, and the area immediately to the north is relatively affluent. Some areas on the western edge of Bath (Twerton, Whiteway), within 2km of the assessment area, are within the most deprived 10% of England.

The area just outside of the assessment area contains larger areas of The Cotswolds and Cranborne Chase AONBs, as well as the Cotswolds Way National Trail, but no recreational / landscape designations that are not also within the assessment area itself.

A3.6.4 Future Baseline

Population is expected to grow at a rate of approximately 14% across the region (see Table A-10), with an increasing proportion of people at or above state pension age. Household projections show potential increases of approximately 16% across the region, with an increasing proportion of one person households (shown, as household numbers are anticipated to rise faster than population).

In response to recent studies access to the recreational resources, green spaces and the historic environment will have greater importance in future planning⁸². The NPPF suggests a range of areas that should be taken into account, including the provision of appropriate facilities for recreation that preserve the openness of the green belt.

The National Ecosystem Assessment and the Marmot Review; 'Fair Society, Healthy Lives' demonstrate the positive impact that nature has on mental and physical health and as a result the Government intends to establish a Green Infrastructure⁸³ Partnership with civil society to support the development of green infrastructure in England.

Improvements to the quality of the water environment and certain potential climate change impacts will present opportunities for an expanding tourist industry in the region⁸⁴.

A3.6.5 Key Issues

The key sustainability issues arising from the baseline assessment for population and human health are:

- The need to ensure water supplies remain affordable especially for deprived or vulnerable communities.
- The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.
- The need to ensure public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures.
- The need to improve water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers.
- The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment.
- The need to accommodate an increasing population.
- The need to contribute towards maintaining sustainable growth in the region.

⁸¹ [2021-Q4-Quarterly-Bulletin-Oct.pdf \(westofengland-ca.gov.uk\)](#)

⁸² Defra (2011) The Natural Choice: securing the value of nature, The Natural Environment White Paper

⁸³ Green infrastructure is a term used to refer to the living network of green spaces, water and other environmental features in both urban and rural areas.

⁸⁴ [UK Climate Change Risk Assessment 2022 \(publishing.service.gov.uk\)](#).

- Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and well-being and the economy.

A3.7 Material Assets

A3.7.1 Baseline

A3.7.1.1 Water Use

Bristol Water supplies nearly 276 million litres of drinking water each day from its 16 water treatment works through over 6,700 kilometres of water mains to customers' taps. Currently, 60.26% (2020/21) of households are metered although Bristol Water plans to reach a metered household rate of 75% by 20225/26. Water consumption in 2020/21 was 161.1 litres per person per day for Bristol Water, this is higher than the national average of approximately 150 litres per person per day⁸⁵.

Bristol Water has one of the lowest leakage levels in the industry in the UK. Between 2015 and 2040, Bristol Water proposes to reduce water leakage from 18% of the total water supplied to the network to less than 10%. Leakage has been reduced from 37 MI/d (megalitres per day) in 2019/20 to 35.52 MI/d in 2020/21⁶⁴.

Bristol Water is actively pursuing measures to encourage its customers to reduce their water use and use water wisely, particularly in dry conditions. These measures of water efficiency activities help to safeguard essential water supplies.

In 2015, Bristol Water generated an estimated 0.50 MI/d in water efficiency savings, by giving out 30,000 free water saving devices. Bristol Water also helps local schools to save water and money through the Eco School Challenge, during which a water audit for the school is carried out, water workshops for the children take place and water-saving devices for teachers and pupils are distributed for them to take home. Bristol Water continues to have the 'Peter the Meter' campaign in place to encourage customers to realise the benefits of a water meter, the campaign was negatively impacted by COVID-19, yet Bristol Water still met its internal target of 60.14% by 2021⁹⁰.

A3.7.1.2 Resource Use and Waste

Bristol Water is a large user of energy due to the energy needed to treat and pump water. Use amounts to just over 78 million kilowatt hours of electrical energy to treat and distribute water and accounts for almost 91% of total carbon footprint⁶⁴. Between April 2015 and March 2016, Bristol Water's carbon footprint on account of energy use equated to around 42 kilotonnes of CO₂ equivalent, with around 1.4% of its total energy use derived from renewable sources. Bristol Water's carbon emissions figure per megalitre of water supplied was 489 kg/CO₂e/MI in 2012. The aim of the water industry sector is to achieve net zero carbon emissions by 2030⁶⁴.

The south west of England is a relatively high producer and consumer of energy. Total energy consumption in the region was 115.8 terawatt hours in 2017 (Total All Fuels), about 8.04% of the total UK figure. This represents a decrease of 9.5% energy consumption over a 10-year period, from the 2007 total of 127.9 terawatt hours⁸⁶.

There is an ongoing need for society to reduce the amount of waste it generates, by using materials more efficiently and improving the management of waste that is produced. Waste in England going to landfill has fallen by over 80% over the period 2004/5 to 2018/19 (19,822 thousand tonnes to 2,756 thousand tonnes); household recycling rates reached 44.7% in 2018 (down from a high of 45.2% in 2017⁸⁷); waste generated by businesses declined by 29% in the six years to 2009 and business recycling rates are above 50%⁸⁸. In line with the widely adopted 'waste hierarchy', best practice for waste management is to reduce, re-use, recycle and recover, and only then should disposal (or storage) in landfill be considered.

⁸⁵ Ofwat (2022) *Conserving Water*. Available at: <http://www.ofwat.gov.uk/households/conservingwater/> (Accessed 8th February 2022).

⁸⁶ DEIS (2019) *Sub-national total final energy consumption in the United Kingdom (2005-2017)*. Available at: <https://www.gov.uk/government/statistical-data-sets/total-final-energy-consumption-at-regional-and-local-authority-level> (Accessed 8th February 2022).

⁸⁷ Defra (2015) Local Authority collected waste statistics 2018/19 (28th November 2019)

⁸⁸ Defra (2011) Government Review of Waste Policy in England 2011

Data on waste arisings are collected in a range of categories. The activities of the water industry contribute to construction, demolition and excavation waste (CDEW), through construction of new infrastructure. The water industry also contributes to several waste streams through the operation of its treatment facilities. Waste streams include commercial and industrial waste (statistics include waste arisings from the power and utilities sector, which includes water supply and sewage removal), and also hazardous wastes. Table A-11 shows waste data according to economic activity in England in 2018 against 2014 data.

Table A-11: Waste generation split by responsible economic activity in England

Sector	2014 ('000 tonnes)	Recycle Rate (%)	2018 ('000 tonnes)	Recycle Rate (%)
Commercial and Industrial	19,849	-	25,938	-
Construction	49,109	91.4	119,429	93.8
Household	22,355	44.8	22,033	44.8
Other (municipal waste)	13,714	-	886	-

Currently, 98% of the waste disposed by Bristol Water complies with Environmental Permitting Regulations against a target of 100%⁶⁴.

The south west of England has the highest recycling rate of 48.7% according to the 2020/21 data published by Defra. North Somerset Council had the highest recycling rate in the south west region at 63.6%⁸⁹.

A3.7.2 Cross-boundary features

The Material Assets section is focussed on the resource and energy use of Bristol Water and is therefore not defined nor constrained spatially. Resource use and waste arising by Bristol Water may have indirect impacts upon receptors outside of the assessment area, but as resource use is an inherently national or international issue, scoping it spatially is unlikely to have benefit in terms of assessment.

A3.7.3 Future Baseline

Bristol Water aims to reduce leakage from its water distribution network over the next 25 years with several schemes planned to support the reduction. Bristol Water's aim is to manage water resources more efficiently in order to improve the reliability of water provision to its customers. To this effect, Bristol Water has a Level of Service of 1 in 15 years for restrictions on customer's water use, such as Temporary Use Bans⁹⁰ average. Bristol Water has set a target of a 21.2% reduction in leakage by 2025⁹¹.

As part of Bristol Water's drive to meet challenging efficiency targets for AMP7, it is reducing the electricity that is imported from the grid by installing gas generators at the Purton treatment works, its biggest energy consumer. This will marginally increase carbon footprint and Bristol Water will seek to mitigate this by sourcing renewable and environmentally sustainable opportunities across operations⁹².

The Government's National Infrastructure Strategy⁹³(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. The UK Government plans to accelerate the deployment of green

⁸⁹ Defra (2021) Statistics on waste managed by local authorities in England in 2020/21. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf (Accessed 8th February 2022).

⁹⁰ Bristol Water (2022) Bristol Water Drought Plan 2022-2027. Available at: https://f.hubspotusercontent30.net/hubfs/7850638/Bristol%20Water%20Drought%20Plan%20non-technical%20summary%202021.pdf?_hstc=48568761.f91f868400fcb0478f740b3a7e7b18b3.1643813791502.1646238226168.1647268925111.9&_hssc=48568761.4.1647268925111&_hsfp=1201343946&hsCtaTracking=6eaaf7c2-99a8-4818-8527-07d3d5feb87b%7C5968b24b-f260-479a-bdc6-e3d924e71e4b (Accessed 14th March 2022).

⁹¹ Bristol Water (2021) Annual Performance Report. Available at: [https://f.hubspotusercontent30.net/hubfs/7850638/BW_APR-2021_Web\(Linked\).pdf](https://f.hubspotusercontent30.net/hubfs/7850638/BW_APR-2021_Web(Linked).pdf) (Accessed 14th March 2022).

⁹² Bristol Water (2021) Annual Performance Report. Available at: [https://f.hubspotusercontent30.net/hubfs/7850638/BW_AnnualReport-2021_artwork-new\(digital\).pdf](https://f.hubspotusercontent30.net/hubfs/7850638/BW_AnnualReport-2021_artwork-new(digital).pdf) (Accessed 8th February 2022).

⁹³ HM Treasury Infrastructure UK (2020) National Infrastructure Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938539/NIS_Report_Web_Accessible.pdf (Accessed 8th February 2022).

technology through private sector investment in the retrofitting of existing stock, carbon capture and low-carbon hydrogen.

A3.7.4 Key Issues

The key sustainability issues arising from the baseline assessment for Material Assets and Resource Use are:

- The need to minimise the consumption of resources, including water and energy.
- The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill.
- The need to continue to reduce leakage from the water supply system.
- Daily consumption of water is higher than the national average in the area and consequently there is a continued need to encourage more efficient water use.
- The need to support regional and national commitments to decarbonisation.

A3.8 Cultural Heritage

A3.8.1 Baseline

Implementation of WRMP options could affect historic landscape character and historic structures associated with the water environment and the historical context of their setting. Archaeological remains are sensitive to changes in water quality, water levels (for example waterlogged deposits), pollution and land-use practices.

Heritage designations for the assessment area are shown in Figure A-15.

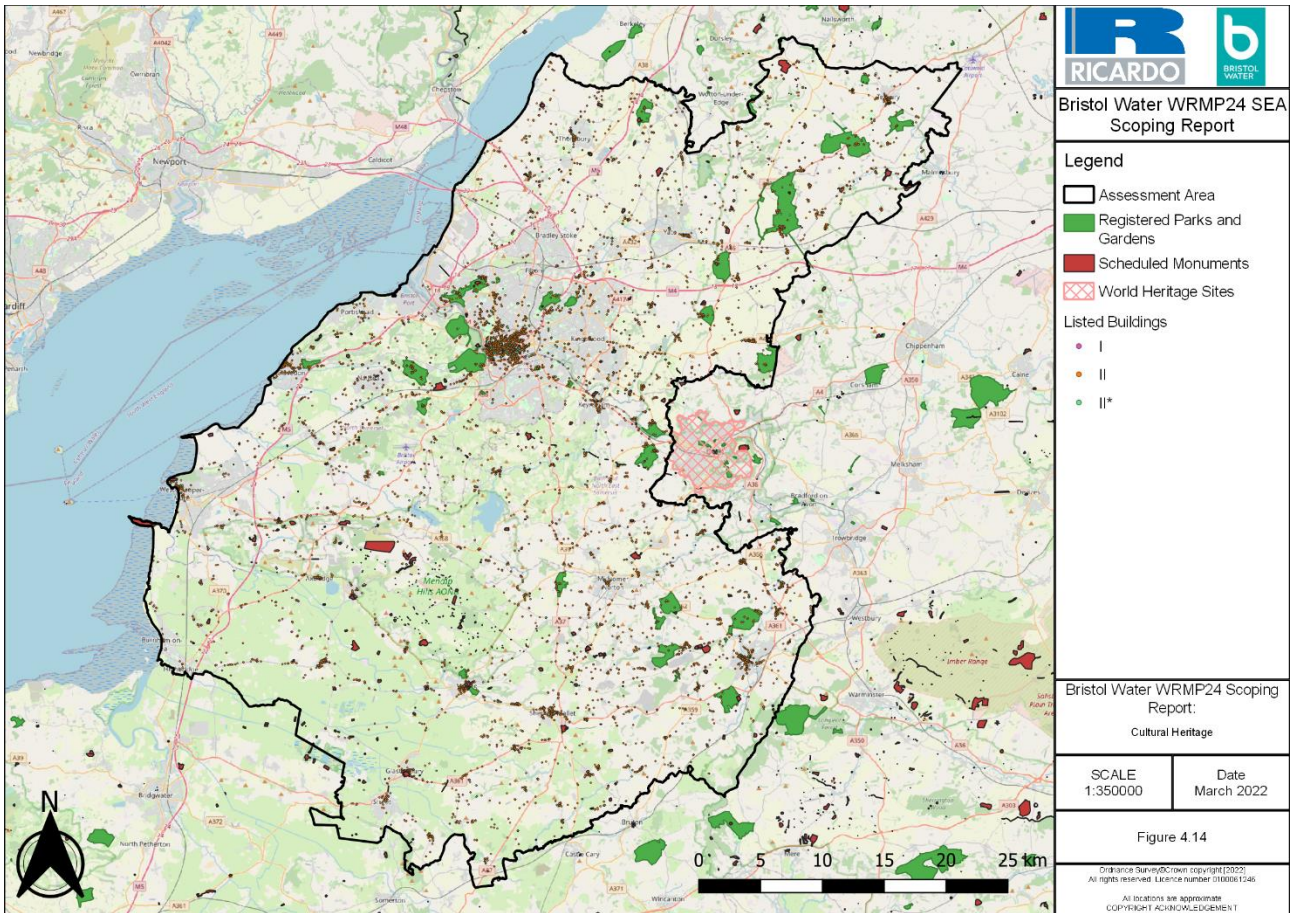


Figure A-15: Cultural Heritage Sites

Nationally important archaeological sites are statutorily protected as Scheduled Monuments (SMs)⁹⁴. There are currently around 20,000 entries in the Schedule for the UK⁹⁵. As of 2021, within the southwest of England, there were 4 World Heritage Sites, 6,994 SMs, about 90,000 listed buildings and over 300 Registered Parks and Gardens. There are approximately 10,331 listed buildings and 470 SMs located within the assessment area.

Historic England collects data on buildings at risk. There were 4,985 assets on the Heritage at Risk (HAR) register in 2021. 233 entries have been removed from the Register in 2021, with 130 being added⁹⁶. Heritage assets such as SMs can be at risk from water abstraction or dewatering (previously 1.71% nationally). However, other assets, such as those composed of organic material and preserved in waterlogged or anaerobic conditions, are proportionately more at risk (e.g., palaeoenvironmental deposits). Of the 6,994 SMs in the South West, 50 (0.7%) are on the at Risk Register. 5.6% of the Registered Parks and Gardens in the South West are identified as at risk (17 out of 305)⁹⁷. These HAR sites are showing in Figure A-16.

⁹⁴ Nationally important archaeological sites designated under the Ancient Monuments and Archaeological Areas Act, 1979,

www.culture.gov.uk/historic_environment/scheduled_ancient_monuments/

⁹⁵ Historic England (2021) Heritage Indicators. Available at: [Heritage Indicators 2021 \(historicengland.org.uk\)](https://historicengland.org.uk/heritage-indicators/)

⁹⁶ Historic England (2021) Heritage at Risk: Latest Findings: <https://historicengland.org.uk/advice/heritage-at-risk/findings/>

⁹⁷ Historic England (2021): Heritage At Risk: The South West Register 2021

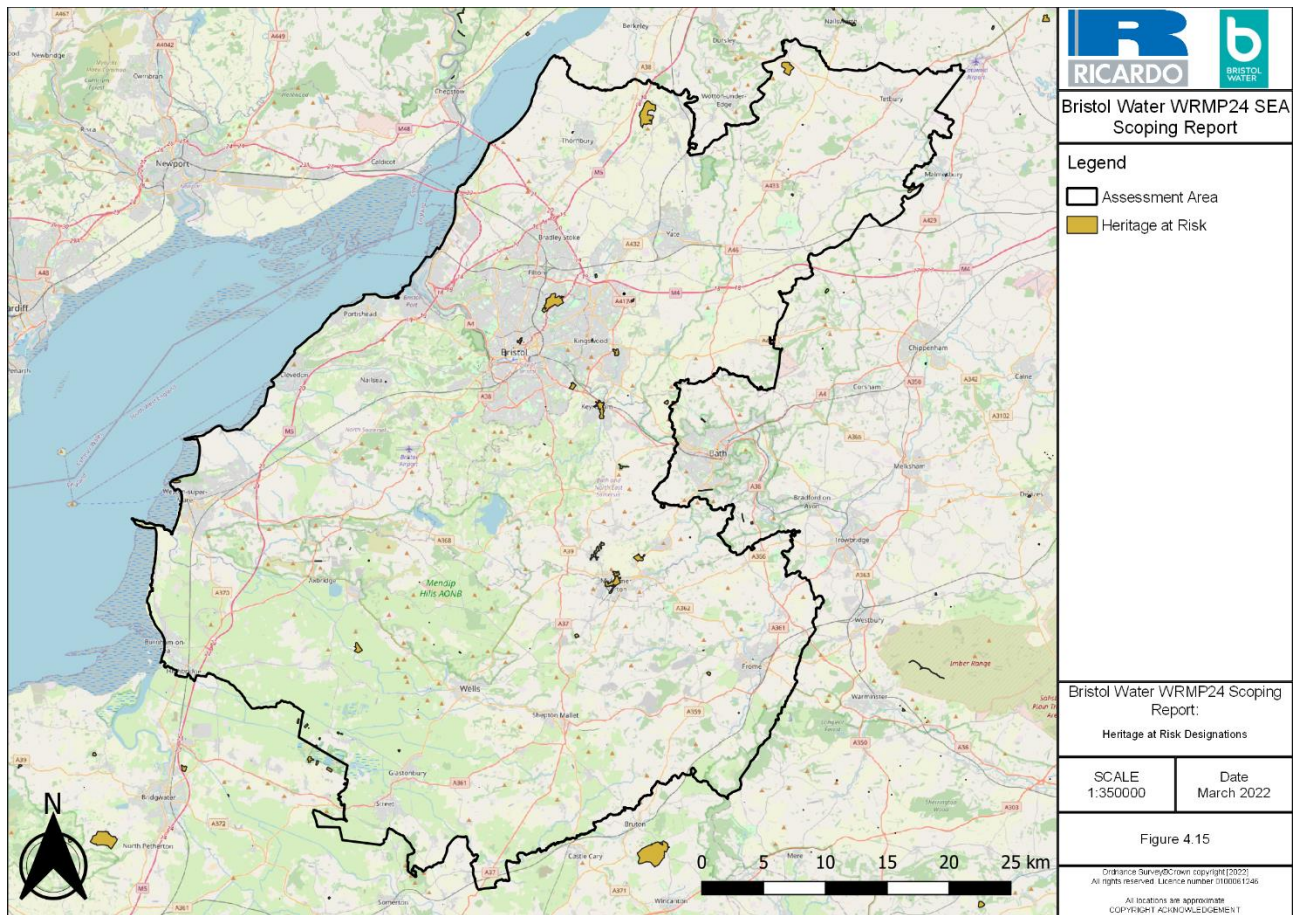


Figure A-16: Heritage at Risk

Within Bristol Water’s supply area, there are also some areas of the existing water supply infrastructure that are heritage assets themselves. The Gloucester and Sharpness Canal, for example, was once the widest and deepest canal in the world⁹⁸ and contains a number of designated heritage assets (for example, many of the mileposts along the canal are Grade II Listed Structures). The Kennet and Avon Canal begins near Keynsham and runs to Reading and supports water-dependent heritage assets.

Conservation Areas are usually designated by the local planning authority. They are designated for their special architectural and historic interest. Conservation Areas can include historic town and city centres, fishing and mining villages, 18th and 19th century suburbs, model housing estates, country houses set in historic parks and / or historic transport links and their environment. There are over 8,000 conservation areas in England. Individual LAs provide details on specific conservation areas. Conservation Areas are shown in Figure A-17.

⁹⁸ Gloucester & Sharpness Canal | Canal Map | Canal & River Trust (canalrivertrust.org.uk)

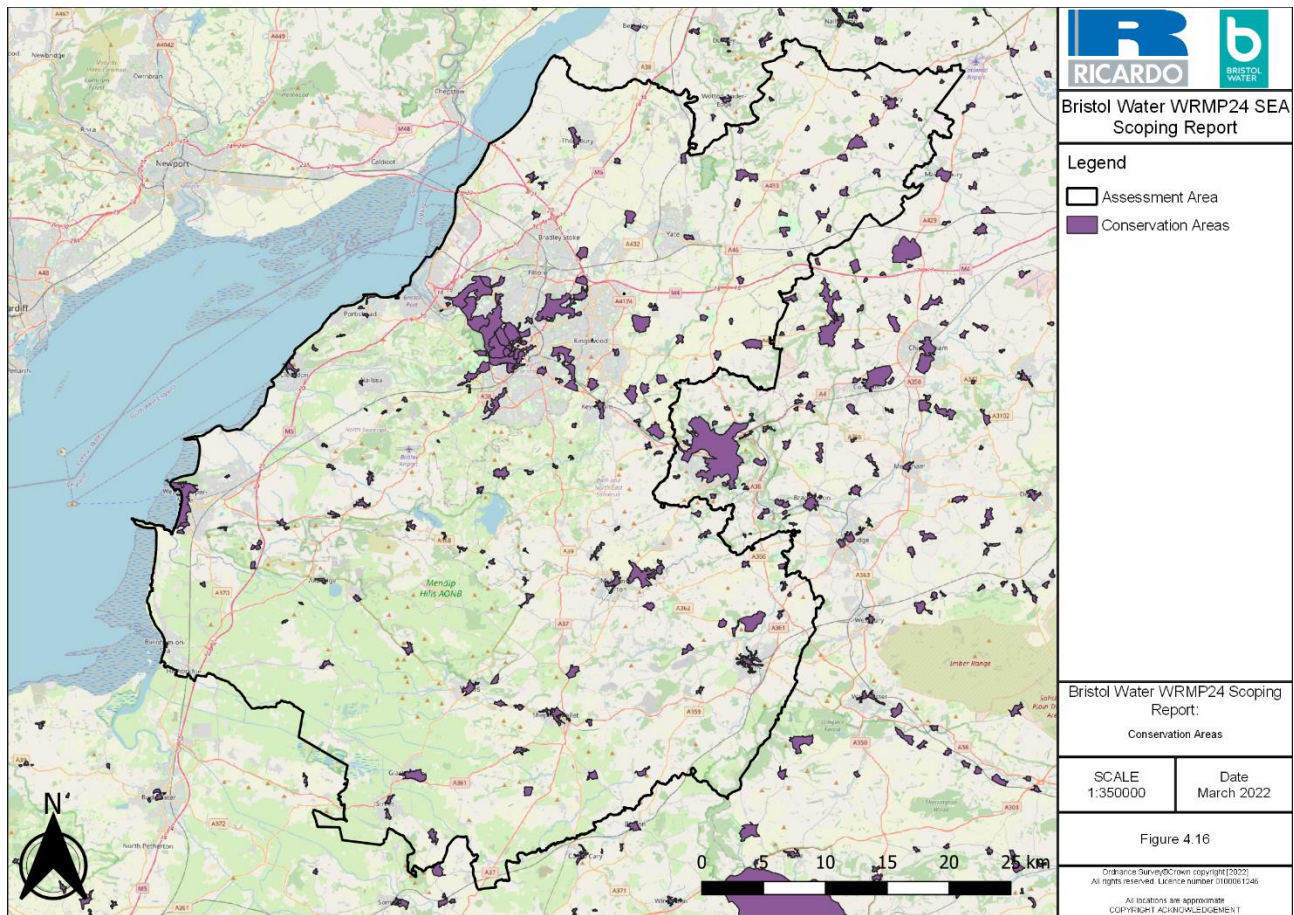


Figure A-17: Conservation Areas

In relation to non-designated assets, waterlogged conditions preserve waterlogged archaeology such as wooden artefacts and structures such as trackways. There are areas of wetlands and floodplains within the Bristol Water supply area that could contain waterlogged archaeology⁹⁹. For example, the Somerset Levels and Moors is below sea level and could contain areas of well-preserved archaeology. There are also areas of the Severn Estuary, around Thornbury, which could contain waterlogged remains. Remains may be located in waterlogged areas which are rain-fed or groundwater fed. If the latter, then clearly abstraction levels can be a critical factor in maintaining conditions in which preservation of the remains is viable. In addition, there are waterlogged deposits that are specifically associated with chalk; springs and their associated wetlands can contain important archaeological information, especially palaeo-environmental evidence. Such water-dependent heritage assets will be considered when assessing potential WRMP options.

The Historic Environment Records (HERs) are managed by Historic England and contain a comprehensive list of non-designated heritage assets throughout the UK. HERs are information services that provide access to comprehensive and dynamic resources relating to the archaeology and historic built environment of a defined geographic area. HERs contain details on local archaeological sites and finds, historic buildings and historic landscapes and are regularly updated¹⁰⁰. These can be found via the Heritage Gateway website¹⁰¹. The HERs relevant to the Bristol area are operated by the local planning authorities within Bristol Water’s Assessment Area (Bath and North East Somerset Council, Bristol City Council, Mendip District Council, Sedgemoor District Council, South Gloucestershire Council). Each of these Records contain hundreds or thousands of entries.

⁹⁹ Historic England (2018): Waterlogged Organic Artefacts: Guidelines on their Recovery, Analysis and Conservation.

¹⁰⁰ [Historic Environment Records \(HERs\) | Historic England](#)

¹⁰¹ [Heritage Gateway - Results](#)

Intertidal and submerged peat deposits are found along England's coastline. They often contain diverse plant and animal remains which can provide important information on past environments, sea-level histories and the timings of any changes. Where these deposits are found in areas where there have been historic populations of people, peat deposits can also preserve ancient finds, and records of previous human activity. Historic England keeps an Intertidal and Coastal Peat Database, which lists known sites and extents of peat deposits around the English coastline¹⁰². It shows that there are widespread peat deposits within the coastal areas of the Assessment Area, along the southern and eastern shores of the Severn Estuary.

A3.8.2 Cross-boundary features

The following heritage assets are within 2km of the assessment area;

- Registered parks / gardens
 - Belcombe Court, Bradley Court, Iford Manor, Longleat, Owlpen Manor, Rodmarton Manor, Royal Victoria Park, St Catherine's Court, Stourhead.
- More than 50 Scheduled Monuments, the largest being Uley Bury Camp and Bury Wood Camp Hillfort
- City of Bath World Heritage Site
- Approximately 40 Conservation Areas, the largest being Bath, Castle Combe, Hullavington Airbase and Malmesbury.

A3.8.3 Future Baseline

The NPPF was introduced in 2012 (updated 2019) and aimed to make the planning system less complex and more accessible, changing the emphasis on planning towards a presumption in favour of development.

However, the NPPF states that *"Local Planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal [...]. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal."*⁴⁹ The NPPF also states that *"Heritage assets [...] should be conserved in a manner appropriate to their significance"*, and that *"Plans should set out a positive strategy for the conservation and enjoyment of the historic environment"*.

When considering potential adverse impacts upon heritage assets arising from development, the NPPF states that *"great weight should be given to the asset's conservation [...] any harm to, or loss of, the significance of a designated heritage asset should require clear and convincing justification, and that the effect of an application on the significance of a non-designated heritage asset should be taken into account when determining the application"*⁴⁹.

Climate change could have variable impacts on heritage assets in the future. Some types of assets and landscapes have already experienced and survived significant climatic changes in the past and may demonstrate considerable resilience in the face of future climate change. For example, global warming is likely to encourage fungal and plant growth and insect infestation which could impact historic building materials with temperate fluctuations also potentially increasing structural problems¹⁰³. However, many more historic assets are potentially at risk from the direct impacts of future climate change¹⁰⁴.

A3.8.4 Key Issues

- The need to conserve or enhance sites of archaeological importance and cultural heritage interest, and their setting, particularly those which are sensitive to the water environment.
- The need to protect designated, and non-designated, water-dependent heritage sites during drought conditions.
- The need to protect those assets that form part of the current water supply system but which are also considered to have a heritage value.

¹⁰² [Intertidal and Coastal Peat Database | Historic England](#)

¹⁰³ Historic England (2021) What Are the Effects of Climate Change on the Historic Environment? Available at: [What Are the Effects of Climate Change on the Historic Environment? | Historic England](#)

¹⁰⁴ English Heritage (2010) Climate Change and the Historic Environment

A3.9 Landscape and Visual Amenity

A3.9.1 Baseline

Landscape character¹⁰⁵ can be defined as a ‘distinct and recognisable pattern of elements, or characteristics in the landscape that make one landscape different from another, rather than better or worse’. Some landscapes are special because they have a particular amenity value, such as those designated as Areas of Outstanding Natural Beauty (AONB). Others may have an intrinsic value as good examples or be the only remaining examples of a particular landscape type. Some landscapes are more sensitive to development whereas others have a greater capacity to accommodate development. Assessments of landscape character and landscape sensitivity enable decisions to be made about the most suitable location of development to minimise impacts on landscapes.

Implementation of WRMP options has the potential to influence landscape and visual amenity, for example through effects arising from construction of new infrastructure, raising of reservoir levels or the abstraction of water affecting existing water levels in rivers.

AONBs and National Character Areas (NCAs) are shown on Figure A-18.

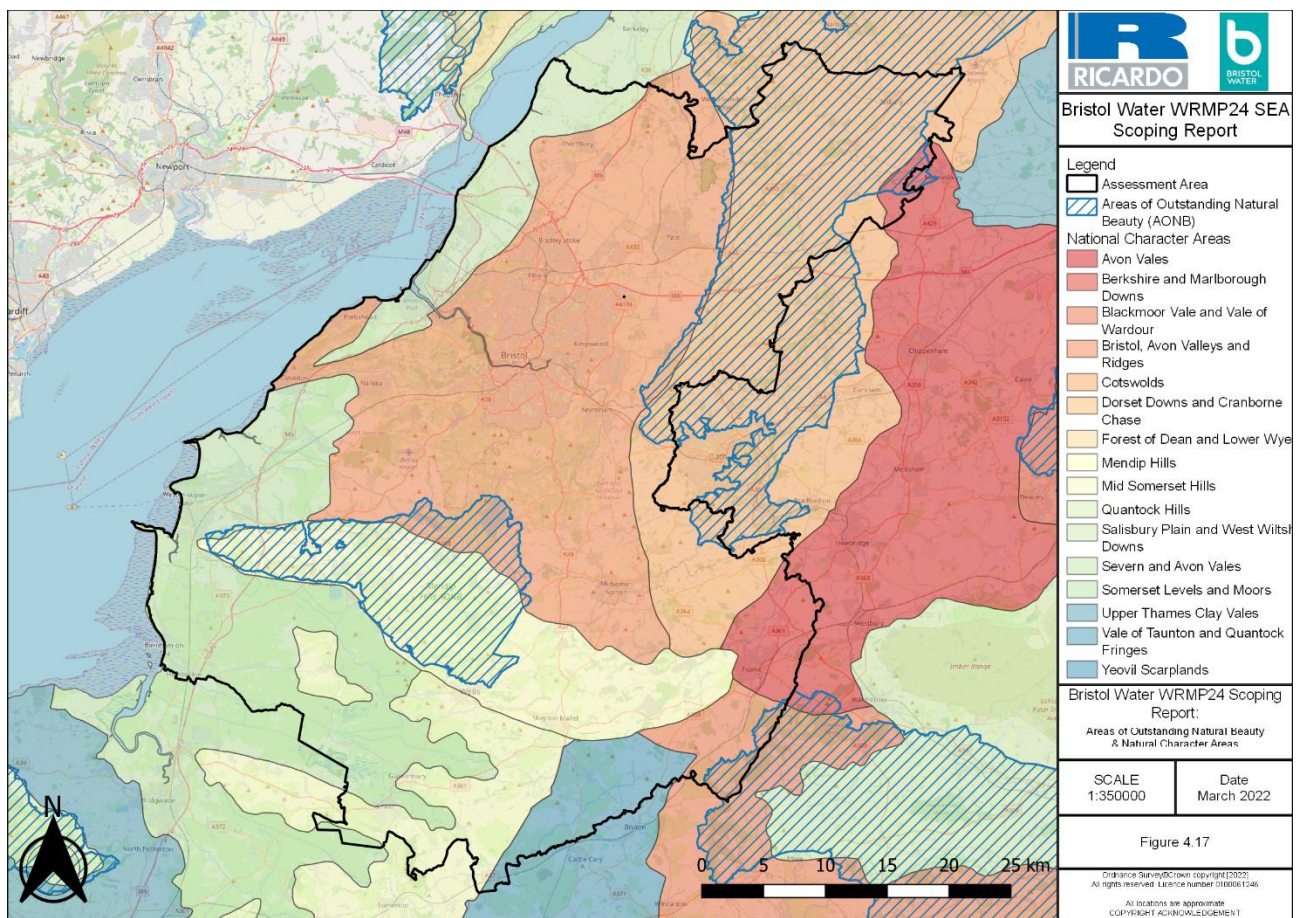


Figure A-18: Areas of Outstanding Natural Beauty and National Character Areas

A3.9.1.1 Nationally Designated Sites

AONBs are defined as ‘precious landscapes whose distinctive character and natural beauty are so outstanding that it is in the nation’s interest to safeguard them’¹⁰⁶. They are designated under the National Parks and Access to the Countryside Act, 1949, strengthened by the Countryside and Rights of Way Act, 2000. The primary purpose of the AONB is ‘to conserve and enhance the natural beauty of the landscape.’ There are

¹⁰⁵ Natural England (2014) An approach to Landscape Character Assessment. [landscape-character-assessment.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292222/landscape-character-assessment.pdf) (publishing.service.gov.uk)

¹⁰⁶ [ARCHIVED CONTENT] Landscape and scenery - Areas of Outstanding Natural Beauty in England : Enjoy England (nationalarchives.gov.uk)

three AONBs wholly or partially within the study area (Cotswolds AONB; Mendip Hills AONB; and Cranborne Chase and West Wiltshire Downs AONB). These nationally important designated landscapes have special qualities that create their sense of place and identity. One of the special qualities of the Mendip Hills AONB is that the entire area lies over an important Carboniferous Limestone aquifer which is designated as a Major Aquifer Unit making a major contribution to public water supply and supplying Bristol and the surrounding area via Cheddar, Blagdon, and Chew Valley reservoirs.

A3.9.1.2 Greenbelt

The main characteristics of Green Belt are its openness and permanence. The main aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open. The Green Belt therefore aims to check the unrestricted sprawl of large built-up areas; prevent neighbouring towns merging into one another; assist in safeguarding the countryside from encroachment; preserve the setting and special character of historic towns; and assist in urban regeneration while encouraging the recycling of derelict and other urban land.

Large areas of the Bristol Water Supply Area are covered by the Bristol and Bath Green Belt, which surrounds both of these cities. The Bristol and Bath Green Belt stretches from Clevedon in the west to Trowbridge in the east, from Blagdon in the south to Thornbury in the North.

A3.9.1.3 Natural England National Character Areas and Heritage Coasts

Natural England National Character Areas also take account of landscape (also referred to in the Biodiversity, Flora and Fauna topic; A3.1). These Landscape Character Areas (LCAs) are shown geographically in Figure A-18 with key features summarised below in Table A-12: Landscape Character Areas: Landscape Characteristics¹⁰⁷. There are no Heritage Coast areas in Bristol Water's SEA assessment area.

Table A-12: Landscape Character Areas: Landscape Characteristics

Area	Characteristics
Severn and Avon Vales	<p>Diverse range of flat and gently undulating landscapes, united by broad river valley character;</p> <p>Riverside landscapes with little woodland, often very open. Variety of land uses from small pasture fields and commons in the west to intensive agriculture in the east;</p> <p>Distinct and contrasting vales: Evesham, Berkeley, Gloucester, Leadon, Avon;</p> <p>Many ancient market towns and large villages along the rivers;</p> <p>Nucleated villages with timber frame and brick buildings;</p> <p>Prominent views of hills - such as the Cotswolds, Bredon and the Malverns - at the edges of the character area.</p>
Bristol, Valleys and Ridges	<p>A landscape of very mixed landform, geology and settlement pattern, strongly influenced by the Avon Valley, Bristol at its centre and by its industrial history;</p> <p>Low-lying, shallow valleys which contrast with limestone ridges and scarps;</p> <p>Frequent large villages, small towns and major conurbations but also undisturbed rural areas;</p> <p>Wooded scarps - with ancient woodland - and high, open, downland ridges;</p> <p>Legacy of coal industry evident in tips, settlement patterns and reclaimed areas;</p> <p>Waterside mills and other features of former rural industries;</p> <p>Frequent parks, mansions and manor houses.</p>
Mendip Hills	<p>A chain of prominent limestone hills extending inland from the coast and rising up sharply from surrounding lowlands;</p> <p>An open, largely treeless, limestone plateau with karst features, cave systems, dry stone walls and sparse settlement;</p> <p>Dramatic gorges, cliffs and escarpment slopes around the plateau;</p>

¹⁰⁷ Natural England (2014). National Character Areas: South West, available at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-south-west-england>

Area	Characteristics
	<p>A sharp contrast between the open plateau and steep escarpment slopes of the karst landscape and the more complex, gentler landforms in the east;</p> <p>Many industrial archaeological sites reflecting the lead, coal and cloth industries;</p> <p>Perpendicular church towers;</p> <p>Country houses in the east with wooded parks;</p> <p>Buildings in local stone with pantile roofs: stones include grey limestone, reddish dolomitic limestone and grey or honey-coloured oolitic limestone;</p> <p>Outstanding prehistoric ritual landscape</p>
Somerset Levels and Moors / Mid Somerset Hills	<p>Flat, open landscape of wet pasture, arable and wetland divided up by wet ditches or 'rhynes';</p> <p>Absence of dispersed farmsteads or any buildings on levels and moors. Nucleated settlements on ridges/islands;</p> <p>Surrounded, and divided up, by low hills, ridges and islands which form distinctive skylines;</p> <p>Peat working and nature reserves contrasting with the rectilinear planned landscape of the Moors;</p> <p>Dramatic and prominent hills such as Brent Knoll, the Isle of Avalon and Barrow Mump, rising above the Levels and Moors;</p> <p>Sparse tree cover on Levels and Moors contrasting with woodland, hedges and orchards of surrounding hills;</p> <p>Sparsely populated Moors but settlements common on hills, ridges and islands;</p> <p>Historic landscape strongly evident in features ranging from prehistoric trackways and lake villages to post-medieval enclosures and peat working;</p> <p>International nature-conservation significance for wetland, waders and waterfowl;</p> <p>Narrow dune belt fringing Bridgwater Bay;</p> <p>Raised rivers and levees, with main roads and causeways flanked by houses. Flooding in winter over large areas.</p>
Cotswolds	<p>Defined by its underlying geology: a dramatic scarp rising above adjacent lowlands with steep combes, scarp foot villages and beech woodlands;</p> <p>Rolling, open, high wold plateaux moulded by physical and human influences, with arable and large blocks of woodland, divided up by small, narrow valleys;</p> <p>Incised landscapes with deep wide valleys;</p> <p>Flat, open dip slope landscape with extensive arable farmland;</p> <p>Prominent outliers within the lowlands;</p> <p>Honey-coloured Cotswold stone in walls, houses and churches;</p> <p>Attractive stone villages with a unity of design and materials.</p>

A3.9.1.4 Tranquillity Areas

'Tranquillity' can be defined as the quality of calm that is experienced by people in places full of the sights and sounds of nature. The Campaign for Rural England (CPRE) developed tranquillity mapping for England to identify areas that are either disturbed or undisturbed by urban areas (towns and cities), traffic (road, rail and airports), power stations, pylons, power lines and open-cast mines¹⁰⁸. Effects on tranquil areas will be considered when assessing the WRMP options.

A3.9.2 Cross-boundary features

There are two further National Character Areas within 2km of the assessment areas, shown in Table A-13.

¹⁰⁸ CPRE tranquillity mapping for England: <http://www.cpre.org.uk/what-we-do/countryside/tranquil-places>

Table A-13: Landscape Character Areas within 2km

Area	Characteristics
Upper Thames Clay Vales	<ul style="list-style-type: none"> • Low-lying clay-based floodplains with alluvium and gravel terraces as superficial deposits, cover 40% of the area. • The headwaters of the River Thames flowing off the Cotswolds • Hedges, hedgerows and field trees are frequent • Grazed pasture with limited areas of wetlands • Brick and tile from local clays, timber and thatch are traditional building materials in the area
Salisbury Vales & West Wiltshire Downs	<ul style="list-style-type: none"> • An extensive and open rolling chalk plateau and one of the largest remaining areas of calcareous grassland in north-west Europe. • Many small, sheltered river valleys, such as the Wylye, with narrow flood plains and meandering river courses. • Woodland generally confined to valley sloped. • Large arable fields predominate with few hedgerows or obvious boundary features, • Rare flora and fauna of national significance, associated with a chalk landscape, from stone curlew, hobby and corn bunting to dropwort, early gentian and slender bedstraw.

A3.9.3 Future Baseline

The intrinsic planning policy in the updated 2019 NPPF is to enable and facilitate growth whilst aiming to protect the character of areas. The 2019 NPPF re-iterates that more weight should be given to conserving landscape and scenic beauty in National Parks and AONBs which have the highest status of protection in relation to landscape and scenic beauty. The NPPF identifies that planning permission should be refused for major developments in these designated areas except in exceptional circumstances and where it can be demonstrated that they are in the public interest.

It states that planning policies and decisions should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes while recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services. The policy is clear that appropriate housing development is required and planning policies should identify opportunities for villages to grow and thrive.

With the pressures for housing in parts of the assessment area, there are likely to be some threats to visual amenity more broadly beyond designated landscape areas (including within Green Belt). Climate change and land use change (e.g. due to agricultural reform associated with the UK’s exit from the EU and Common Agricultural Policy) may also, in the longer term, lead to changes to landscape character.

A3.9.4 Key Issues

- The need to protect and improve the natural beauty of the area’s AONBs and other areas of natural beauty.
- The need to protect and improve the character of landscapes and townscape.
- It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public.

A4 Appendix 4 Options Assessment Matrices

Option Name
P01_01_Charterhouse Increase performance of existing sources (P01-01R) to increase deployable output to near licensed volume
Option Description
<p>There are two spring systems at Charterhouse (Upper and Lower). There is one treatment works. The Upper spring sources have most recently been used, and the DO of the Upper Springs was considered as WRMP19 DO 1.24 MI/d constrained by the membrane plant capacity.</p> <p>However Charterhouse WTW suffered an electrical fire in 2019 and has been out of service ever since. The construction of a replacement membrane plant at Charterhouse WTW has been approved and design of the replacement works is underway by Atkins. This current project will take the yield of the scheme back to c.2MI/d, which was the design based on the yield of the Upper Springs.</p> <p>This WRMP24 option would improve the output of existing sources utilising the Lower Springs by providing new pumps to the Charterhouse WTW site and extending the treatment processes at the site so that the full licensed volume can be treated and put into supply. This would take the scheme from the 2MI/d under the current project up to 2.74MI/d, the licensed quantity.</p> <p>The scope of the scheme is therefore low lift pumps from the Upper Springs to the treatment works and an extension of the treatment process. It is assumed that the treatment process for the additional 0.74MI/d will be the same as that currently being developed to replace the fire damaged unit. The engineering drawing shows the presence of raw water mains from the Upper and Lower Springs.</p>
Yield
0.74 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	---	0	<p>There are several European designated sites in proximity of the option, including: North Somerset Mendip Bats SAC (0km - within), Mendip Woodlands SAC (2.9km W), Mendip Limestone Grasslands SAC (5.1km W), Chew Valley Lakes SPA (6.7km NE), Somerset Levels & Moors SPA/Ramsar (9.6km S) and Severn Estuary SAC/SPA/Ramsar (17km). In addition, immediately to the south of option is the northern tip of the Cheddar Complex SSSI which is designated for a variety of habitats, flora and fauna.</p> <p>Construction effects</p> <p>Charterhouse WTW is directly adjacent to North Somerset & Mendip Bats SAC and although works are small scale, the option will likely result in impacts during construction works through loss/damage to supporting habitats (if present), air pollution, dust, surface and ground water pollution incidents. Construction is also likely to result in impacts on the bat species through habitat loss/damage (foraging, commuting and roosting habitat), killing/injuring individual, light spills, noise, vibration, air pollution, dust, surface and groundwater pollution incidents. LSE identified during construction on greater horseshoe bat <i>Rhinolophus ferrumequinum</i> given proximity of nearby woodland habitat and foraging range of species. Mitigation measures required during construction, therefore Stage 2 Appropriate Assessment required if option selected. There is no hydrological connectivity for construction impacts on the Severn Estuary SAC/SPA/Ramsar and the option is sufficient distance from Mendip Woodlands SAC for air quality related construction impacts. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p>Operational effects</p> <p>The option will require additional water abstraction within the current abstraction licence. The HRA concludes LSE during operation on North Somerset and Mendip Bats SAC as the option could result in impacts on groundwater levels, which may have impacts on the water dependent habitat qualifying features of the SAC; H8310 Caves not open to the public. Furthermore, potential impacts on GWDTE within the North Somerset and Mendip Bats SAC and supporting foraging habitats needs further considerations. Therefore LSE from operational activities cannot be ruled out at this stage and further assessment will be required. No LSE are anticipated on Severn Estuary SAC/SPA/Ramsar during operation as changes in groundwater abstraction impacts to River Yeo will not impact migratory fish species given barriers, and volume not considered significant alone with regards the estuary qualifying feature. In-combination effects may need further consideration.</p> <p>The operation of this option could result in effects on non-designated aquatic habitats or species. Additional abstraction from the boreholes that supply Charterhouse WTW could impact the flows from the Cheddar Springs which dominate the flow regime of the River Yeo. Though it is unclear how the flows from the Cheddar Springs may be impacted, there is the possibility that there could be deterioration in the biological elements in this water body. As such there could be moderate impacts on the biodiversity in the River Yeo. Geomorphological forms and processes could be altered which underpin physical habitat for aquatic ecosystems.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0	0	++	<p>Construction effects</p> <p>The draft Natural Capital Assessment concluded that construction of the new pumping station and associated infrastructure will have a temporary, moderate impact.</p> <p>Operational effects</p> <p>It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided</p>

	1.3	To protect priority habitats and species	0	0	--/?	0	<p>Construction effects</p> <p>There is deciduous woodland habitat within the WTW where upgrade works are required. Construction activities may result in minor loss of/disturbance to habitats and species, however any works will take place within the boundaries of the WTW therefore any effect is considered neutral.</p> <p>Operational effects</p> <p>The operation of this option could result in effects on priority habitats or species. Additional abstraction could impact flows from the Cheddar Springs which dominate the flow regime of the River Yeo. This has the potential to cause deterioration of biological elements and therefore result in a moderate effect on any priority habitat or species present in the watercourse. There is uncertainty with this assessment and further work is required.</p>
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	<p>Construction effects</p> <p>The scheme requires updates to an existing treatment facility, as such there is risk of INNS transfer resulting from the movement of machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a negligible risk given the scale of infrastructure required for the scheme.</p> <p>Operational effects</p> <p>The abstraction of water from the charterhouse springs is perceived to have a very low potential for INNS transfer due to the source being fed by a groundwater spring and the transfer of raw water occurring over a very short distance. Additionally, operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	+	0	0	<p>Construction effects</p> <p>The option is not located within valuable agricultural land. The modification required to increase capacity of the WTW is contained within the pre-existing site which was operational as recently as 2019, therefore any associated works should not impact soil quality or land use. The option does utilise existing infrastructure and would have a minor positive effect on Objective 2.1.</p> <p>Operation effects</p> <p>It is not expected that this option will have any effect on geology or soils once in operation.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	-	0	<p>Construction effects</p> <p>Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects</p> <p>The reduction in flows associated with this option may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	--	0	<p>Construction effects</p> <p>No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects</p> <p>Operational activities associated with this option may have a moderate discernible effect on river flows with potential for a reduction in flow in a water body where the CAMS indicates that there is no additional water available for abstraction. There would also be a reduction in groundwater quantity however this is only expected to be minor as the amount of water abstracted is small compared to the scale of the groundwater body.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	<p>Construction effects</p> <p>The option would not require the construction of new above ground water-supply infrastructure and would be an upgrade to an existing facility. None of the components are situated within an area at risk of flooding therefore this option will have a neutral effect.</p> <p>Operation effects</p> <p>Operational effects on flood risk will be neutral.</p>
	3.4	To meet WFD objectives	0	0	--/?	0	<p>This options involves the upgrade of an existing water treatment works. Through the use of best practice construction techniques, these construction activities are deemed as WFD compliant. Operation of the option will require further assessment to determine compliance with WFD due to changes in river flows, therefore this has been assessed as moderate negative (uncertain).</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>There are no AQMAs within 5km of the option.</p> <p>Construction effects</p> <p>Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed.</p> <p>Operation effects</p> <p>Operation of the option will have a neutral effect on air quality.</p>

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	--	0	<p>Construction effects</p> <p>Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is expected to be 181 tCO₂e, which has been assessed as a minor negative effect on GHG emissions.</p> <p>Operation effects</p> <p>Operational carbon emissions include energy required to pump water as well as energy used extended treatment process. Operational carbon for this option is anticipated to be 1,387 tCO₂e per year which has been assessed as having a moderate negative effect on GHG emissions when in operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide 0.74 Ml/d of additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	<p>Construction effects</p> <p>The expenditure during construction of this option (CAPEX) is estimated to be £480,164. This relatively small capital investment is unlikely to have any discernible impact on job growth or the local economy and has been assessed as a neutral effect overall.</p> <p>Operation effects</p> <p>In operation, this option would provide an additional design capacity of 0.74 Ml/d to support a sustainable and growing economy. The effect has been assessed as neutral.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>There are no areas for recreation in close proximity to the option.</p> <p>Construction effects</p> <p>Construction activities will be contained within the existing WTW and would have no effect on recreation or tourism.</p> <p>Operation effects</p> <p>This option would not have any effects on existing recreation or tourism in operation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	<p>Construction effects</p> <p>Construction activities may increase noise and disruption in and around the WTW site. The setting is rural and the construction requirement is small in scale, therefore overall effects are considered to be neutral for health and wellbeing.</p> <p>Operation effects</p> <p>This option will provide an additional average design capacity of 0.74 Ml/d for drinking water. This will have a minor beneficial effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	+	0	0	<p>Construction effects</p> <p>This option makes use of existing built assets and infrastructure. This has a minor positive effect on the construction of the scheme. Small scale upgrade works are required at the WTW and there will be limited opportunities for the re-use or recycling of materials. The amount of materials (e.g. concrete) required is unknown but based on the CAPEX of the scheme this is expected to be minor.</p> <p>Operation effects</p> <p>This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals in the extended treatment process. However, the yield is relatively small therefore overall effect is considered to be neutral.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>There are no designated heritage assets within the WTW site. There are several within 500m of the option, including scheduled monuments (Gorse Bigbury earth circle and round barrow near Longwood and a World War II bombing decoy complex c.200m west and 570m north of the WTW, respectively).</p> <p>Construction effects</p> <p>Construction activities will be contained to the existing facility therefore no effects on heritage assets are expected.</p> <p>Operation effects</p> <p>No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	0	0	<p>The WTW is located within the Mendip Hills AONB.</p> <p>Construction effects</p> <p>Construction works are expected to be small scale and will be contained to the existing site. However they could have negative effects on local landscape character and visual amenity within the AONB. These effects are considered to be minor, short-term and temporary assuming best-practice construction measures are followed.</p> <p>Operation effects</p> <p>Once operational, the option is not expected to have any effects landscape as upgrade works will be on existing structures.</p>

Option Name
P01-02_Forum Increase performance of existing sources to increase DO near to licensed quantity
Option Description
<p>This option would improve the output of existing sources by improving the efficiency of treatment processes at the site so that more of the licensed volume can be treated and put into supply. This scheme would involve the maximisation of the yield from an existing operational source at Forum (which is currently constrained by the performance of the membrane plants). The key works include:</p> <ul style="list-style-type: none"> - Decommissioning and removal of obsolete equipment including the pressurised membrane system - Building extension and building services (to include building ventilation and insulation) <ul style="list-style-type: none"> - New Boll prefiltration (300 µm) - Installation of submerged membranes - Refurbishment/modification of control and telemetry systems as required to integrate new works - Condition survey of retained existing structures and repair/renovation as required - Replacement of gas chlorine with OSEC <p>Licensed volume 2.73 Ml/d Maximum output 2 Ml/d</p>
Yield
1.59 Ml/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--/?	0	<p>There are three European sites within 10km of the option, including Mendip Woodlands SAC (5.7km east), Mells Valley SAC (2.6km NE) and North Somerset and Mendip Bats SAC (8.2km NW). There are four SSSIs within 1km of the option, the nearest is Hobbs Quarry located c.200m SE.</p> <p>Construction Construction may result in LSE on qualifying feature of Mells Valley SAC (greater horseshoe bat <i>Rhinolophus ferrumequinum</i>) given proximity of nearby woodland habitat and foraging range of species. Mitigation measures required during construction, therefore Stage 2 Appropriate Assessment required if option selected and a moderate negative effect has been concluded at this stage. North Somerset and Mendip Bats SAC and Mendip Woodlands SAC are considered sufficient distance from the construction site such that air quality and noise, visual disturbance issues during construction not anticipated on qualifying species and habitats. Construction activities are contained within the existing WTW and are not located near any water courses therefore no effects on other habitats and/or species are anticipated.</p> <p>Operation No new water abstraction licence is required however, improving the treatment processes will aim to abstract more water within the current abstraction licence. Operation effects uncertain regarding flow changes in the River Sheppey and use of this watercourse by the bat species. Therefore Stage 2 Appropriate Assessment required if option selected. No impacts to Mendip Woodlands SAC are anticipated in operation as habitat is not water dependent. The operation of this option could result in effects on non-designated aquatic habitats or species. There is a lack of hydrological data for the River Sheppey in which to use as a baseline to establish the potential impacts on the biodiversity in the River Sheppey. It is also unclear what the potential flow change would be due to a lack of understanding of the groundwater and surface water interactions between the Wells groundwater body and the River Sheppey. As such, at this stage the impact on non-designated aquatic habitats and species is moderate (uncertain).</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0		++	<p>Construction effects The draft Natural Capital Assessment concluded that construction of the new pumping station and associated infrastructure will have a temporary, moderate impact.</p> <p>Operation effects It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	--/?	0	<p>No areas of priority habitat have been identified in proximity to the WTW.</p> <p>Construction effects Construction activities will be contained within the existing treatment facility therefore no effects are anticipated on priority habitats and/or species.</p> <p>Operational effects The operation of this option could result in effects on priority habitats or species. There is uncertainty over the impacts on the River Sheppey as a result of increased abstraction. At this stage, the effect on aquatic priority habitats and species have been assessed as moderate (uncertain) until confirmed through further investigation.</p>

	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	<p>Construction effects The scheme requires updates to an existing treatment facility, as such there is of INNS transfer resulting from the movement of machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a negligible risk given the scale of infrastructure required for the scheme.</p> <p>Operation effects During normal operation the scheme does not constitute a raw water transfer. Potable water stored within a storage reservoir will be treated on-site prior to onward transmission to supply. Operations at the treatment works may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	+	0	0	<p>Construction effects Forum WTW is located wholly within Grade 3 agricultural land. An extension is required to the current facility to improve the efficiency of the treatment processes and this will involve permanent land-take of Grade 3 land. However, this will be within the existing site boundary and therefore any effect on soil and geology is considered neutral. The option makes use of existing infrastructure which has a minor positive effect on land-use.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	--/?	0	<p>Construction effects Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects The operation of this option would result in a reduction in both groundwater and surface water quantities. It is unlikely that this reduction in groundwater would lead to deterioration in groundwater water quality. There is a lack of hydrological data for the River Sheppey in which to use as a baseline to establish the potential river flow reduction. It is also unclear what the potential flow change would be due to there being little understanding of the groundwater and surface water interactions between the Wells groundwater body and the River Sheppey. As such, at this stage the impact on water quality is negative however the magnitude is uncertain but a moderate effect has been assumed.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	--/?	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects The operation of this option would result in a reduction in both groundwater and surface water quantities. There is a lack of hydrological data for the River Sheppey in which to use as a baseline to establish the potential flow reduction. It is also unclear what the potential flow change would be due to there being little understanding of the groundwater and surface water interactions between the Wells groundwater body and the River Sheppey. As such, at this stage the impact on water quantity has been assessed as moderate negative however this is uncertain.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	<p>Construction effects The option would require the construction of new above-ground water supply infrastructure (building extension to extend treatment processes) however this is located away from flood risk areas therefore any effect is considered to be neutral.</p> <p>Operation effects No effects on flood risk are expected during operation.</p>
	3.4	To meet WFD objectives	0	0	-/?	0	<p>Construction effects This options involves the upgrade of an existing water treatment works. Through the use of best practice construction techniques, these construction activities are deemed as WFD compliant</p> <p>Operation effects Further assessment is required to determine effect on WFD compliance. This has been assessed as minor (uncertain) as although impacts are possible they are unlikely to cause a deterioration in status.</p>
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	<p>There are no AQMAs within 5km of the option.</p> <p>Construction effects Construction activities and vehicle movements may cause a temporary decrease in local air quality, however the activities are anticipated to be small-scale and largely limited to the existing treatment works. Assuming best-practice construction measures overall effect is considered to be neutral.</p> <p>Operation effects Operation of the option will have a neutral effect on air quality.</p>

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	--	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is expected to be 345 tCO2e, which has been assessed as a minor negative effect on GHG emissions.</p> <p>Operation effects Operational carbon emissions include energy required to pump and treat additional water. Operational carbon for this option is anticipated to be 826 tCO2e per year which has been assessed as having a moderate negative effect on GHG emissions when in operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide 1.59 MI/d of additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	<p>Construction effects The expenditure during construction of this option (CAPEX) is estimated to be £801,000. This small capital investment is unlikely to have any discernible impact on job growth or the local economy. A neutral effect has been assigned.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 1.59 MI/d to support a sustainable and growing economy. This would have a minor positive effect.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>There are limited opportunities for recreation or tourism within close proximity to the option.</p> <p>Construction effects Construction activities are limited to the existing site and although there would be some minor disruption to the local traffic network in the area as a result of construction activities, this would not be significant.</p> <p>Operation effects This option would not have any effects on existing recreation or tourism in operation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	<p>Construction effects Construction related activities may result in a short-term and temporary increase in disturbance and nuisance, however, this would be limited to the existing site and very few receptors would be effected. The option therefore has a neutral effect on health during construction.</p> <p>Operation effects This option will provide an additional average design capacity of 1.59 MI/d for drinking water. This will have a minor positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	<p>Construction effects This option requires an extension to the existing treatment facility which will involve the use of materials and generate waste. There will be limited opportunities for the re-use or recycling of materials. The amount of materials (e.g. concrete) required is unknown but based on the relatively small CAPEX of the scheme this is expected to be minor.</p> <p>Operation effects This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals in the extended treatment process. However, the yield is relatively small therefore overall effect is considered to be neutral.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>The WTW site does not contain any designated heritage assets. There are assets in close proximity to the option including a scheduled monument c.710m the south as well as several listed buildings within 500m and a conservation area c.700m south.</p> <p>Construction effects Any construction would be contained within an existing site, no effects on the settings of these heritage features are anticipated and a neutral effect has been identified.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	<p>The option is not located within, or in close proximity to, protected/designated landscapes.</p> <p>Construction effects Construction would be contained within an existing site. In consequence, any landscape/visual impacts are expected to be negligible and a neutral effect has been identified.</p> <p>Operation effects No effects on landscape or visual amenity are anticipated in operation.</p>

Option Name
P06_Catchment Management of Mendip Lakes Catchment Management of the Mendip Lakes (Chew, Blagdon and Cheddar) to manage outage risk from algal blooms
Option Description
<p>This option is to continue the established programme of catchment management to reduce nutrient loads. This option is considered in relation to reducing the outage risk at Stowey, Barrow and Cheddar WTW that result from algae loads in Chew, Blagdon and Cheddar Reservoirs and ensuring optimum output of Stowey, Barrow and Cheddar in relation to algal loads.</p> <p>The programme involves the implementation of the catchment grant scheme to support farms to improve their infrastructure and reduce diffuse pollution risk. This option will not require construction works nor new water abstraction licence.</p> <p>The benefit of this scheme may therefore be considered to be a reduction in risk of an outage due to algae. The yield benefit is estimated to be an average of 0.7MI/d.</p>
Yield
0.7 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	-	++	<p>There are several European designated sites in proximity this option, including; North Somerset Mendip Bats SAC (1.8km), Mendip Limestone Grasslands SAC (1.4km), Mendip Woodlands SAC (0.6km), Severn Estuary SAC/SPA/Ramsar (12.7km), Chew Valley Lake SPA (0km within) and Somerset Levels & Moors SPA/Ramsar (7.9km).</p> <p>Construction No significant construction works will be required as part of this option. This option is to continue the established programme of catchment management to reduce nutrient loads. Therefore no impacts / LSE on European designated sites are anticipated.</p> <p>Operation Operation of the option will result in less outage and therefore greater water abstraction from the Chew, Blagdon and Cheddar Reservoirs. The yield benefit has been estimated to be 0.7MI/d which could result in a minor impact on both the reservoir waterbody and the waterbody downstream (noting that Cheddar Reservoir does not have a downstream waterbody). It is considered that such additional abstraction from reservoir is considered compliant with the WFD without needing an impact assessment. Due to the minor additional abstraction and lack of impacts anticipated on the WFD, no LSE are anticipated during operation, on the European designated sites. The operation of this option could result in effects on non-designated aquatic habitats or species due to changes in the abstraction regime within the reservoir water bodies. As such there could be a minor impact on the biodiversity within the downstream rivers and within the reservoirs themselves. This impact would only be low magnitude. Water quality improvements as a result of the catchment management activities would have a positive impact on the biology within the targeted catchments.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	<p>Construction No construction associated with this scheme, neutral impact expected.</p> <p>Operation It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. In this case, the assessment remains neutral.</p>
	1.3 To protect priority habitats and species	0	0	0	++	<p>Construction Construction works will be very small scale. Therefore no impacts on priority habitats and species are anticipated.</p> <p>Operation Operation of this option has potential to improve water quality which may result in a positive effect on aquatic priority habitats and species. A moderate positive effect has been identified</p>

	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	<p>Construction No significant construction associated with this scheme and assuming reasonable mitigation is put in place, there will be an overall neutral effect to INNS.</p> <p>Operation Operation of the scheme does not constitute a raw water transfer. Based on the current understanding of the option there is negligible risk of INNS transfer during operation.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	+	<p>Construction effects No significant construction works will be required as part of this option. This option is to continue the established programme of catchment management to reduce nutrient loads. Therefore no impacts on soils, geology and land use are anticipated.</p> <p>Operation effects The option would deliver to support to the agricultural sector and implementation would reduce the sources and incidents of soil contamination, particularly from slurry spillage or tank rupture. This would have a positive effect on geology and soils, however this would be highly localised.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	-	++	<p>Construction No construction activities are associated with this option therefore there would be no discernible effect on water quality.</p> <p>Operation The reduction in flows associated with this option may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration. This option would be implemented across the catchment with a range of measures to reduce diffuse pollution from agricultural land run off. The catchment management activities would improve the water quality in the targeted catchments and has the potential to improve the WFD status.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction No construction activities are associated with this option therefore there would be no discernible effect on river flows or groundwater levels.</p> <p>Operation Operation of this option could result in a minor reduction in flows in the rivers downstream of the reservoirs due to less abstraction outages. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	<p>Construction effects The catchment area contains land in all flood zones, however the minor construction requirements do not involve anything that will cause or exacerbate flooding in the catchment.</p> <p>Operation effects The catchment area contains land in all flood zones, however the specific interventions are not considered to have any effects on flood risk in operation.</p>
	3.4	To meet WFD objectives	0	0	0	++	<p>Construction This option has a very minor construction element limited to implementing small scale catchment management measures across a wide area. Therefore no effects are anticipated on this objective.</p> <p>Operation This option would improve surface water quality and may help address underlying causes for poor progress against WFD Good Ecological Status/Potential. There would be a an overall moderate positive effect on this objective.</p>
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	<p>Construction effects This option has a very minor construction element limited to implementing small scale catchment management measures across a wide area. Therefore no effects are anticipated for air quality.</p> <p>Operation effects Operation of the option will have a neutral effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	---	0	<p>Construction effects Construction of the option would be limited to implementing catchment management measures to support farms and will involve the use of vehicles across the catchment areas. Embodied carbon for this scheme is estimated at 26,320 tCO₂e which constitutes a major negative effect.</p> <p>Operation effects It is assumed there is no operational carbon associated with this measures, therefore no impacts on GHG emissions are likely.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	<p>This option would provide an average of 0.7 Ml/d additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.</p>

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	0	<p>Construction effects The capital investment (CAPEX) of this option is estimated to be in the region of £6 million. This level of expenditure will have a moderate positive effect on job creation and will support the local economy.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 0.7 MI/d to support a sustainable and growing economy. The effect has been assessed as neutral.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	+	<p>Construction effects Construction activities are very small scale and are unlikely to have any effects on recreation or tourism in the area.</p> <p>Operation effects There may be positive effects as a result of implementing this option due to reduced risk of algal loads in the reservoirs. These reservoirs may provide opportunities for recreation and the water quality may be improved as a result of implementing these measures, resulting in a minor positive effect on recreation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	<p>Construction effects Construction activities may result in very minor increases in disturbance and nuisance. Any effect would be short-term and of low significance resulting in a neutral effect overall.</p> <p>Operation effects This option will provide an additional design capacity of 0.7 MI/d. This will support the health and wellbeing of the local communities through continual supply of clean drinking water however the yield is relatively low and has been assessed as neutral overall.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	--	0	0	+	<p>Construction effects This option will involve the use of materials to implement catchment management measures and will generate waste. There may be limited opportunities for re-use of materials e.g. to install trackways across fields using re-purposed concrete railway sleepers. The use of concrete will be required for various measures e.g. concreting of farm yard to keep clean and slurry storage tanks. The amount of concrete/materials is unknown however using a CAPEX of £6 million this is anticipated to be a moderate amount.</p> <p>Operation effects The option may save energy through a reduction in the treatment required. This is anticipated to be minor positive.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>Construction effects Implementation of the catchment management measures may involve works in the vicinity of designated and undesignated heritage assets. It is anticipated that any negative effects can be managed by following best practice construction measures therefore effects are considered neutral.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	<p>Construction effects Construction activity would be very small scale and is not anticipated to have any effects on landscape or visual amenity.</p> <p>Operation effects There would be no operational effects on landscape during operation.</p>

Option Name
P08_Alderley WTW Increase performance of existing sources (Alderley WTW) to increase deployable output
Option Description
<p>The output is constrained physically by processes on site, which is the size of membranes (currently max. output is 5 MI/d). In 2013 a feasibility assessment (Alderley WtW Membrane Replacement with UV) was undertaken which assessed increasing production via an increase in membrane capacity or via UV treatment. The report recommended UV treatment to increase capacity to up to a total of 6.8 MI/d (2 MI/d increase to be achieved by the scheme).</p> <p>Therefore, this scheme would involve the maximisation of the yields from existing operational source at Alderley, including the replacement of the current membranes to UV treatment. This option requires the upgrade of the water treatment works, with an expected increase in yield of 2 MI/d (total capacity of the UV system: 7 MI/d).</p> <p style="text-align: center;">Replacement of the current membranes to UV treatment.</p> <p style="text-align: center;">The UV treatment will replace the existing membrane system (5 MI/d) and allow for an increase of yield (2 MI/d). Total treated capacity will amount to 6.8 MI/d (the licence).</p>
Yield
2 MI/d (to provide capacity 7MI/d)

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	-	0	--/?	0	<p>The Severn Estuary SAC/SPA/Ramsar is 16.3km from the option location. There are several areas of ancient woodland within 1km of the option, however all are more than 500m from the option components.</p> <p>Construction Due to the distance between the option and the SAC, weir structures on the watercourse (capture fine sediment etc) and small extent of the works with upgrade of existing infrastructure within the treatment works, no impacts are anticipated from construction works. Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p>Operation The operational increase in abstraction at Alderley WTW may significantly reduce flow in the Ozleworth Brook and Little Avon. Flows into Berkley Pill are unlikely to be affected with the confluence of the Little Avon River. The large sluice structure at Berkley Pill is also likely to limit migratory fish into the watercourses, no salmon have been identified upstream of the sluice. European eels have been identified within upstream watercourses. In the context of the Severn Estuary, changes in flow are considered minimal and therefore no impacts are anticipated upon the estuary. As such, no LSEs during operation are considered likely. The operation of this option could result in effects on non-designated aquatic habitats or species. Additional abstraction at Alderley WTW may significantly reduce flow in the Ozleworth Brook and Little Avon. Though there is little data to understand the proportion of flow reduction, the CAMS indicates that there is no additional water available for abstraction in these water bodies, indicating a potential flow pressure. As such a further reduction in flows could lead to deterioration in the biological elements. As such there could be moderate impacts on the biodiversity in the Ozleworth Brook and Little Avon. Geomorphological forms and processes could be altered which underpin physical habitat for aquatic ecosystems.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0	0	++	<p>Construction The draft Natural Capital Assessment concluded that construction of the new pumping station and associated infrastructure will have a temporary, moderate impact.</p> <p>Operation It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>

	1.3	To protect priority habitats and species	0	0	--/?	0	<p>This option requires an upgrade to the existing WTW at Alderley. There are areas of deciduous woodland priority habitat within the treatment works.</p> <p>Construction Construction activities will be contained within the existing WTW. There may be some minor, temporary, short-term effects on the deciduous woodland surrounding the proposed works as a result. However, with best-practice construction measures it is assumed any effects will be neutral.</p> <p>Operation Operation of the option may cause a reduction in flow in the nearby watercourses. This has the potential for adverse effects on water dependent priority habitats and/or species. A moderate negative (uncertain) effect has been identified until further assessment has been made.</p>
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	<p>Construction The scheme requires updates to an existing treatment facility, as such there is of INNS transfer resulting from the movement of machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a negligible risk given the scale of infrastructure required for the scheme.</p> <p>Operation During normal operation the scheme does not constitute a raw water transfer, raw water will be abstracted and treated within the treatment works footprint. Additionally, operations at the treatment works may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	+	0	0	<p>Construction effects The modification of the WTW's treatment processes would be contained within the pre-existing operational site such that any new infrastructure or works required should not adversely impact on land use or soil quality. The option would be making use of existing infrastructure which would have a minor positive effect.</p> <p>Upgrade to the treatment works at Stowey is required for this option with an estimated maximum land take area of 100 x 100m. This will largely be located in Grade 1 agricultural land. This would be a moderate negative effect on land use as it would result in permanent loss of the best and most versatile agricultural land. There are also several areas of historic landfill sites in close proximity to the pipeline route, including a Former Quarry Site at Northend Farm <25m south. Excavation works along the pipeline route have the potential to disturb potentially contaminated land therefore appropriate mitigation will be required.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>
	3.1	To protect and improve the quality of surface water and groundwaters	-	0	--	0	<p>Construction Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operation The reduction in flows associated with this option may reduce the rivers buffering capacity against point source pollutants potentially causing WFD deterioration, particularly in the Little Avon.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	--	0	<p>Construction No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operation Operational activities associated with this option may have a moderate discernible effect on river flows with there being the potential for a reduction in flow in a water body where the CAMS indicates that there is no additional water available for abstraction.</p>

Water	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	<p>The southern section of the treatment works site is located within Flood Zone 3, however, the area where the proposed upgrades are planned is just outside of this zone (20m).</p> <p>Construction effects The option would not require the construction of above ground water-supply infrastructure and instead will be replacement of the membrane within the existing treatment facility. These works are located just outside of the Flood Zone therefore any internal modification to the WTW is not considered to be at increased risk of flooding. This has been assessed as neutral overall, although timing of the works will need to be considered to ensure any potential effects are mitigated.</p> <p>Operation effects Despite the upgrades being located 20m from Flood Zone 3, the present operation of the site suggests site level mitigation measures are already established. The overall operation of the option is not likely to cause or exacerbate flooding and has been assessed as having a neutral effect.</p>
	3.4	To meet WFD objectives	0	0	--/?	0	<p>Construction This component involves the construction of a UV treatment system in replacement of current membranes at Alderley WTW. Through the use of best practice construction techniques, negligible effects have been concluded for this option.</p> <p>Operation The reduction in flows may reduce the rivers buffering capacity against point source pollutants which has the potential to cause WFD deterioration, particularly in the Little Avon. Overall this has been assessed as moderate negative (uncertain). Operation of this option requires further assessment to determine compliance with WFD.</p>
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	<p>There are no AQMAs within 5km of the option.</p> <p>Construction effects Construction activities and vehicle movements may cause a decrease in local air quality, however the small scale nature of the works are unlikely to have a significant effect on traffic congestion and overall this has been assessed as having a neutral effect.</p> <p>Operation effects Operation of the option will have a neutral effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. The upgrade works are expected to be small scale and as a result, embodied carbon for this options relatively low at 94 tCO2e, therefore a neutral effect on GHG emissions has been identified.</p> <p>Operation effects Operational carbon emissions include energy required to pump and treat additional water. Operational carbon for this option is anticipated to be 33 tCO2e per year which has been assessed as having a neutral effect on emissions in operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide 7 MI/d additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	<p>Construction effects The expenditure during construction of this option (CAPEX) is estimated to be £541,000. This relatively small capital investment is unlikely to have any discernible impact on job growth or the local economy and neutral impact overall.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 7 MI/d to support a sustainable and growing economy. The effect has been assessed as moderate positive.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>There are some areas for recreation in proximity to the option, including Cotswold Way National Trail (93m from the treatment works). Ozleworth Beck (tributary of the Little Avon) runs adjacent to the southern boundary of the treatment works and this may host recreational walking and/or fishing.</p> <p>Construction effects Construction activities are contained within the existing works and although increased activity may cause some noise and disruption in the area there is considered to be sufficient woodland screening for any adverse effects on recreation or tourism. Upgrades to the WTW may limit access to the adjacent watercourse but this has been assessed as neutral overall considering the small-scale and temporary nature of the works.</p> <p>Operation effects This option would not have any effects on existing recreation or tourism in operation.</p>

	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	<p>There are no built up areas in proximity to the option.</p> <p>Construction effects Construction activities are contained within the existing works and although increased activity may cause some noise and disruption there is considered to be sufficient woodland screening for proximate residential receptors to experience any adverse effects. Overall, the effect has been assessed as neutral for health and wellbeing.</p> <p>Operation effects This option will provide an additional design capacity of 7 MI/d. This will have a moderate positive effect on the health and wellbeing of the local communities through continual supply of clean drinking water.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	+	0	0	<p>Construction effects This option makes use of an existing built asset (Alderley WTW) and the upgrade works will be contained to this site. This has a minor positive effect for efficient use of resources. However, the upgrade works will require replacement of the membranes which will generate some waste, with limited opportunities to recycle or reuse materials. This would have a negative effect but based on a CAPEX figure of £541,000 the significance would be minor.</p> <p>Operation effects This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals. Due to the relatively low yield this has been assessed as neutral.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>There are two designated heritage assets within 500m of the option; Alderley Grange (Grade II registered park and garden) and The Gate House (Grade II listed building), both of which are over 490m from the option location.</p> <p>Construction effects The scale of works is anticipated to be small and contained within the existing treatment works. Any designated heritage assets are considered to be at a sufficient distance from the option, so that their setting will not be impacted. Overall the effect is considered to be neutral.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	<p>Alderley WTW is located within Cotswold AONB.</p> <p>Construction effects Construction works will be confined to the existing treatment works and involve internal modifications to the treatment processes. This is not expected to have any adverse effects on designated landscape character. There may be increased disruption from transportation of equipment and materials which may have an effect on the amenity value of the AONB however activities are anticipated to be of minor significance. Overall the effect on landscape has been assessed as neutral as any works will be small-scale, short-term and temporary and best-practice construction measures will be adhered to.</p> <p>Operation effects The option does not require any new above-ground infrastructure and is an upgrade of existing infrastructure. There would be no operational effects on landscape during operation.</p>

Option Name

R005_Cheeddar Reservoir
Cheeddar 2 Source and Transfer SRO

Option Description

Since the Draft WRMP24, it has been shown that there is not the need, in Bristol Water's supply area for an additional reservoir at the present time and as a result the option has been removed from Bristol Water's feasible options list. However, this option has been selected as a preferred option within the WCWR regional plan and is being developed within Bristol Water's supply area to serve the wider region as part of the RAPID gated process. Information concerning the Cheeddar 2 option as assessed at the Draft WRMP24 stage has been retained in this report for reference.

The option is based upon Cheeddar 2, as per the existing design being put forward for Gate 2 (costs are from Gate 1 as they were not available at the time of writing).

Construction of a second reservoir at Cheeddar of c.9,000MI capacity with associated infrastructure and a new, dedicated WTW to provide a potable supply to Wessex Water's groundwater region in the east. The reservoir will be filled alongside the existing reservoir within Bristol Water's existing abstraction licences at Cheeddar Springs and on the River Axe. The scheme will provide a peak deployable output of 36MI/d. In the regional plan, this assumes that the reservoir will be utilised at capacity for 2 months of the year and at 25% capacity the rest of the year by Wessex Water only. Cheeddar 2 Reservoir built to the South of Cheeddar Reservoir. The new reservoir has a proposed volume of 9400 MI, a surface area of 868000 m2 (surface area from WRMP19) and a 3600m perimeter (perimeter from WRMP19)

For the option as part of the Bristol Water WRMP24, the use of this scheme is altered, although all other aspects remain the same. Bristol Water will be the sole user of the scheme, equally over the year.

Yield

13.5 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	---	0	-	0	<p>There are several European designated sites within 10km or in hydrological connectivity of the option, including: North Somerset Mendip Bats SAC (0.04km south), Mendip Limestone Grasslands SAC (1.9km NW), Mendip Woodlands SAC (0.8km east), Mells Valley SAC (8.7km NE), Salisbury Plain SAC/SPA (6.6km NE), River Avon SAC (1.5km NE), Chilmark Quarries SAC (8.4km SE), Severn Estuary SAC/SPA/Ramsar (13.2km west) and Somerset Levels & Moors SPA/Ramsar (4.8km west). In addition, there are 14 SSSIs within 1km of the option, the nearest is Cheeddar Reservoir (0km). There are also several areas of ancient woodland in close proximity to the option, including areas which are intersected by the proposed pipeline.</p> <p>Construction effects Although construction of the pipeline route and reservoir is outside the identified buffer zones identified in available guidance, it is considered that the numerous bat SACs across Wiltshire and the Mendips, and offsite functionally linked habitat, act to support metapopulations. As such, loss of linear features such as hedgerows and pipelines may result in changes in availability of foraging habitats, and therefore population dynamics. The pipeline route crosses numerous watercourse which flow to the European site; River Altham, River Whitelake, River Redlake, River Sheppey and Keward Brook. Potential degradation of habitats from the introduction of invasive non-native species (INNS), sediments and pollution incidents caused by construction upstream of the European site will need consideration. Loss of offsite functionally linked habitat within the footprint of Cheeddar 2 Reservoir could impact the overwintering birds. Deterioration of wider connected offsite wetland habitats, e.g. localised drying, may occur due to inappropriate pipeline routing. The HRA has concluded LSE during on construction on the following designated sites; Chew Valley Lake SPA, Chilmark Quarries SAC, Mells Valley SAC, Mendip Limestone Grasslands SAC, North Somerset and Mendip Bats SAC, Severn Estuary SAC/SPA/Ramsar and Somerset Levels SPA/Ramsar. See HRA Report for more detailed information.</p> <p>Construction of the new reservoir is adjacent to the existing Cheeddar Reservoir (a SSSI) and will be a significant undertaking resulting in the significant loss of greenfield land which could have an adverse effect on aquatic and terrestrial ecological features. Pipeline construction will take place in and near areas of ancient woodland and could result in deterioration or potential loss of irreplaceable habitats and consequently this will have a major negative effect. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems. Overall, the effect on biodiversity is considered to be major negative due to the loss of ancient woodland and LSEs on several designated sites.</p> <p>Operational effects During operation, a change in hydrology across the system of rhynes and pills may change overwintering foraging and roosting habitat availability and condition. The changes to the functioning of the ditch network, and availability of water, across the wider area is uncertain. This could result in a change in condition of offsite functionally linked foraging habitat. The operation of the scheme will require additional abstraction to fill Cheeddar 2 reservoir. As such there may be a change in flows/velocities and wetted widths in the Cheeddar Yeo and River Axe which could impact use by migratory fish. Changes to the hydrology of the network may also affect the passability of barriers on the system. Additional abstraction may also alter the volume of pass-forward freshwater into the estuary. The HRA has concluded LSE during operation on the following designated sites; Chew Valley Lake SPA, Chilmark Quarries SAC, Mells Valley SAC, Mendip Limestone Grasslands SAC, North Somerset and Mendip Bats SAC, Severn Estuary SAC/SPA/Ramsar and Somerset Levels SPA/Ramsar. Stage 2 Appropriate Assessment will be required if this option is selected. See HRA Report for more detailed information.</p> <p>The operation of this option could result in minor effects on non-designated aquatic habitats or species. The construction of the new reservoir would lead to the potential for the loss of some higher flows from the Cheeddar Springs and the partial loss of winter flows in the River Axe. Low flow conditions would still be protected by HoFs. It is worth noting that this assessment is likely to be updated once the results from the WCN SRO environmental assessments are available.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	---	0		+++	<p>Construction effects The draft Natural Capital assessment concluded that construction impacts of Cheeddar 2 and transfer are expected to be major, due to the size of the pipeline required and the land-take from the new reservoir.</p> <p>Operational effects It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided</p>
	1.3 To protect priority habitats and species	--	0	-	0	<p>Construction effects The development site for the new reservoir is surrounded and partially intersected by areas of coastal and floodplain grazing marsh. The pipeline route has a variety of protected habitats and species present along its length. Construction activities will result in the loss and/or disturbance of these habitats and associated species. Site level mitigation and best practice construction measures should reduce this effect.</p> <p>Operational effects The operation of this option may have minor negative effects on aquatic receptors due to the new reservoir potentially resulting in the loss of some higher flows from Cheeddar Springs and partial loss of winter flows in the River Axe, however low flow conditions would be protected by HoFs.</p>
	1.4 To reduce the spread of invasive, non-native species	--	0	--	0	<p>Construction effects The scheme requires the construction of >50km of pipeline and 6 pumping stations therefore there is a risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p>Operational effects The abstraction and transfer of raw water from the River Axe and Cheeddar Springs to Cheeddar 2 and the onward transfer of raw water from the Cheeddar 2 reservoir to Honeyhurst WTW pose an INNS transfer risk. Additionally, operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may also present a risk. Based on the current scheme design and understanding of mitigation in place there is a moderate risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1 To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	---	0	0	0	<p>Construction effects Construction of the new reservoir would result in the significant loss of greenfield land, including Grade 3 agricultural land which is currently used for grazing purposes. There will also be temporary disturbance to soils of primarily Grade 3 quality (with pockets of Grade 1 and 2) during construction of the pipeline but it is assumed that any land excavated would be reinstated following completion of the works. There are also several historic landfill sites in proximity to the proposed pipeline routes, construction near these areas has the potential to disturb contaminated land. Overall the effect on soils, geology and land use has been assessed as major negative.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>

Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	-	0	<p>Construction effects Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects The reduction in flows associated with this option may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration. It is worth noting that this assessment is likely to be updated once the results from the WCN SRO environmental assessments are available.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects Operation of this option could result in a minor reduction in flows in the River Yeo and River Axe. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology. It is worth noting that this assessment is likely to be updated once the results from the WCN SRO environmental assessments are available.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	--	0	0	++	<p>Construction effects The proposed reservoir and ancillary infrastructure/pipeline would be partially (<40%) located within Flood Zone 3. Construction activities would be partially in Flood Zone 3 areas and would be at increased risk of flooding depending on the timing of the works. Overall, considering the proportion of the development at risk, the option has been assessed as having a moderate negative effect on this objective during the construction phase.</p> <p>Operation effects This option involves a land take which would result in the loss of flood storage area. However, the new reservoir could provide additional buffer storage and has the potential for upstream retention of water to help alleviate flooding in the catchment. The overall effect is considered to be moderate positive due to the new reservoir being partially located within Flood Zone 3.</p>
	3.4	To meet WFD objectives	0	0	0	0	The option is not anticipated to cause deterioration in WFD classification during construction or in operation.
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>There are no AQMAs within 5km of the option.</p> <p>Construction effects Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed.</p> <p>Operation effects Operation of the option will have a neutral effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	---	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is expected to be significant, over 80,000 tCO2e, with the majority associated with the construction of the new reservoir. Overall this has been assessed as a major negative effect on GHG emissions.</p> <p>Operation effects The option would provide additional storage capacity which would enable Cheddar Reservoir to suspend storage optimisation via pumped water outflow. This would result in lower energy demand and generate a carbon saving however the overall effect is considered to be neutral positive. Conversely, operation of this option will also generate emissions which are anticipated to be 7,539 tCO2e per year which has been assessed as having a major, long-term negative effect on GHG emissions when in operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide an average of 13.5 MI/d additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+++	0	++	<p>Construction effects The expenditure during construction of this option (CAPEX) is estimated to be £150million. This is a significant capital investment and would result in a major increase in construction related jobs to support the economic wellbeing of the population.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 13.5 MI/d to provide clean drinking water and support a sustainable and growing economy. The effect has been assessed as moderate positive.</p>
	6.2	To maintain and enhance tourism and recreation	-	0	0	+++	<p>There are several areas for recreation surrounding the new reservoir site and along the length of the pipeline route, including several playing fields and play areas. The existing Cheddar Reservoir is also home to recreational opportunities for the local community group, including water sports. The National Cycle Network also runs in close proximity the reservoir. It is also noted that the construction site would be visible from the top of Cheddar Gorge.</p> <p>Construction effects Construction activities and HGV movements associated with the option may result in increased disruption and reduce the availability and/or quality of existing recreational areas. Access to the existing Cheddar Reservoir may be limited temporarily and there will be adverse effects on the visual amenity of recreational receptors. Overall, considering the scale of the development, duration of the construction activity and proximity of sensitive receptors, the option has been assessed as having a minor negative effect on this objective.</p> <p>Operation effects Once operational, the new reservoir may provide recreational opportunities (e.g. angling, sailing). This would have a major positive effect on tourism and recreation.</p>
	6.3	To protect and enhance the human health and wellbeing	-	0	0	++	<p>The new reservoir site is adjacent to Cheddar built up area (BUA). Several other BUAs are in proximity to the pipeline route. Population density tends to be greater in these areas and therefore increases the potential receptors.</p> <p>Construction effects Construction activities may increase noise, disruption and air quality impacts around the areas where new infrastructure is required and along the length of the pipeline route. The option will generate a large number of HGV movements which may result in congestion, delays and possible road closures along access routes to the construction areas. These effects will be temporary and result in an overall minor negative effect on the health and wellbeing of the local population.</p> <p>Operation effects This option will provide an additional average design capacity of 13.5 MI/d for drinking water. This will have a moderate positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	---	0	-	0	<p>Construction effects Construction of a new reservoir and pipeline would increase resource use and generate waste, with limited opportunities to recycle or re-use materials. The amount of materials required is unknown, however, using the CAPEX of £150 million as a proxy, this is anticipated to be major.</p> <p>Operation effects This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals. The effect of this has been assessed as minor negative.</p>

Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	---	0	--	0	<p>There are no designated heritage assets in location of the new reservoir, however there are several designated heritage assets within 500m of the option, including scheduled monuments Parson's Farm Duck Decoy (0.04k to the west of Cheddar 2) and a Roman settlement site, Anglo-Saxon and Norman royal palace, and St Columbanus' Chapel is situated ~500m to the east. The pipeline route also runs in close proximity to several heritage assets and intersects one scheduled monument, a section of roman road. Additionally, there is a scheduled monument on the heritage at risk register located 420m from Summerslade (Long barrow on Pertwood Down). There are also several listed buildings clustered around Cheddar, Axbridge and along the length of the pipeline route.</p> <p>Construction effects Construction activities at the new reservoir site is unlikely to result in the loss of Parson's Farm Duck Decoy, however, there is potential for temporary minor negative effects on the setting of this asset. The pipeline construction has the potential to cause significant adverse effects on the section of roman road including deterioration or possible loss which would diminish the overall setting of this asset. This section of the pipeline may need rerouting or appropriate mitigation embedded. The monument on the risk register is considered to be at a sufficient distance from the construction for any adverse effects. The setting of listed buildings in close proximity to construction activities or HGV routes may be temporarily affected, however this is not expected to be significant. Overall, the construction of this option has been assessed as having a major negative effect on cultural heritage.</p> <p>Operation effects The presence of a new reservoir would have a permanent, long-term effect on the setting those assets in close proximity and has been assessed as a moderate effect on this objective.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	---	0	--	0	<p>The site of the new reservoir is ~1.2km from the Mendip Hills AONB and less than 250m from the pipeline route.</p> <p>Construction effects The AONB is elevated when compared to the land surrounding the reservoir and the construction site would be visible from various points around the AONB. This would have significant adverse effects on the setting of the AONB and on the visual amenity for recreational users. The construction would be large scale and also result in the loss of greenfield land, affecting local landscape/townscape character and the visual amenity of residential receptors and recreational users of Cheddar Reservoir. Overall, the effect has been assessed as major (negative).</p> <p>Operation effects The new reservoir would introduce significant new above ground infrastructure that would permanently alter the local landscape/townscape character and visual amenity. The presence of the reservoir could also affect views from the Mendip Hills AONB. However, the reservoir would be set within the context of the existing Cheddar Reservoir and it is noted that the scheme would include environmental enhancements such as reduction of bund gradient, screening and planting and naturalising of embankments that would be expected to help lessen landscape and visual impacts. On balance, this option has been assessed as having a moderate negative effect.</p>

Option Name
R007_Pumped Refill of Chew Valley Reservoir
Option Description
Transfer from River Avon at Bath as part of a joint scheme with Wessex Water to extend yield period of reservoir. Existing reservoir is large compared to the catchment, and this option would provide support to refilling the reservoir.
The option requires:
- Intake structure from River Avon at Newton Meadows - it has been assumed that the infrastructure would allow for abstraction and pumping of up to three times the increase in DO. This means that the broad assumption is that the pumping would take place four months of the year (e.g. November to February or December to March) at an average of 90MI/d with the DO of 30MI/d.
- pipeline and pumping stations would be required to transfer water from the River Avon.
- Pre-treatment would be required prior to discharge to Chew Valley Lake.
- Upgrade to the treatment works at Stowey (on new land, adjacent; 100 x 100 m max.) with new draw-off tower.
Yield of approximately 25-30 MI/d.
Yield
25-30 MI/d (25 MI/d average)

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	---	0	--	0	<p>There are several European designated sites within 10km or in hydrological connectivity of the option, including: Bath & Bradford on Avon Bats SAC (4.8km south east) and Chew Valley Lake SPA (1.4km west). In addition, there are two SSSIs within 1km of the option; Folly Farm SSSI (directly adjacent to the proposed pipeline route (< 2 metres)) and Newton St.Loe SSSI (~250m south of the pipeline and intake at Newton Meadows). The pipeline route intersects Folly Farm LNR. There are several areas of ancient woodland within 500m of the option, including Folly Wood and Honey Gaston which are both intersected by the proposed pipeline route.</p> <p style="text-align: center;">Construction effects</p> <p>Due to the distance between option and the SAC construction works could result in impacts upon the bat populations (Greater horseshoe bat, Bechstein's bat and Lesser horseshoe bat) and supporting habitats potentially present along the pipeline route (although to be contained in road where possible). Due to the distance between the SPA and the option, construction works are not anticipated to result in impacts upon northern shoveler through air pollution, dust emission, incidental pollutions or loss of supporting habitats. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems. The pipeline intersects two areas of ancient woodland which would result deterioration or potential loss of irreplaceable habitats. Ancient woodland is a high value receptor and consequently this significance of effect will be major negative effect, even with appropriate compensation or mitigation.</p> <p style="text-align: center;">Operational effects</p> <p>During operation, a minor discernible change on flow is expected. However, it is assumed that water flow will be protected by sensible measures and therefore reduction in water flow is considered to be minor over the winter months and is not anticipated to result in impacts upon the qualifying features of the SAC. As such, no LSEs during operation are considered likely. Due to the uncertainty of the pre-treatment of the water at this stage, operation of the option may result in impacts to the SPA through siltation, increase of nutrients and transfer of INNS. While considered unlikely with additional filtration, LSE cannot be ruled out at this stage.</p> <p>The operation of this option could result in effects on non-designated aquatic habitats or species. Flows in the River Avon would be reduced however a suitable hands-off flow condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this option. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0		++	<p style="text-align: center;">Construction effects</p> <p>The draft Natural Capital Assessment concluded that construction of the pipeline will have a temporary, moderate impact.</p> <p style="text-align: center;">Operational effects</p> <p>It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	-	0	<p style="text-align: center;">Construction effects</p> <p>Small parts of the pipeline intersect areas of priority habitat, primarily; deciduous woodland and good quality semi-improved grassland. Construction activities may result in minor loss of/disturbance to habitats and species, however site level mitigation and best-practice construction measures should reduce this effect.</p> <p style="text-align: center;">Operational effects</p> <p>The operation of this option could result in effects on priority habitats or species. Flows in the River Avon would be reduced however a suitable hands-off flow condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of priority habitats and species.</p>
	1.4 To reduce the spread of invasive, non-native species	--	0	-	0	<p style="text-align: center;">Construction effects</p> <p>The scheme requires the construction of an intake structure on the River Avon and a pipeline of >15km as well as updates and expansion of existing treatment works, therefore there is a risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p style="text-align: center;">Operational effects</p> <p>The abstraction and transfer of raw water from the River Avon to Stowey Treatment Works pose a potential INNS transfer risk, however, INNS are not likely to be transported during onward transmission from the treatment works to chew valley reservoir. Additionally, operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a minor risk of INNS transfer during the operation of the scheme.</p>

Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	--	0	0	0	<p>Construction effects</p> <p>An upgrade to the treatment works at Stowey is required for this option with an estimated maximum land take area of 100 x 100m. This will largely be located in Grade 1 agricultural land. This would be a moderate negative effect on land use as it would result in permanent loss of the best and most versatile agricultural land. There are also several areas of historic landfill sites in close proximity to the pipeline route, including a Former Quarry Site at Northend Farm <25m south. Excavation works along the pipeline route have the potential to disturb potentially contaminated land therefore appropriate mitigation will be required.</p> <p>Operation effects</p> <p>It is not expected that this option will have any effect on geology or soils once in operation.</p>
	Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	-	0
3.2		To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction effects</p> <p>No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects</p> <p>Operational activities associated with this option may have a minor discernible effect on river flows, however, hands-off flow conditions would be required to prevent this from being a significant impact. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
3.3		To reduce or manage flood risk whilst accounting for climate change	---	0	0	0	<p>Construction effects</p> <p>The option would require the construction of above ground water-supply infrastructure. An intake structure from the River Avon at Newton Meadows would be constructed wholly in a Flood Zone 3 area and the site would be at major risk of surface water flooding during construction</p> <p>Operation effects</p> <p>The intake structure at Newton Meadows would also be at major risk of flooding during operation, however, it is expected that construction and design would account of this and reduce the risk to neutral.</p>
3.4		To meet WFD objectives	0	0	0	0	<p>The option is not anticipated to cause deterioration in WFD classification during construction or in operation.</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>There are four AQMAs within 5km of the option; Saltford (1.4km NW), Bath (1.4km SE), Temple Cloud (1.9km S) and Farrington Gurney (4.4km S).</p> <p>Construction effects</p> <p>Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed. The AQMAs are considered sufficient distance away from the activities to not be affected.</p> <p>Operation effects</p> <p>Operation of the option will have a neutral effect on air quality.</p>
							Climate Change
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	++	
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+++	0	+++	<p>Construction effects</p> <p>The expenditure during construction of this option (CAPEX) is estimated to be £32.3 million. This would result in a major increase in construction related jobs to support the economic wellbeing of the population.</p> <p>Operation effects</p> <p>In operation, this option would provide an additional design capacity of 25 MI/d to support a sustainable and growing economy (with a peak of up to 30 MI/d). The effect has been assessed as major positive.</p>
	6.2	To maintain and enhance tourism and recreation	-	0	0	0	<p>There are several areas for recreation within 500m of the option, including; multiple playing fields, bowling greens, play spaces and religious grounds. The nearest is a playing field <130m from the pipeline route. The pipeline route also crosses the National Cycle Network in one place.</p> <p>Construction effects</p> <p>Construction activities and HGV movements associated with the option may result in increased disruption and reduce the availability and/or quality of existing recreational areas. Assuming best-practice construction measures and appropriate mitigation, this effect is anticipated to be minor.</p> <p>Operation effects</p> <p>This option would not have any effects on existing recreation or tourism in operation.</p>

	6.3	To protect and enhance the human health and wellbeing	-	0	0	+++	<p>The pipeline route and option elements cross through or are in close proximity to several built up areas (e.g. Clutton/Temple Cloud and Corston) where population density is greater.</p> <p>Construction effects Construction activities may increase noise and disruption along the length of the pipeline route and in areas where new infrastructure is required (e.g. upgrade works at Stowey, intake at Newton Meadows and other pumping stations required along pipeline). The effects are not expected to be significant and will be temporary, resulting in an overall minor negative for health and wellbeing.</p> <p>Operation effects This option will provide an additional average design capacity of 25 MI/d for drinking water (with a peak of up to 30 MI/d). This will have a major positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	---	++	-	0	<p>Construction effects This option makes some use of existing built assets and infrastructure, including both Stowey WTW and some existing raw pipeline to Chew Valley. This has a minor positive effect on the construction of the scheme. Additional infrastructure is required including an expansion at Stowey WTW, new intake structure at Newton Meadows and a new 15.4km pipeline and associated pumping stations. There will be limited opportunities for the re-use or recycling of materials. The amount of materials (e.g. concrete) required is unknown but based on the CAPEX of the scheme this is expected to be major.</p> <p>Operation effects This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals. The effect of this has been assessed as minor negative.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	---	0	0	0	<p>There are several designated heritage assets within 500m of the option, including two scheduled monuments (castle remains and a part of the boundary of Wansdyke 140m and 118m from the pipeline route, respectively). There are two registered parks; Kelston Park (230m) and Newton Park (0m), the latter is intersected by the pipeline and is Grade II* and of particular importance. There are also three conservation areas within 500m. The proposed pumping station at the Newton Meadows intake is 35m from the boundary of the City of Bath which is designated as a World Heritage Site and has international importance.</p> <p>Construction effects Construction activities, particularly the pipeline through Newton Park (a registered park and garden), may diminish the significance of known, designated heritage assets and their setting. Activities may cause deterioration of these assets and/or limit public access. As this is a high value receptor, the overall effect would be major and the pipeline may need re-routing.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	0	0	<p>There are two AONBs within 5km of the option including Cotswolds AONB (35m from the intake at Newton Meadows) and Mendip Hills (1.2km from Stowey WTW).</p> <p>Construction effects Construction works are expected to be medium scale however they could have negative effects on local landscape character and visual amenity. Despite the proximity to Cotswold AONB, these effects are considered to be minor, short-term and temporary assuming best-practice construction measures are followed.</p> <p>Operation effects The option requires new above-ground infrastructure however, the works would be contained within or would be an extension to existing water assets and would not cause a greater impact to the landscape over and above what is currently there. A neutral effect has therefore been identified for landscape and visual amenity in operation.</p>

Option Name
R08_02_Bathford New water sources within Bristol Water CAMS area for the location Middle River Avon at Bathford
Option Description
This option is the development of a new supply source on the Middle River Avon at Bathford. The Bristol Avon and North Somerset Streams WFD Management Area Abstraction Licensing Strategy assessment (2012) indicates that 1.4 Ml/d would be available at this location. Water would be treated on site via a new membrane plant to reduce the risk of cryptosporidium along with a conventional water treatment site and chlorination. It will then be pumped to Tolldown Service Reservoir. Booster pumping stations would be required along the pipeline, including a new booster pumping station located at Banner Down. Additional disinfection will be required at Tolldown given the length of the pipeline.
Yield
1.4 Ml/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--	0	<p>There are two European designated sites within 10km or in hydrological connectivity of the option, including: Bath & Bradford on Avon Bats SAC (0.4km south) and Severn Estuary SAC/SPA/Ramsar (28km). In addition, there are three SSSIs within 1km of the option; St. Catherine's Valley (0.36km west), Hampton Rocks Cutting (0.47km south-west) and Brown's Folly (0.42km south-east). There are several areas of ancient woodland within 500m of the proposed pipeline route, the nearest is just 41m away.</p> <p>Construction effects Due to the distance between option and Bath and Bradford on Avon Bats SAC construction works could result in impacts upon the bat populations (Greater horseshoe bat, Bechstein's bat and Lesser horseshoe bat) and supporting habitats potentially present along the pipeline route (although to be contained in road where possible). Due to the hydrological connectivity between the SAC, SPA and Ramsar and option R08_02 via the River Avon, construction works may result in indirect impacts upon Severn Estuary EMS through surface pollution incidents and sedimentation. Therefore LSE on qualifying features of designated sites cannot be ruled out at this stage and further assessment will be required (see HRA report for further details). Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems. The construction of the pipeline is in close proximity to several areas of ancient woodland (including one area <50m away) and activities may result in damage and/or deterioration to these areas which would have a moderate negative effect due to the high value of the receptor.</p> <p>Operational effects During operation, a minor discernible change on flow is expected. However, the increase in abstraction by 1.4 Ml/d would account for a 0.7% reduction in Q95 flows on the River Avon at the abstraction point. This is deemed to be a minor hydrological change, and therefore no impacts are anticipated upon the qualifying features of Bath and Bradford on Avon Bats SAC. As such, no LSEs during operation are considered likely. Operation will affect flows within the River Avon and it is uncertain if this would impact flows in the estuarine part of Avonmouth. Fisheries surveys completed for the Bristol Water Drought Plan in 2018 reported the presence of migratory fish including brown/sea trout, Atlantic salmon, river lamprey and European eel in the River Chew, and as such it is likely they would be present in the River Avon. The passability of some of the weir structures on the River Avon is uncertain, however if present, changes in flow could result in impacts upon supporting habitats if present within the River Avon. Therefore LSE from operational activities cannot be ruled out at this stage, further assessment would be required. The operation of this option would not result in effects on non-designated aquatic habitats or species. The abstraction from the River Avon is deemed insufficient to impact the in-river ecology. Geomorphological forms and processes would not be altered.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	---	0		+++	<p>Construction effects The draft Natural Capital Assessment concluded that construction of pipeline will have a significant impact due to the temporary loss of a significant amount of Floodplain Wetland Mosaic (CFGM).</p> <p>Operation effects It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	0	0	<p>There are several areas of priority habitat around the option. Pockets of deciduous woodland, lowland calcareous grassland and semi-improved grassland are adjacent to the pipeline route.</p> <p>Construction effects Construction activities may result in minor disturbance to habitats and species along the length of the pipeline route as well as those present in the River Avon during construction of the abstraction point, this has been assessed as minor overall.</p> <p>Operational effects The operation of this option could result in effects on priority habitats or species. Additional abstraction from the River Avon is considered to be insufficient to impact the in-river ecology therefore effects on priority habitats and species are considered to be neutral.</p>

	1.4	To reduce the spread of invasive, non-native species	--	0	0	0	<p>Construction effects The scheme requires the construction of >16km of pipeline and a new treatment facility therefore there is a risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p>Operation effects During normal operation, the scheme does not constitute a raw water transfer. Water abstracted from the Middle Avon will be treated at a bankside water treatment works before onward transmission to a service reservoir, therefore, eliminating INNS transfer risk. Additionally, operations at the treatment works may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	<p>Construction effects Approximately 80% of the proposed pipeline crosses Grade 3 agricultural land however the pipeline route follows existing minor roads and any excavated land would be reinstated. The option requires new-above ground infrastructure (new WTW facility at Bathford) however this is not located within valuable agricultural land. Overall this has been assessed as a neutral effect on land use, geology and soils.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	0	0	<p>Construction effects Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects The reduction in flow associated with this option would be insufficient to cause deterioration in water quality.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects Operational activities associated with this option would have a minor discernible effect on river flows. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	---	0	0/?	0	<p>Construction effects The option would require the construction of new above-ground water supply infrastructure (new membrane plant, pumping station and booster stations). The new treatment plant and pumping station are wholly located within Flood Zone 3. This results in a major negative effect to flood risk during construction.</p> <p>Operation effects It is assumed that appropriate mitigation will be built into the design of the new treatment plant and pumping station to reduce any risk of surface water flooding during operation. Operational effects have been assessed as neutral however this is uncertain until mitigation is confirmed.</p>
	3.4	To meet WFD objectives	0	0	0	0	<p>Construction effects This option involves the construction of an intake and treatment works including a new membrane site and conventional treatment. A pipeline would be constructed from the treatment site to Tolldown SR. A pumping booster station is also required at Banner Down. Through the use of best practice construction techniques, these construction activities are deemed as WFD compliant</p> <p>Operation effects This option would abstract water from the River Avon upstream of Bathford. The increase in abstraction by 1.4 Ml/d would account for a 0.7% reduction in Q95 flows on the River Avon at the abstraction point. This is deemed to be a minor hydrological change that would not be sufficient to impact any WFD elements. As such, the operation of this option is deemed to be WFD compliant.</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>There is one AQMA within 5km of the option; Bath AQMA located 1.9km to the south-east.</p> <p>Construction effects Construction activities and vehicle movements may cause a temporary decrease in local air quality, however this will be short-term and minor assuming best-practice construction and mitigation measures are embedded.</p> <p>Operation effects In operation the option will have a neutral effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	--	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is expected to be 1,297 tCO₂e, which has been assessed as a moderate negative effect on GHG emissions.</p> <p>Operation effects Operational carbon emissions include energy required to pump water and treat additional water. Operational carbon for this option is anticipated to be 876 tCO₂e per year which has been assessed as having a moderate negative effect on GHG emissions when in operation.</p>

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide 1.4 Ml/d of additional water resource and have a minor positive effect on increasing the resilience to climate change effects, in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	+	<p>Construction effects The expenditure during construction of this option (CAPEX) is estimated to be £4.9 million. This capital investment may result in a minor increase in construction jobs which would have a positive effect on job growth and the local economy.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 1.4 Ml/d to support a sustainable and growing economy. This would have a minor positive effect.</p>
	6.2	To maintain and enhance tourism and recreation	-	0	0	0	<p>There are a number of recreational facilities in close proximity to the pipeline route, including playing fields, allotments and PRoW.</p> <p>Construction effects Construction activity and HGV movements associated with the option are likely to result in increased disruption and reduce the availability and/or quality of existing recreational areas, although effects are not expected to be significant. Overall, the option has been assessed as having a minor negative effect on recreation and tourism.</p> <p>Operation effects This option would not have any effects on existing recreation or tourism in operation.</p>
	6.3	To protect and enhance the human health and wellbeing	-	0	0	+	<p>Construction effects The pipeline route is anticipated to follow minor roads and construction activities may cause temporary disruption and traffic congestion. There may be increased noise attributed to plant machinery. With best-practice construction measures, overall effects on human health and wellbeing are considered to be minor.</p> <p>Operation effects This option will provide an additional average design capacity of 1.4 Ml/d for drinking water. This will have a minor positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	<p>Construction effects This option requires new infrastructure and will involve the use of materials and generate waste. There will be limited opportunities for the re-use or recycling of materials. The amount of materials (e.g. concrete) required is unknown but based on the CAPEX of the scheme this is expected to be minor.</p> <p>Operation effects This option creates a new water resource, the operation of which is likely to require additional energy and may require the use of chemicals in the extended treatment process. However, the yield is relatively small therefore overall effect is considered to be neutral.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	-	0	0	0	<p>There are two scheduled monuments within 500m of the option, including Bathford Bridge c.70m from the proposed pipeline. There is one registered park and garden (Ashwicke Hall) adjacent to the proposed pipeline route. The proposed pipeline intersects both Marshfield and Bathford Conservation Areas. Bath World Heritage Site is located just over 1km away from the option. There are 34 listed buildings within 50m of the proposed pipeline route.</p> <p>Construction effects Construction of the pipeline will follow the existing road network therefore is unlikely to directly cause damage to any heritage assets in proximity. Construction activities may limit public access and/or undermine the significance of some heritage assets, this would result in a temporary, short-term negative effect but the significance is expected to be minor assuming best-practice construction measures.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	--	0	-	0	<p>Over 90% of the option is within the Cotswolds AONB, including c.16km of pipeline and new above-ground infrastructure.</p> <p>Construction effects Construction activities would have negative effect on the designated landscape however with appropriate mitigation and best-practice construction measures this is expected to be of moderate significance.</p> <p>Operation effects The option involves the construction of new permanent above-ground infrastructure within an AONB. The new membrane plant is considered to be small scale therefore the resultant effect in operation is anticipated to be minor, but long-term.</p>

Option Name
R08-03_Frome at Frenchay New water sources within Bristol Water CAMS area for the location Bristol Frome at Frenchay
Option Description
This option is the development of a new supply source on the Bristol Frome at Frenchay (abstraction would be from this location). Water will be pumped to Littleton Water Treatment Works for treatment and distribution. A pumping station would be located on the abstraction site. No upgrades are required at Littleton treatment works. The option was developed from the Bristol Avon and North Somerset CAMS assessment (2012) that indicates that 1.1 MI/d is available with 100% reliability.
Details: - Water will be pumped to Littleton Water Treatment Works (LWTW) via a 13.2km (300mm diameter) pipeline for treatment and distribution. - A pumping station would be located on the abstraction site (1.1 MI/d, 66 mhd). - No upgrades are required at Littleton treatment works.
Yield
1.1 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--	0	<p>There are seven European designated sites within 10km of the option, including: Avon Gorge Woodlands SAC (8.5km SW), River Wye SAC (6km NW), Wye Valley Woodlands SAC (8.8km NW), Wye Valley & Forest of Dean Bat Sites (9.2km NW), Severn Estuary SAC/SPA/Ramsar (2.5km W). There are several nationally designated sites within 1km of the option, including: Winterbourne Railway Cutting SSSI (0.15km east), Monks Pool & Bradley Brook LNR (0.21km west) and Huckford Quarry LNR (0.89km east). There are several areas of ancient woodland within 0.5km of the proposed pipeline route including one area immediately adjacent to the existing WTW at Littleton and one area 0.06km south of the abstraction point.</p> <p style="text-align: center;">Construction</p> <p>The HRA concluded LSEs on the Severn Estuary SAC/SPA/Ramsar due to the new abstraction required on the River Frome, and the pipeline crosses (assumed to be trenchless) under the watercourse and a number of tributaries to the Littleton WTW. The use of the River Frome by the migratory fish species of the Severn Estuary SAC/SPA is uncertain, and given works in proximity to the watercourse, there is a hydrological pathway for sedimentation and pollution incidents. The qualifying bird species are considered less sensitive. LSE are also concluded for Wye Valley & Forest of Dean Bat Sites SAC and Wye Valley Woodlands SAC due to potential impacts to offsite supporting habitat for lesser horseshoe bat and greater horseshoe bat due to known foraging range of the species and pipeline construction through potentially suitable habitat. Mitigation measures required during construction, therefore Stage 2 Appropriate Assessments required if option selected.</p> <p>Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems. Construction near Monks Pool and Bradley Brook LNR may result in the loss of/disturbance to habitats and species, however this may be avoided through site level mitigation and best practice construction. No upgrades are required to Littleton WTW so impacts on the ancient woodland here are considered neutral and the ancient woodland near the abstraction point is considered sufficient distance to avoid any effects. Overall, the effect on biodiversity is considered moderate negative due to impacts on the SACs.</p> <p style="text-align: center;">Operation</p> <p>The HRA concluded LSE in operation on qualifying features of the Severn Estuary SAC/SPA/Ramsar. Although the WFD has concluded that an impact to in-river ecology is not anticipated, the use of the River Frome by migratory fish species is uncertain. Pass-forward flow to the estuary and LSEs to the other qualifying features is not anticipated. A Stage 2 Appropriate Assessment is therefore required to consider the migratory fish species.</p> <p>The operation of this option would not result in effects on non-designated aquatic habitats or species. The abstraction from the River Frome is deemed insufficient to impact the in-river ecology. Geomorphological forms and processes would not be altered.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0	0	++	<p style="text-align: center;">Construction</p> <p>The draft Natural Capital Assessment concluded that construction of the pipeline will have a temporary, moderate impact.</p> <p style="text-align: center;">Operation</p> <p>It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	0	0	<p style="text-align: center;">Construction</p> <p>The pipeline route is in proximity to several areas of priority habitat, primarily deciduous woodland. Construction activities may result in the loss of/disturbance to habitats and species, however site level mitigation and best-practice construction measures should ensure this effect is limited to minor.</p> <p style="text-align: center;">Operation</p> <p>The operation of this option would not result in effects on priority habitats or species. The abstraction from the River Frome is deemed insufficient to impact the in-river ecology. Geomorphological forms and processes would not be altered.</p>

	1.4	To reduce the spread of invasive, non-native species	--	0	-	0	<p>Construction</p> <p>The scheme requires the construction of an abstraction point, pumping station, >13km of pipeline and a new treatment facility, therefore there is a risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p>Operation</p> <p>The abstraction of water from the River Frome is perceived to have a high potential for INNS transfer, however, the destination of transfer will limit the onward transmission and establishment of INNS during normal operation. Additionally, operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a minor risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	-	0	0	0	<p>The majority of the pipeline route (>90%) is located within valuable Grade 1-3 agricultural land. Development of the new abstraction infrastructure would be in greenfield land.</p> <p>Construction</p> <p>Construction activities would have a minor temporary negative effect on soil quality and land use, however, excavated land associated with pipeline works would be reinstated following the completion of construction. The area surrounding the abstraction where new above-ground infrastructure is required is not within valuable land therefore there will be no permanent valuable land take associated with the option. Overall the effect will be minor negative.</p> <p>Operation</p> <p>It is not expected that this option will have any effect on geology or soils once in operation.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	0	0	<p>Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operation</p> <p>The reduction in flow associated with this option would be insufficient to cause deterioration in water quality.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operation</p> <p>Operational activities associated with this option would have a minor discernible effect on river flows.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	--	0	0	0	<p>Construction effects</p> <p>The option would require a pumping station to be built at the abstraction location. This is located within Flood Zones 3 and the new infrastructure would be at moderate risk of surface water flooding during construction.</p> <p>Operation effects</p> <p>It is assumed mitigation would be built into the design of the pumping station so that this infrastructure would not be at risk of flooding during operation.</p>
	3.4	To meet WFD objectives	0	0	0	0	<p>Construction</p> <p>This component requires the construction of a 13.2km pipeline (300mm diameter) from the abstraction point to Littleton WTW. A pumping station at the abstraction site will also be required. Through the use of best practice construction techniques, these construction activities are deemed as WFD compliant and are unlikely to cause any deterioration in class.</p> <p>Operation</p> <p>This option would abstract water from the River Frome at Frenchay. The increase in abstraction by 1.1 MI/d would account for a 7% reduction in Q95 flows on the River Frome at the abstraction point. This is deemed to be a minor hydrological change that would not be sufficient to impact any WFD elements. As such, the operation of this option is deemed to be WFD compliant.</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>There is an AQMA (Bristol AQMA) 1.06km SW of the option.</p> <p>Construction</p> <p>There will be temporary negative effect on local air quality associated with construction activities but assuming best-practice measures this is anticipated to be minor.</p> <p>Operation</p> <p>Operation of the option would have a neutral effect on local air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	0	0	<p>Construction</p> <p>Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option have been estimated at 1,537 tCO2e which results in a moderate negative effect on GHG emissions.</p> <p>Operation</p> <p>Additional energy consumption for pumping and additional water treatment would generate increased emissions equivalent to 38 tCO2e. This has been assessed as having a neutral effect during operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	<p>This option would provide an additional 1.1 MI/d of water resource and have a minor positive effect on increasing the resilience to climate change in operation only.</p>

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	+	<p>Construction effects</p> <p>The capital investment (CAPEX) of this option is estimated to be in the region of £7.6 million. This level of expenditure will have a moderate positive effect on job creation and will support the local economy.</p> <p>Operation effects</p> <p>In operation, this option would provide an additional design capacity of 1.1 Ml/d to support a sustainable and growing economy. The effect has been assessed as minor positive.</p>
	6.2	To maintain and enhance tourism and recreation	---	0	0	0	<p>There are a number of recreational facilities in close proximity to the pipeline route, including a playing field and play space <75m to the west. The pipeline route appears to intersect a church (St Michael's Church, near Winterbourne) and may require rerouting at this section.</p> <p>Construction</p> <p>Construction activity and HGV movements associated with the option are likely to result in increased disruption and reduce the availability and/or quality of existing recreational areas. Overall, the option has been assessed as having a major negative effect on recreation as it would result in the loss of a religious grounds.</p> <p>Operation</p> <p>Once in operation, effects on tourism and recreation are considered neutral.</p>
	6.3	To protect and enhance the human health and wellbeing	-	0	0	+	<p>The pipeline route crosses through and in close proximity to built up areas including Bristol.</p> <p>Construction</p> <p>Construction activity and HGV movements may increase noise and disruption along the length of the route, although the effects are not expected to be significant. Overall, the option has been assessed as having a minor negative effect on health.</p> <p>Operation</p> <p>In operation, the option will provide an additional design capacity of 1.1 Ml/d for drinking water. This would have a minor positive effect on the health of local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	--	+	-	0	<p>Construction</p> <p>This option requires new infrastructure and would have limited opportunities for the re-use or recycling of materials. The amount of concrete/materials required is currently unknown but using a CAPEX of £7.6 million, it is expected to be a moderate amount. The option also makes use of existing infrastructure (Littleton WTW) which results in a minor positive effect.</p> <p>Operation</p> <p>The operation of this option is likely to require additional energy (38 tCO₂e/annum) and may require increased use of chemicals to treat the additional yield. The effect is expected to be minor negative.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	-	0	0	0	<p>There are two scheduled monuments within 500m of the proposed pipeline, an Iron Age settlement and Bury Hill camp, the latter of which is also identified on the Heritage at Risk register. The pipeline route intersects two conservation areas (Church Lane, Winterbourne and Frenchay). There are several listed buildings in close proximity to the pipeline route.</p> <p>Construction</p> <p>Construction of this option may have result in the loss of significance or cause damage to those heritage assets identified in close proximity. There may also be unknown archaeology that has the potential to be adversely effected. Assuming site level mitigation and best-practice construction measures this is anticipated to be a minor negative effect overall.</p> <p>Operation</p> <p>In operation, the effect is anticipated to be neutral.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	-	0	<p>There are no AONBs or National Parks in close proximity to the option. Oldbury Hall Estate Country Park is located 0.63km SW of the proposed abstraction location where new above-ground infrastructure is required.</p> <p>Construction</p> <p>The option would involve new above-ground infrastructure which will have a minor negative effect on the local landscape during construction.</p> <p>Operation</p> <p>The pumping station is anticipated to be small in scale but will permanently alter the existing landscape/townscape, resulting in a minor negative effect.</p>

Option Name

R014_Avonmouth WWTW Direct Effluent Re-use

Option Description

This option would take treated effluent from Wessex Water's Avonmouth Wastewater Treatment Works for further treatment, and then put directly into supply at Littleton Treatment Works (blended with Sharpness water). Supply of approximately 10 MI/d. Water would be treated first at Avonmouth (Reverse Osmosis) first so that the effluent from the treatment can be discharged at the Avonmouth water recycling centre. There is some existing pipe between Littleton and Avonmouth which may be brought back into service, however the assessment has assumed new pipeline would be required as there is uncertainty around this. The following elements will be required:

- additional storage at Littleton to allow blending
- new WTW
- new pipeline from Avonmouth WwTW to Littleton WwTW (total length = 6.4 with ~2.5km new)
- 1 x pumping station at intake

Yield

10 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--	0	<p>There are several European designated sites within 10km or in hydrological connectivity of the option, including: Avon Gorge Woodlands SAC (8.5km SW), River Wye SAC (6km NW), Wye Valley Woodlands SAC (8.8km NW), Wye Valley & Forest of Dean Bat Sites SAC (9.2km NW) and Severn Estuary SAC/SPA/Ramsar (2.5km W). In addition, there is one SSSI within 1km of the option (Severn Estuary, adjacent to section of pipeline) and an area of ancient woodland adjacent to Littleton WwTW.</p> <p>Construction effects Due to the distance between the option and Severn Estuary, construction works may result in indirect impacts upon Sever Estuary SAC/SPA/Ramsar through surface and groundwater pollution incidents and sedimentation, dust and air pollution. As such, mitigation measures will be required and therefore a Stage 2 Appropriate Assessment should be undertaken if this option is selected. Due to the distance between the option and the River Wye SAC and due to the lack of hydrological connectivity (the option is not located within the same catchment of the River Wye), construction works is not anticipated to result in impacts.</p> <p>Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p>Operational effects Avonmouth WWTW is understood to discharge to the Severn Estuary, approximately around Unit 26 of the underlying Severn Estuary SSSI which is noted for saltmarsh habitat. Therefore changes in the waste-stream resulting from the water recycling process (chemical composition, salinity, pH, temperature etc) and the reduction in final effluent freshwater input need to be considered in terms of potential deterioration of the immediate habitats around the outfall and impacts to qualifying bird and fish species (e.g. Atlantic salmon, sea lamprey) within the Severn Estuary and potential changes to olfactory cues (see HRA report for further details). A Stage 2 Appropriate Assessment is therefore required if this option is selected.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0	0	++	<p>Construction effects The draft Natural Capital Assessment concluded that construction of the pipeline will have a temporary, moderate impact.</p> <p>Operational effects It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	0	0	<p>Construction effects The majority of the pipeline route intersects areas of priority habitat, primarily coastal and floodplain grazing marsh. Construction activities may result in minor loss of/disturbance to habitats and species, however site level mitigation and best-practice construction measures should reduce this effect.</p> <p>Operational effects The reduction in effluent into the Severn Estuary is unlikely to result in effects on priority habitats and/or species as the effects are considered to be negligible in the context of the estuary.</p>
	1.4 To reduce the spread of invasive, non-native species	-	0	0	0	<p>Construction effects The scheme requires the construction of a pipeline of ~15km, therefore there is risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p>Operational effects This option would take treated effluent from Wessex Waters Avonmouth Wastewater Treatment Works for further treatment, and then put it directly into supply at Littleton Treatment Works (blended with Sharpness water), therefore, during normal operation, there is no risk of INNS transfer. Operations at the treatment works may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>

Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	-	0	0	0	<p>Construction effects Additional storage at Littleton WwTW will be required and this is located within Grade 3 land. All works are assumed to be contained within the existing site therefore the effect is assumed to be neutral. There is also an historic landfill site (No.3 AHF Lagoon) which is at the same location as a current permitted waste site (Kinsweston Lane) adjacent to the pipeline route, mitigation will be required during construction so any activities do not disturb this land which may be contaminated.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>
Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	0	0	<p>Construction effects No watercourse crossings are required for the construction of the pipeline. Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects The reduction in freshwater input associated with this option would be insufficient to cause deterioration in water quality.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects There would be a reduction in freshwater input to the Severn Estuary however this is negligible in the context of the estuary.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	-/?	0	0	0	<p>Construction effects The option would require the construction of above ground water-supply infrastructure. Additional water storage would be required at Littleton for the blending process, there will also be a pumping station required at the intake. The intake pump may be located within Flood Zone 3 and the site would be at medium risk of surface water flooding during construction, however this assessment is uncertain until the location of the intake PS is confirmed.</p> <p>Operation effects If the intake pump is located in Flood Zone 3, this site will be at medium risk of flooding during operation, however, it would be expected that construction and design would account of this and reduce the risk to neutral.</p>
	3.4	To meet WFD objectives	0	0	0	0	<p>The option is not anticipated to cause deterioration in WFD classification during construction or in operation. There are no AQMAs within 5km of the option.</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>Construction effects Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed.</p> <p>Operation effects Operation of the option will not have an effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	---	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is estimated to be 2,232 tCO2 which relates to a moderate negative effect on GHG emissions and embodied carbon.</p> <p>Operation effects Operational carbon emissions include energy required to pump water as well as energy used in the additional pre-treatment process at Avonmouth before transferring to Littleton. Operation carbon is estimated to be 3,632 tCO2e/year which will result in a major long-term increases and negative effects on GHG emissions.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	<p>This option would provide an additional 10 Ml/d of water resource and have a minor positive effect on increasing the resilience to climate change in operation only.</p>
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	<p>Construction effects The capital investment (CAPEX) required for this option is estimated to be £3.4 million. This would result in a minor increase in construction related jobs and contribute to a growing and sustainable economy.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 10 Ml/d to support a sustainable and growing economy. The effect would be moderate positive.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>There are no recreational facilities in close proximity to the pipeline route or around either WwTW.</p> <p>Construction effects Construction activities and HGV movements associated with the option may result in increased disruption and reduce the availability and/or quality of existing recreational areas. However, there are none within close proximity to the option therefore the effect is considered neutral.</p> <p>Operation effects This option would not have any effects on existing recreation or tourism in operation.</p>

	6.3	To protect and enhance the human health and wellbeing	-	0	0	++	<p>The pipeline route crosses through or in close proximity to several built up areas (e.g. Bristol and Severn Beach) where population density is greater. Littleton WwTW is within the Bath and Bristol greenbelt area.</p> <p>Construction effects Construction activities may increase noise and disruption along the length of the pipeline route, although the effects are not expected to be significant. Overall the effect is considered to be minor negative for health and wellbeing.</p> <p>Operation effects This option will provide an additional design capacity of 10 Ml/d for drinking water. This will have a moderate positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	--/?	++	-	0	<p>Construction effects This option makes use of existing built assets and infrastructure, including both WwTWs and some existing pipeline. This has a moderate positive effect on the construction of the scheme. Some additional infrastructure is required including additional storage at Littleton WwTW and at least 2.5km of new pipeline, where there will be limited opportunities for the re-use or recycling of materials. The amount of materials required is unknown but based on the scale and requirements for the scheme this is expected to be moderate. There is uncertainty with this assessment until figures are confirmed.</p> <p>Operation effects This option includes a new resource which will require additional energy to treat and may require the use of chemicals in the treatment process. The overall effect is anticipated to be minor negative.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	-	0	0	0	<p>There are two scheduled monuments within 500m of the option, a heavy anti-aircraft battery and The Mere Bank and flanking ditches located c.120m and c.40m from the proposed pipeline route, respectively.</p> <p>Construction effects Depending on the width required for construction of the pipeline, construction activities may diminish the significance of known, designated heritage assets and their setting and/or limit public access. The overall effect would be considered major, however, with appropriate mitigation and best-practice construction measures this will reduce to minor negative effect.</p> <p>Operation effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	0	0	<p>There are no AONBs in close proximity to the option.</p> <p>Construction effects The proposed works are not within designated landscapes. Construction works are expected to be small-medium scale however they could have negative effects on local landscape character and visual amenity, these effects would be minor, short-term and temporary.</p> <p>Operation effects The option requires new above-ground infrastructure (additional storage at Littleton WwTW and associated pumping infrastructure) however, the works would be contained within an existing WwTW and would not cause a greater impact to the landscape over and above what is currently there. A neutral effect has therefore been identified for landscape and visual amenity in operation.</p>

Option Name
R016_Huntspill transfer
Option Description
<p>This option would involve the transfer of water from the Huntspill River / Kings Sedgemoor drain during the winter period to provide support to Cheddar reservoir during dry winter periods.</p> <p>Transfer of water from the Huntspill River / Kings Sedgemoor drain during the winter period to provide support to Cheddar reservoir during dry winter periods.</p> <p>Option includes:</p> <ul style="list-style-type: none"> - New ~19km long pipeline to Axbridge <p>- Pre-treatment at Axbridge Treatment Works, the existing capacity is too small for an additional 20 MI/d in winter so additional pre-treatment (sand filtration to remove turbidity and some nutrients) on additional land is required (max. 100 x 100 m adjacent to existing works).</p> <ul style="list-style-type: none"> - Short pipeline from Axbridge to Cheddar Reservoir and scour control.
Yield
20 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--	0	<p>There are several European designated sites within 10km or in hydrological connectivity of the option, including: Mendip Woodlands SAC (0.8km N), Mendip Limestone Grasslands SAC (1.1km NW), North Somerset & Mendip Bats SAC (2.8km E), Severn Estuary SAC/SPA/Ramsar (5.6km W) and Somerset Levels and Moors SPA/Ramsar (0.2km S). In addition, there are seven nationally designated sites within 1km of the proposed option. These include: 4 SSSIs Cheddar Reservoir (0km), Calcot Edington and Chilton Moors (0.2km S), Axbridge Hill and Fry's Hill (0.5km N) and Cheddar Wood (0.6km N); 1 NNR Huntspill River (0km) and 1 area of ancient woodland 0.8km N.</p> <p style="text-align: center;">Construction effects</p> <p>The HRA concluded LSEs on qualifying features within Mendip Limestone Grasslands SAC, Mendip Woodlands SAC and North Somerset and Mendip Bat SAC during construction. Pipeline construction is required between Axbridge and Cheddar Reservoir which may give risk to air quality issues on the qualifying habitats. Although works are likely to be small, the potential construction haul route (A371) extends within 200m of the site and therefore further consideration is required through a Stage 2 Appropriate Assessment. Option R016 may result in direct and indirect impacts on greater horseshoe bat during construction works through loss of/damage to offsite habitats and disturbance (i.e. light spill, noise, vibration, air pollution, dust and incidental pollutions). Permanent changes to the drainage ditches, and potential drying of the area will also need to be considered when laying the pipeline route. As such, a Stage 2 Appropriate Assessment will be required if this option is selected. LSEs were also concluded for Severn Estuary SAC/SPA/Ramsar due to the hydrological connectivity between the option and the Severn Estuary SPA/Ramsar through Huntspill River, construction works are considered likely to result in impacts upon the SPA/Ramsar through surface water pollution incidents and sedimentation as well as disturbance to the bird communities which may present within offsite supporting habitats. Permanent changes to the drainage ditches, and potential drying of the area will also need to be considered when laying the pipeline route, to avoid deterioration of functionally linked offsites supporting habitats (see HRA report for further detailed assessment).</p> <p>Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p style="text-align: center;">Operational effects</p> <p>The operation of the option will require the transfer of water from the Huntspill River (20MI/d) which may result in a reduction of volume that enters the Severn Estuary SAC and cause habitat deterioration in the immediate area downstream of the tidal sluice on the River Parrett. A hands-off flow/level condition would be required to prevent this from being an impact. Given the presence of the tidal sluice, it is considered unlikely that migratory fish are using the Huntspill River and therefore impacts to offsite functionally linked habitat used by migratory fish are not anticipated. As such, a Stage 2 Appropriate Assessment will be required if this option is selected. The operation of this options could result in effects on non-designated aquatic habitats or species. Flows/levels in the Huntspill River would be reduced however a suitable hands-off flow/level condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this option. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p>	
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain	---	0		+++		<p style="text-align: center;">Construction effects</p> <p>The draft Natural Capital Assessment concluded that construction of pipeline will have a large scale, major negative effects due to the temporary loss of a significant amount of Floodplain Wetland Mosaic (CFGM)</p> <p style="text-align: center;">Operational effects</p> <p>It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	-	0		<p>The majority of the pipeline route intersects areas of priority habitat, primarily coastal and floodplain grazing marsh.</p> <p style="text-align: center;">Construction effects</p> <p>Construction activities may result in minor loss of/disturbance to habitats and species, however site level mitigation and best-practice construction measures should reduce this effect.</p> <p style="text-align: center;">Operational effects</p> <p>Operation of the option may cause a minor degradation to priority habitats and/or species as a result of any changes to flow, geomorphology or water quality. Flow in the Huntspill River would be reduced, however a suitable hands off flow/level condition will be required to ensure no significant impacts on priority habitats and species.</p>
	1.4 To reduce the spread of invasive, non-native species	--	0	-	0		<p>The scheme requires the construction of a pipeline of ~19km as well as updates and expansion of existing treatment works, therefore there is risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a moderate risk given the scale of infrastructure required for the scheme.</p> <p style="text-align: center;">Operational effects</p> <p>The abstraction and transfer of raw water from the Huntspill river to a treatment work pose a potential INNS transfer risk, however, INNS are not likely to be transported during onward transmission to cheddar reservoir. Additionally, Operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a minor risk of INNS transfer during the operation of the scheme.</p>

Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	--	0	0	0	<p>The majority of the pipeline route (>80%) is located within valuable Grade 3 agricultural land and a smaller pocket of Grade 2 land.</p> <p>Construction effects Construction activities would have a minor temporary negative effect on soil quality and land use, however, excavated land associated with pipeline works would be reinstated following the completion of construction. An expansion to the WTW at Axbridge will be required and this is located within Grade 3 land, resulting in a moderate loss (100 x 100m) of the best and most versatile agricultural land. There is also an historic landfill site (Axbridge Refuse Tip) adjacent to the pipeline route which may contain contaminated land and construction activities may disturb these areas.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>
	Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	-	0
3.2		To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects Operational activities associated with this option may have a minor discernible effect on river flows or groundwater levels, however, hands-off flow/level conditions would be required to prevent this from being a significant impact. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
3.3		To reduce or manage flood risk whilst accounting for climate change	--/?	0	0	0	<p>Construction effects The option would require the construction of above ground water-supply infrastructure. Three pumping stations are required (intake pump, pump to Axbridge WTW and from the WTW to Cheddar Reservoir) as well as an expansion to the existing WTW. Only the intake pump may be located within Flood Zone 3 and the site would be at medium risk of surface water flooding during construction, however this assessment is uncertain until the location of the intake PS is confirmed.</p> <p>Operation effects If the intake pump is located in Flood Zone 3, this site will be at medium risk of flooding during operation, however, it would be expected that construction and design would account of this and reduce the risk to neutral.</p>
3.4		To meet WFD objectives	0	0	0	0	<p>The option is not anticipated to cause deterioration in WFD classification during construction or in operation.</p> <p>There are no AQMAs within 5km of the option.</p>
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>Construction effects Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed.</p> <p>Operation effects Operation of the option will not have an effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	-	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon for this option is estimated at 4,820 tCO2e which will have a moderate negative effect on GHG emissions.</p> <p>Operation effects Operational carbon emissions include energy required to pump water as well as energy used in the additional pre-treatment process before transferring to the reservoir. Operational carbon is estimated to be 284 tCO2e per annum, which converts to a minor negative effect during operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	<p>This option would provide an additional 20 MI/d of water resource and have a minor positive effect on increasing the resilience to climate change in operation only.</p>
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	++	<p>Construction effects This option would involve a capital investment (CAPEX) of around £18.6 million, which will result in a moderate increase in construction jobs and will support job growth and promote a sustainable economy. Overall this is a moderate positive effect for the economic wellbeing of local communities.</p> <p>Operation effects In operation, this option would provide an additional design capacity of 20 MI/d to support a sustainable and growing economy. The effect would be moderate positive.</p>
	6.2	To maintain and enhance tourism and recreation	-	0	0	0	<p>There are a number of recreational facilities in proximity to the scheme, including a church and playing fields <140m from the pipeline route</p> <p>Construction effects Construction activities and HGV movements associated with the option may result in increased disruption and reduce the availability and/or quality of existing recreational areas. This may have a minor negative effect on recreation.</p> <p>Operation effects This option would not have any effects on existing recreation or tourism.</p>
	6.3	To protect and enhance the human health and wellbeing	-	0	0	++	<p>The pipeline route crosses through or in close proximity to several built up areas (e.g. Axbridge, Lower Weare and Mark) where population density is greater.</p> <p>Construction effects Construction activities may increase noise and disruption along the length of the pipeline route, although the effects are not expected to be significant. Overall the effect is considered to be minor negative for health and wellbeing.</p> <p>Operation effects This option will provide an additional design capacity of 20 MI/d for drinking water. This will have a moderate positive effect on the health and wellbeing of the local communities.</p>

Material Assets	7.1	To promote the efficient use of resources and minimise waste	--	+	-	0	<p>Construction effects</p> <p>This option involves an expansion of an existing WTW thereby making use of existing infrastructure resulting in a minor positive effect. New infrastructure is also required and there would be limited opportunities for the re-use or recycling of materials resulting in a negative effect. The amount of materials required is unknown but based on the CAPEX and the scale of works required, this is estimated to be a moderate amount.</p> <p>Operation effects</p> <p>This option includes a new resource which will require additional energy to treat and may require the use of chemicals in the treatment process. The overall effect is anticipated to be minor negative.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	--	0	0	0	<p>There are two conservation areas (Axbridge and Weare) and 33 listed buildings (inc. two Grade I) within 500m of the option, including one Grade II listed building which appears to be <10m from the pipeline route. There are no further designated heritage assets in close proximity to the option.</p> <p>Construction effects</p> <p>Depending on the width required for construction of the pipeline there may be damage or loss of listed building and appropriate mitigation will be required, such as rerouting of the pipeline. This assessment has been assessed as moderate negative based on the current pipeline route.</p> <p>Operation effects</p> <p>No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	0	0	<p>Mendip Hills AONB is <480m from the proposed expansion area at Axbridge WTW.</p> <p>Construction effects</p> <p>The proposed works are not within designated landscapes but may be visible from the Mendip Hills AONB. Construction works are expected to be medium scale however they could have negative effects on local landscape character and visual amenity, these effects would be minor, short-term and temporary.</p> <p>Operation effects</p> <p>The option requires new above-ground infrastructure which may be visible from the Mendip Hills AONB, however, the works would be an extension to an existing WTW and would not cause a greater impact to the landscape over and above what is currently there. A neutral effect has therefore been identified for landscape.</p>

Option Name
R24_Honeyhurst Bring Honeyhurst source back into supply
Option Description
<p>Honeyhurst Well is currently out of service due to high turbidity and associated risk of cryptosporidium. To bring this well back into service it is proposed to pump water from Honeyhurst to Cheddar Water Treatment Works. This option would involve the construction of a new pumping station at the Honeyhurst site and the construction of a new pipeline.</p> <p style="text-align: center;">This option would involve:</p> <ul style="list-style-type: none"> - the construction of a new pumping station at the Honeyhurst site - and the construction of a new 4.2km 225mm diameter pipeline (assume iron). - there is no requirement to upgrade Cheddar Treatment works given the current capacity. <p style="text-align: center;">It is assumed that the current well requires no additional works and that there is a pump installed.</p>
Yield
2.4 Ml/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effects Description
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1 To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	--	0	--	0	<p>There are several European designated sites within 10km or in hydrological connectivity of the option, including: Mendip Woodlands SAC (0.9km east), Mendip Limestone Grasslands SAC (1.3km NW), North Somerset & Mendip Bats SAC (0.9km NE), Severn Estuary SAC/SPA/Ramsar (12.7km W) and Somerset Levels and Moors SPA/Ramsar (4.9km south). In addition, there are several nationally designated sites within 1km of the proposed option. These include 3 SSSIs; Cheddar Reservoir (0.5km NW), Rodney Stoke (also a NNR) (0.9km E), and Draycott Sleights (0.9km E). There are no areas of ancient woodland within 500m of the option.</p> <p>Construction effects The HRA concluded LSEs on qualifying features (bat species) of Mendip Limestone Grasslands SAC and North Somerset and Mendip Bats SAC. Bat species are potentially vulnerable to construction impacts. This relates to habitat fragmentation resulting from the removal of sections of linear features that bats use for navigation and commuting between roosting and foraging areas, and also loss of foraging habitat during construction. Direct or indirect construction effects are considered unlikely on the habitat qualifying features given the distance of the works to the site and intervening habitats. LSEs were also concluded for Severn Estuary SAC/SPA/Ramsar and Somerset Levels and Moors SPA and Ramsar. Mitigation measures may be required during construction to prevent any adverse effects on the water quality of the River Axe and Stoke Brook tributary stream that might potentially affect designated fish species migrating through the River Axe system. Due to the hydrological connectivity between the SAC, SPA and Ramsar and option R24 via the River Axe, construction works may result in indirect impacts upon Severn Estuary EMS qualifying habitats through surface pollution incidents and sedimentation. The pipeline is to be constructed through potentially functionally linked offsite habitat as it is located between three SPAs designated for a variety of overwintering birds; Severn Estuary Somerset Levels and Chew Valley Lake SPAs. Disturbance and habitat deterioration will need to be considered. Overall, the option has been assessed as having a potentially moderate negative effect on biodiversity. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p>Operational effects The HRA concluded that for Mendip Limestone Grasslands SAC and North Somerset and Mendip Bats SACO, the distance of the abstraction from the SACs and lack of hydrological connectivity, direct operational impacts on habitats are probably unlikely but this is currently uncertain. Wetland habitats provide foraging habitat for bats. The abstraction has potential to alter wetland habitats and the food resource. Further information is required on the hydrological effects of the scheme, regarding likely alterations to wetland habitats from abstraction. The habitat qualifying features, with the exception of H8310 caves, are not water dependent. However, there is no hydrological connectivity to Stoke Brook and therefore no pathway for impact. With regards to Severn Estuary and Somerset Levels, further information is required on the hydrological effects of the scheme, regarding likely alterations to aquatic habitats from abstraction and impacts to migratory fish species. Impacts to the qualifying habitats are not anticipated given the small volume of water being abstracted and control sluices on the River Axe. The operation of this option could result in effects on non-designated aquatic habitats or species. Flows in the Stoke Brook would be reduced however a suitable hands-off flow condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this option. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p>
	1.2 To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	--	0	++		<p>Construction effects The draft Natural Capital Assessment concluded that construction of the pipeline will have a temporary, moderate impact.</p> <p>Operational effects It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.</p>
	1.3 To protect priority habitats and species	-	0	-	0	<p>The pipeline route is within close proximity/intersects several areas of priority habitat, primarily coastal and floodplain grazing marsh.</p> <p>Construction effects Construction activities may result in the loss of/disturbance to habitats and species, however site level mitigation and best-practice construction measures should reduce this effect.</p> <p>Operational effects Operation of the option may cause a minor degradation to priority habitats and/or species as a result of any changes to flow, geomorphology or water quality.</p>
	1.4 To reduce the spread of invasive, non-native species	-	0	0	0	<p>Construction effects The scheme requires the construction of a pipeline of 4km pipeline and pumping station, therefore there is a risk of INNS transfer resulting from the movement of biological materials within soils and aggregates and via machinery and personnel during construction. Standard mitigation encompassed within construction best practices such as those discussed within the INNS assessment report is likely to reduce the INNS transfer risk considerably though there remains a minor risk given the scale of infrastructure required for the scheme.</p> <p>Operational effects The abstraction of water from the Honeyhurst Well is perceived to have a low potential for INNS transfer due to the abstraction point being fed by a groundwater spring a short distance from the abstraction point. Additionally, the destination of transfer will limit the onward transmission and establishment of INNS during normal operation. Operations at the various infrastructure sites as part of the scheme including pumping stations and abstraction intakes may present a risk, assuming for example that site operatives will be required to attend the site periodically and treatment waste materials will likely be transported to off-site disposal facilities. Based on the current scheme design and understanding of mitigation in place there is a negligible risk of INNS transfer during the operation of the scheme.</p>
Soil, Geology and Land Use	2.1 To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	--	0	0	0	<p>The majority of the pipeline route (>90%) is located within valuable Grade 2 and 3 agricultural land.</p> <p>Construction effects Construction activities would have a minor temporary negative effect on soil quality and land use, however, excavated land associated with pipeline works would be reinstated following the completion of construction. A new pumping station is required at Honeyhurst as part of this option. The site is located within Grade 3 agricultural land and the construction will have a moderate negative effect through the permanent loss of best and most versatile land. There are also a number of historic landfill sites (e.g. Carscliffe Farm and Hardmead Lane) adjacent to the pipeline route which contain potential contaminated land and construction activities may disturb these areas.</p> <p>Operation effects It is not expected that this option will have any effect on geology or soils once in operation.</p>

Water	3.1	To protect and improve the quality of surface water and groundwaters	-	0	-	0	<p>Construction effects Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The option would not lead to a change in WFD classification.</p> <p>Operational effects The reduction in flows associated with this option may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration.</p>
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	-	0	<p>Construction effects No construction activities associated with this option would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p> <p>Operational effects Operational activities associated with this option may have a minor discernible effect on river flows or groundwater levels, however, hands-off flow conditions would be required to prevent this from being a significant impact. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.</p>
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	<p>Construction effects The option would require the construction of above ground water-supply infrastructure (a new pumping station on Honeyhurst), but it is located outside of flood zone areas. It is anticipated that the option would neither cause nor exacerbate flooding in the catchment.</p> <p>Operational effects Operation of the option will not have an effect on flood risk.</p>
	3.4	To meet WFD objectives	0	0	0	0	The option is not anticipated to cause deterioration in WFD classification during construction or in operation.
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	<p>Construction effects Construction activities and vehicle movements may cause a decrease in local air quality, however this will be short-term and minor. Best-practice construction measures will be employed.</p> <p>Operational effects Operation of the option will not have an effect on air quality.</p>
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	-	0	<p>Construction effects Construction of the option would involve the use of materials with embodied carbon as well as increased emissions from construction traffic and plant machinery. Embodied carbon during construction is equivalent to 383 tonnes CO2e and will have a minor negative effect on GHG emissions.</p> <p>Operational effects Operational carbon emissions from restarting supply are estimated to be around 14 tonnes CO2e/annum. This will have a neutral effect on GHG emissions in operation.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide an additional 2.4 MI/d of water resource and have a minor positive effect on increasing the resilience to climate change in operation only.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	+	<p>Construction effects The capital investment (CAPEX) required for this option is estimated at £3 million, this level of expenditure would result in a minor increase in construction related jobs and contribute towards job growth and a sustainable economy.</p> <p>Operational effects In operation, this option would provide a minor additional design capacity of 2.4MI/d provided an increase in supply of water to support a sustainable and growing economy.</p>
	6.2	To maintain and enhance tourism and recreation	-	0	0	0	<p>Construction effects Construction activities and HGV movements associated with the option will result in increased disruption and reduce the availability and/or quality of existing recreational areas. If the pipeline is not rerouted or appropriate mitigation not built in, the option may result in the permanent removal of these facilities which would have a moderate negative effect on recreation.</p> <p>Operational effects In operation this option would not have any effects on existing recreation or tourism.</p>
	6.3	To protect and enhance the human health and wellbeing	-	0	0	+	<p>Construction effects The pipeline route crosses through Cheddar and Draycott built up areas where population density is greater. Construction activities may increase noise and disruption along the length of the pipeline route, although the effects are not expected to be significant. Overall the effect is considered to be minor negative for health and wellbeing.</p> <p>Operational effects This option will provide an additional design capacity of 2.4 MI/d for drinking water. This will have a temporary minor positive effect on the health and wellbeing of the local communities.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	+	<p>Construction effects This option is to bring an existing source back in to supply but requires some new infrastructure and would have limited opportunities for the re-use or recycling of materials. Materials, including concrete, contain embodied carbon. The amount of materials required is unknown but based on the scale and requirements for the scheme this is expected to be minor.</p> <p>Operational effects This option will bring an old source back into supply to provide an additional 2.4MI/d of drinking water. This will have a minor positive effect on this objective.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	-	0	0	0	<p>The proposed pumping station site would not affect any designated heritage assets. The proposed pipeline route intersects a scheduled monument (a roman settlement site, Anglo-Saxon and Norman royal palace and St Columbanus' Chapel). Cheddar conservation area is located <30m from the pipeline route. There are 23 listed buildings within 500m of the option.</p> <p>Construction effects Unless rerouted, construction of the pipeline could cause damage to the scheduled monument, a known designated heritage asset, with a consequent loss of significance only partly mitigated by best-practice measures and archaeological investigation.</p> <p>Operational effects No effects on cultural heritage are anticipated during operation.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	-	0	0	0	<p>Mendip Hills AONB is <130m from the proposed pipeline <470m from the new pumping station.</p> <p>Construction effects The proposed pipeline and pumping station are not within designated landscapes but may be visible from the Mendip Hills AONB. Construction works are expected to be small scale however they could have negative effects on local landscape character and visual amenity, these effects would be minor and temporary.</p> <p>Operational effects The option requires new above-ground infrastructure which may be visible from the Mendip Hills AONB, however, the proposed pumping station is expected to be small in scale and would be located on a disused site. A neutral effect has therefore been identified for landscape.</p>

Option Name
HH_M_009 (AMI) Watersmart - customer feedback from metering
Option Description
This option makes use of customer meter and other data to provide personalised bills and behavioural nudges (e.g. comparisons against local averages). Watersmart is rolled out with the SMART metering roll out. It's assumed it will be offered to all newly metered customers (e.g. 90% of HHs by 2050 in mid scenario), however it is assume only 50% of customers will take up the service. Expected savings of the option is based on voluntary metering savings estimates from the Artesia Report 2019.
Yield
4.01 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option is not expected to have an effect on the conservation of designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 4.01 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an effect on WFD Objectives
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 432,700 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	0	+	This option involves the rollout of SMART meters. There are emissions from embodied carbon associated with meters. A total of 266,993 devices are expected to be installed as part of this option. The embedded carbon associated with this option (4,900tCO ₂) would have a moderate negative effect on greenhouse gases in construction. In operation there are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 44tCO ₂ (petrol vehicles) and 810tCO ₂ (electric vehicles) over the period of the plan which results in a neutral effect on this objective. There may be positive effects through less energy required to treat water made available through implementation of the option, but this would be minor.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 4.01 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option involves a low average yearly expenditure (less than 1 million undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 4.01 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have an effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 4.01 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (266,993) and construction waste along with fuel usage for vehicles (432,700 km). A minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_M_009 (AMI) Watersmart - customer feedback from metering
Option Description
This option makes use of customer meter and other data to provide personalised bills and behavioural nudges (e.g. comparisons against local averages). Watersmart is rolled out with the SMART metering roll out. It's assumed it will be offered to all newly metered customers (e.g. 90% of HHs by 2050 in mid scenario), however it is assume only 50% of customers will take up the service. Expected savings of the option is based on voluntary metering savings estimates from the Artesia Report 2019.
Yield
13.84 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option is not expected to have an effect on the conservation of designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 13.84 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an effect on WFD Objectives
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	-	+	This option involves the rollout of SMART meters. There are emissions from embodied carbon associated with meters. A total of 454,580 meters are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO2) would have a major negative effect on greenhouse gases in construction. In operation there are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 369 tCO2 (petrol vehicles) and 5000tCO2 (electric vehicles) over the period of the plan which results in a minor effect on this objective. There may be positive effects through less energy required to treat water made available through implementation of the option, but this would be minor.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 13.84 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option involves a low average yearly expenditure (less than 1 million undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 13.84 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have an effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 13.84 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (454,580) and construction waste along with fuel usage for vehicles. A minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_A_001 Home efficiency visits (HEV) - Targeted water efficiency audit with free water efficient device installation - In person.
Option Description
Visits include undertaking a water audit, advice and tailored retrofit of free water efficient devices where required (e.g. leaky loo fix). The visits are selected based on high potential for water saving (e.g. highest unaccountable water, household high water usage, areas of highest leakage).
Yield
14.32 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 14.32 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 25,978,894 km of vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	--	+	This option involves the installation of a large number of water efficient devices (3,443,565) in households. The embedded carbon associated with this option (>7,500tCO ₂) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 344tCO ₂ (petrol vehicles) and 34,500tCO ₂ (electric vehicles) over the period of the plan which results in a moderate effect on this objective. There may be positive effects through less energy required to treat water made available through implementation of the option, but this would be minor.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 14.32 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	This option involves a 'low' average yearly expenditure (£2 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 14.32 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 14.32 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (3,443,565 devices) and construction waste along with fuel usage for vehicles (25,978,894 km per year). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_A_002 Home efficiency visits (HEV) - water efficiency audit with free water efficient device installation - metered
Option Description
Visits include undertaking a water audit, advice and tailored retrofit of free water efficient devices where required (e.g. leaky loo fix) to households with a meter already installed.
Yield
5.41 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 5.41 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 12,363,207 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	-	0	This option involves the free retrofit of devices. A total of 1,604,835 devices are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO ₂) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 350tCO ₂ (petrol vehicles) and 18,700tCO ₂ (electric vehicles) over the period of the plan which results in a minor effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 5.41 MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option involves a 'low' average yearly expenditure (£679,308 undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 5.41 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 5.41 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (1,604,835 devices) and construction waste along with fuel usage for vehicles (12,363,207 km). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_A_003 Home efficiency visits (HEV) - water efficiency audit with free water efficient device installation - New meter
Option Description
Visits include undertaking a water audit, advice and tailored retrofit of free water efficient devices where required (e.g. leaky loo fix). HEV's are provided alongside the company's ongoing smart meter rollout.
Yield
13.78 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 13.78 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 29,510,836 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	--	0	This option involves the installation of water saving devices. There are emissions from embodied carbon associated with water saving devices. A total of 1,543,545 devices are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO2) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 600tCO2 (petrol vehicles) and 42,300tCO2 (electric vehicles) over the period of the plan which results in a moderate effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide up to 13.78 MI/d of additional water resource by 2050 which would have a minor positive effect on increasing the resilience to climate change effects.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	This option involves a 'low' average yearly expenditure (£2.3 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 13.78 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 13.78 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices and construction waste along with fuel usage for vehicles 29510836 km vehicle cumulative km). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_A_004 Virtual Home efficiency visits (VHEV) - water efficiency audit with free water efficient devices
Option Description
Virtual home use assessment undertaken online. The assessment provides advice, recommendations and actions, and could include sending free water efficiency devices for self-install or a professional plumber visit (e.g. for leaky loo fix). An extended version of this option assumes that a proportion of those audited are visited in person by a plumber to support wastage fixes.
Yield
5.33 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 5.33 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves some household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 10,111,557 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	-	0	This option involves the fitting of water saving devices. There are emissions from embodied carbon associated with water saving devices. A total of 1,370,130 devices are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO ₂) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 585tCO ₂ (petrol vehicles) and 16,000tCO ₂ (electric vehicles) over the period of the plan which results in a minor effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 5.33 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	This option involves a 'low' average yearly expenditure (£1.1 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 5.33 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 5.33 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (1,370,130 devices) and construction waste along with fuel usage for vehicles (10,111,557 vehicle cumulative km). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_E_001
Option Description
Appliance subsidies (rebates for water efficient devices and appliances)
Yield
0.86 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.86 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to impact upon WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve household visits or the use of vehicles. A neutral impact is anticipated.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option involves customers switching to water-efficient devices. There are emissions from embodied carbon associated with these devices. A total of 143,812 devices are expected to be installed as part of this option. This would have a minor effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.86 MI/d additional resource.
Human Health and	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	0	This option involves a 'low' average yearly expenditure (£3.7 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.86 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.

Socio-Economics	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.86 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (143,812 devices / 25 years) and construction waste. Consequently, a minor negative effect on resources and waste is identified.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_002 Pay per use appliances (e.g. Miele bundles subscription)
Option Description
The manufacturer Miele offers a service plan for washing machines and dishwashers which include flat monthly fee or pay-per-use option with a lower monthly fee and a cost per use, with online functionality (i.e. smart devices). This option assumes that the water company will subsidise this service for customers taking it up.
Yield
0.11 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.11 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not anticipated to impact upon WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve household visits and would not involve vehicle movements (directly). There are no impacts on air quality therefore.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option involves individuals purchasing Miele equipment. There are emissions from embodied carbon associated with these devices. A total of 676 devices are expected to be installed as part of this option. This would have a negligible effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.11 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a 'low' average yearly expenditure (£50,700 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.11 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.

SOCIO-ECONOMICS	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	<p>The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.11 Ml/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.</p>
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Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (676 devices / 25 years). A neutral effect on resources and waste is identified.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_004 Leaky Loos' Wastage Fix: large scale targeted fixes
Option Description
This option is to find and fix leaky loos using data from metered customers, and through awareness campaigns and initiatives for unmetered customers. Customers would be able to identify leaky loos using simple measures such as leak strips or drops of food dye in the cistern. Water companies would then arrange for repair or replacement of the faulty cistern mechanism at no cost to the customer. The effectiveness of this intervention will be proportional to smart meter penetration, as smart meter data will indicate which households have high levels of continuous flow. Here listed as a stand-alone option, but most likely implemented as an add on to virtual or HEVs.
Yield
3.41 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 3.41 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not anticipated to impact upon WFD objectives.
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 1,192,784 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-/?	0	-	0	This option involves replacement of faulty equipment. There are emissions from embodied carbon associated with this equipment. An unknown total devices are expected to be installed as part of this option. This would have an unknown effect on GHG emissions. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 141tCO2 (petrol vehicles) and 890tCO2 (electric vehicles) over the period of thre plan which results in a minor effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 3.41 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	This option does not involve yearly expenditure (£0 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 3.41 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 3.41 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices and construction waste along with fuel usage for vehicles (1,192,784 vehicle cumulative km over the period of the plan). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_005 Eco branding water efficiency programme
Option Description
This option relies on motivation of people to 'do the right thing'. Option could include provision of free or subsidised water efficiency devices, which are eco-branded. Could be accompanied by information on contribution of water efficiency to local environmental (e.g. river flow) and social (e.g. affordability) goals. Likely to appeal to subset of customers only.
Yield
1.18 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option is not expected to have an effect on the conservation of designated sites as no construction or infrastructure is required.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 1.18 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an impact on WFD objectives
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option will not involve household visits or vehicle movements. No impacts on air quality are anticipated.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option involves the purchase of water efficient devices. There are emissions from embodied carbon associated with water saving devices. A total of 148,000 water efficiency kits are expected to be delivered as part of this option. This would have a minor effect on GHG emissions. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 1.18 MI/d additional resource.
	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	+	This option involves a 'low' average yearly expenditure (£0.15 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 1.18 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.

Human Health and Socio-Economics	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have an effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 1.18 Ml/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be a small increase in resource use associated with this option, including for installation of water efficient devices (148, 000 devices over 25 years). Consequently, a neutral effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_006 Distribution of household water efficiency kits for self-installation - via the water company of WCWR website.
Option Description
This option would allow customers to request a household water efficiency kit (e.g. aerated shower heads, cistern displacement devices, shower timers, tap inserts) with a booklet containing advice on water efficiency via the website.
Yield
4.27 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 4.27 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an impact on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve household visits or movement of vehicles. No impacts are anticipated.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option involves deliveries of water efficiency kits. There are emissions from embodied carbon associated with these. A total of 588,612 water efficient devices are expected to be delivered as part of this option. This would have a minor effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 4.27 MI/d additional resource.
Human Health and	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	Expenditure in the delivery of this option (£13m/25 years) and the improved continuity of supply, including the provision of an addition 4.27 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism & recreation.

Socio-Economics	6.3	To protect and enhance the human health and wellbeing	0	+	0	+	This option involves a 'low' average yearly expenditure (£0.59 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 4.27 Ml/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (588,612 over 25 years). A neutral negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_008 Partnerships/targeting of large/small developers to install water efficient devices
Option Description
Work in partnership with selected developers to ensure all homes are designed to enhanced water efficiency standards beyond building regulations, through the installation of high efficiency water fittings. Option may be expanded to include installation of rainwater harvesting.
Yield
5.88 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 5.88 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an impact on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not result in any effects on air quality or AQMAs as it does not involve construction or vehicle movements.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option involves the working in partnership with selected developers to ensure homes are designed to enhanced water efficiency standards beyond building regulations, through the installation of high efficiency water fittings. There are emissions from embodied carbon associated with the installation of high efficiency water fittings. A total of 20,180 homes are expected to be constructed as part of this option. This would have a minor effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 5.88 MI/d additional resource.
	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option involves a 'low' average yearly expenditure which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 5.88 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.

Human Health and Socio-Economics	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. This option is expected to reduce demand for water and result in a yield of 5.88 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for the high efficiency water fittings required for the construction of water-efficient homes (20,180 in total). A minor negative effect on resources and waste is therefore identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_009 Home Efficiency Visits (HEVs) - water efficiency audit - local authorities, housing associations, corporate landlords)
Option Description
Visits include undertaking a water audit, advice and tailored retrofit of free water efficient devices where required. Targeted at specific housing stock of local authorities or housing associations. The visits are selected based on high potential for water savings.
Yield
1.01 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 1.01 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an impact on WFD objectives
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves visiting households which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 13,105,573 km vehicle movements are anticipated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality will be minor negative (based on ~30 visits being made a day). The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	-	0	This option involves home visits and retrofits. There are emissions from embodied carbon associated with water saving devices. A total of 1,937,232 devices are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO2) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 758tCO2 (petrol vehicles) and 20,700tCO2 (electric vehicles) over the 25 year period which results in a minor effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 1.01 MI/d additional resource
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	+	This option involves a 'low' average yearly expenditure (£1.9 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 1.01 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. This option is expected to reduce demand for water and result in a yield of 1.01 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option encourages enhanced water efficiency in the design of new developments which will provide a positive effect to minimise waste through reduced energy and chemicals required in the treatment process. These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (1,937,232) and construction waste along with fuel usage for vehicles (13,105,573 km). A minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_010 Home Efficiency Visits (HEVs) - water efficiency audit - combined with energy efficiency audits
Option Description
Visits include undertaking a water audit, advice and tailored retrofit of free water efficient devices where required. These visits are combined with energy efficiency advice into a new joint delivery mechanism. Synergies between using less hot water and reduction in energy
Yield
7.62 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 7.62 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	Implementation of this option will not have an effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 17,870,230 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	--	+	This option involves water audits and retrofitting of water efficient devices. There are emissions from embodied carbon associated with this equipment. A total of 1,937,232 devices are expected to be installed as part of this option. The embedded carbon associated with this option (>7,500tCO2) would have a major negative effect on greenhouse gases in construction. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 1000 tCO2 (petrol vehicles) and 28,200tCO2 (electric vehicles) over the period of the plan which is considered to represent a moderate negative effect. There may be positive effects through less energy required to treat water made available through implementation of the option, but this would be minor.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 7.62 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	This option involves a low average yearly expenditure (£3.07 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 7.62 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect for construction on this objective. This option is expected to reduce demand for water and result in a yield of 7.62 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (1,937,232) and construction waste along with fuel usage for vehicles (17,870,230 km distance travelled). Consequently, a minor negative effect on resources and waste is identified for construction. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_013 School visits water efficiency programme
Option Description
<p>This option involves working in partnership with schools across the WCWR region to promote water efficiency. The aim is that education regarding water efficiency starts at an early age and therefore will result in long term demand savings. This would be tailored for children for the different key stages. It would provide lesson plans and material to allow teachers to deliver water efficiency lessons, this would be provided to all schools. This would also be accompanied by a set number of school visits (targeted to areas of high water use or demography) each year reaching 30 students per visit.</p> <p>For school visits to promote water efficiency it is assumed that each company will aim to visit 55 schools/classes a year with approx. 30 children per class (in the mid scenario). This translates to 1650 children/HHs impacted by the option. Of these 1650 HHs, it is assumed that 50% will go on to achieve PCC savings. This is set as a yearly target continuing for the full 25 years.</p>
Yield
0.06 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.06 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have any effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves visiting schools (1,625 total visits) which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 130,759 km vehicle movements are anticipated. Given the relatively low number of visits and distance travelled over the 25-year implementation period, the overall effect on air quality is expected to be neutral.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option is to undertake school visits to promote water efficiency. There are negligible amounts of carbon associated with this option, from the small amount of vehicle usage (27 tCO2 and 14 tCO2 for petrol and electric vehicles, respectively). Overall this will have a neutral effect on GHG emissions and embodied carbon.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.06 MI/d additional resource
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a 'low' average yearly expenditure (£49,000 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.06 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.06 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_016 Media campaigns to influence water use
Option Description
This option would provide ambitious year-round campaigns to influence water use by raising public awareness of why we need to save water and to help drive uptake of water efficiency programmes and tools. Recent research has shown that customers who have a better understand of the bigger picture can make them more responsive to messages of how to save water. The central purpose and message of the campaigns are to urge all customers to conserve water, especially during periods of drought. The messaging would be underpinned by explanations of the background to the prevailing conditions. The campaigns would be large scale multi-channel communications across the WCWR area and could be seasonally, geographically and demographically focused. They could align with on the ground SMV and SBV visits.
Yield
2.37 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 2.37 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have any effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves year-round media campaigns to raise awareness of water saving measures. There are no activities which could contribute to air quality therefore the effect is considered neutral.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option is to undertake year-round media campaigns and does not contain any activities which will contribute to GHG emissions or contain embodied carbon. The overall effect is considered to be neutral.
	5.2	To adapt and improve resilience to the threats of climate change	0	0		+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 2.73 MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	+	This option involves a medium scale average yearly expenditure (£1m undiscounted CAPEX) which has been assessed as having a moderate positive effect. In operation, the improved continuity of supply, including the provision of an additional 2.37 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	This option is expected to reduce demand for water and result in a yield of 2.37 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0		0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_I_001 Targeted incentives scheme - Individual customer/community reward (e.g. Greenredeem) - New metered customers.
Option Description
<p>This option will offer non-financial incentives in the form of shopping vouchers/discounts, prize draws and charity donations to increase awareness and motivation to reduce water use, it will be delivered in association with Greenredeem. The option will include the use of innovative apps and website content, whilst maximising the benefits offered through smart metering data. This will be targeted at new smart metered customers.</p> <p>This option is rolled out with the new SMART metering roll out and is offered to every newly metered customer. Of those offered it is assumed that only 10% take up the scheme (in mid scenario). Of the 10% of newly metered households targeted in the mid scenario 50% are assumed to establish PCC savings related to behavioural change.</p>
Yield
6.17 Ml/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would not result in either a reduction or an enhancement in natural capital assets.
	1.3	To protect priority habitats and species	0	0	0	0	This option would not result in impacts, adverse or beneficial, to priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option would not result in changes to the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not require the use of any land.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option would not result in changes to the quality of surface waters or groundwaters.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 6.17 Ml/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in changes to the WFD status of any waterbody.
Air Quality	4.1	To protect and enhance air quality	-/?	0	0	0	This option may involve household visits which would involve the use of vehicles which can contribute to reducing the local air quality. The total number of vehicle movements is unknown but assumed to be relatively low. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option will offer non-financial incentives and operate with new SMART metering roll out. Related greenhouse gas emissions are unknown but considered low resulting in uncertain neutral negative effects.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 6.17 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	++	This option involves a low average yearly expenditure and will cost £1.2M helping to support economic conditions in local communities, this is expected to be a minor effect. In operation, the improved continuity of supply, including the provision of an additional 6.17 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any impacts to recreational or tourism assets.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation of smart meters and associated transportation of equipment are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 6.17 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (568,900 / 25 years) and construction waste along with fuel usage for vehicles. Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_I_004 Community competition
Option Description
A competition between communities (e.g. towns or villages) to save the most water. The 'winner' may receive a prize (e.g. community asset).
Yield
0.07 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would not result in either a reduction or an enhancement in natural capital assets.
	1.3	To protect priority habitats and species	0	0	0	0	This option would not result in impacts, adverse or beneficial, to priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option would not result in changes to the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not require the use of any land.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option would not result in changes to the quality of surface waters or groundwaters.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.07 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in changes to the WFD status of any waterbody.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option is not expected to increase vehicle movements above the existing baseline (no data available so this is uncertain). During operation there will be no effect on air quality.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	The option is not anticipated to involve any construction requirements or operational energy use) therefore a neutral effect is identified against this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.07 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	The option involves a minor average yearly expenditure (£5,000 undiscounted CAPEX) which has been assessed as having a neutral positive effect in helping to support economic conditions in local communities. In operation, the improved continuity of supply, including the provision of an additional 0.07 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any impacts to recreational or tourism assets.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.07 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing

Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore heritage assets will not be impacted.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore landscape assets will not be impacted.

Option Name
HH_T_006 Community reward tariff
Option Description
The objective of this tariff is to encourage the community to reduce water use, by providing a reward in the form of a WCWR funded community reward. If the community reduces its combined water use during a defined period of time then they get rewarded with a WCWR funded community reward. This option has the potential to reduce both average and peak consumption, but primarily targeting reduced discretionary use
Yield
0.07 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.07 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not require construction or vehicle movements and therefore it is not expected to have an effect on air quality.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option does not require construction or vehicle movements and therefore it is not expected to have an effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.07 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option does not involve construction and therefore will not impact upon the local economy in that form. In operation, the improved continuity of supply, including the provision of an additional 0.07 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on tourism or recreational assets or activity.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.07 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.

Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option does not involve construction and therefore will not require new resource use. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_T_008 Individual reward tariff
Option Description
In this option customers could be offered a financial reward for reducing their consumption below the identified threshold level (e.g. money off their next water bill) or alternatively could be offered points to redeem.
Yield
0.18 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on designated wildlife sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on natural capital assets.
	1.3	To protect priority habitats and species	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on the populations or spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on local geomorphology, soil quality or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on surface water or groundwater quality.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.18 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not require construction or vehicle movements and therefore it is not expected to have an effect on air quality.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. During operation, it is not anticipated that the option will result in increased vehicle movements above the anticipated baseline. There is no anticipated impact on greenhouse gas emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.18 MI/d additional resource.
Human Health and	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	The financial rewards are anticipated to add financial resource into the local economy (estimated to be £237,000 per year), which would have a neutral impact upon the local economy. In operation, the improved continuity of supply, including the provision of an additional 0.18 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.

Human Health and Socio-Economics	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on tourism or recreational assets or activity.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.18 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on any heritage asset.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option involves changes in customer behaviour only and does not involve any construction work or new infrastructure. There is no anticipated impact on landscape or visual amenity.

Option Name
HH_N_002 Home retrofit of rainwater harvesting
Option Description
This option encourages the retrofitting of rainwater harvesting systems to existing housing stock.
Yield
0.56 Ml/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	Neutral positive effect - rainwater harvesting systems reduces the quantity of surface water runoff thus reduces the potential for the inundation of the surface water drainage systems and treatment facilities and associated impacts (e.g. sewer overflows).
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.56 Ml/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	The retrofitting of rainwater harvesting systems is unlikely to involve the construction of new above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment. Minor positive effect uncertain - there are potential benefits associated with attenuation of surface water runoff during rainfall events. Rainwater harvesting systems capture rainwater or surface water at source which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow.
	3.4	To meet WFD objectives	0	0	0	0	This option would not impact upon WFD objectives.
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option would involve the use of vehicles which can contribute to reducing the local air quality. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	0	0	This option involves encouragement to retrofit rainwater harvesting. There are emissions from embodied carbon associated with this equipment. A total of 18,700 devices are expected to be installed as part of this option. This would have a minor effect on GHG emissions. There would also be power requirements and associated emissions resulting from use of the system itself. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.56 Ml/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	The option will provide a negligible increase in design capacity of 0.56 Ml/d. This will have a positive effect on the economy and wellbeing of the community however this will be of neutral significance.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	+/?	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. This option involves only indirect yearly expenditure, which has been assessed as having a minor positive uncertain effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.56 Ml/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-/?	0	0	+	Minor negative effect uncertain - The construction of this option would require minor quantities of additional materials. The option promotes water efficiency through encouraging the retrofitting of rainwater harvesting systems to existing housing stock. This option would provide an additional 0.56 Ml/d and results in a minor improvement in water efficiency and resilience. The reduction in consumption of potable mains water will also reduce the amount of energy and chemicals used for treating and pumping. Indirect benefits also include those associated with the contribution of these systems to the need for new water infrastructure.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	There is the potential for the home retrofit of rainwater harvesting systems to result in very small scale effects to the appearance of buildings. However, most systems and components of systems will not be visible and will result in neutral effects.

Option Name
HH_N_003 Rainshare - Communities direct harvested rainwater into a centralised shared resource
Option Description
Work with the Council to identify Rainshare twinning schemes, e.g. where buildings with low demand but which can generate high rainfall yields are located next to buildings or other demands with high non-potable demand (e.g. for irrigating or dual-supply toilet flushing). The rationale behind this option is that the harvested rainwater will replace water that had been, or would have been taken from public mains supply.
Yield
0.38 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	Negligible positive effect - rainwater harvesting systems reduces the quantity of surface water runoff thus reduces the potential for the inundation of the surface water drainage systems and treatment facilities and associated impacts (e.g. sewer overflows).
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.38 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	The retrofitting of rainwater harvesting systems will neither cause nor exacerbate flooding in the catchment. Minor positive effect uncertain - there are potential benefits associated with attenuation of surface water runoff during rainfall events. Rainwater harvesting systems capture rainwater or surface water at source which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This scheme will require vehicle movement. Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-	0	-	0	This option involves the potential construction of rainwater harvesting systems. A total of 12,500 systems are expected to be installed as part of this option. This would have a minor effect on GHG emissions. There are GHG emissions associated with the use of vehicles and in operation there would also be power requirements and associated emissions resulting from use of the systems, which is considered to represent a minor negative effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.38 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a 'low' average yearly expenditure (£461,000 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.38 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option would result in changes to existing buildings with low demand, therefore there is the potential for small scale, negligible, disruption to people. Once implemented, the option would provide an additional 0.38 MI/d which has a negligible effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	The construction of this option would require minor quantities of additional materials assessed as neutral. The option promotes water efficiency through encouraging the retrofitting of rainwater harvesting systems to existing housing stock. This option would provide an additional 0.38 MI/d and results in an improvement in water efficiency and resilience. The reduction in consumption of potable mains water will also reduce the amount of energy and chemicals used for treating and pumping. These have not been quantified but are anticipated to be neutral. Indirect benefits also include those associated with the contribution of these systems to the need for new water infrastructure.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	There is the potential for the home retrofit of rainwater harvesting systems to result in small scale effects to the appearance of buildings. However, most systems and components of systems will not be visible and will result in negligible effects.

Option Name
HH_N_004 Grey water recycling retrofitting to existing properties
Option Description
This option retrofits grey water recycling systems into existing houses. Greywater recycling systems collect the water you've used in sinks, dishwashers, showers and baths, treat it and plumb it straight back for use in toilets, washing machines and outside tap.
Yield
1.15 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 1.15 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	The retrofitting of greywater recycling systems will neither cause nor exacerbate flooding in the catchment. Minor positive effect uncertain - The separation of grey water can reduce the volume sent to wastewater treatment plants. This creates space in the sewer network and therefore can contribute to reducing flooding risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	-	0	0	0	This option would involve the use of vehicles which can contribute to reducing the local air quality. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	--	0	Moderate negative effect uncertain - The construction of the option would include embodied carbon from material production of devices (18,350), their transportation and installation (number of vehicle movements undisclosed). There would also be power requirements and associated emissions resulting from use of the system itself. Total carbon is estimated as 16,820 tCO2.

Climate Change	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 1.15 Ml/d additional resource. The inclusion of grey water recycling systems reduce reliance on mains supply, with particular benefits during periods of drought. Some of the modern GWR systems also have the capability of recovering the heat in grey water, feeding the heat back into the central heating system.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	+	This option involves a 'low' average yearly expenditure (£1.5 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 1.15 Ml/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 1.15 Ml/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of devices (18,350) and construction waste along with fuel usage for vehicles. Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral. Indirect benefits also include those associated with the contribution of these systems to the need for new water infrastructure.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	There is the potential for the home retrofit of grey water recycling systems to result in small scale effects to the appearance of buildings. However, most systems and components of systems will not be visible and will result in negligible effects.

Option Name
C019
Option Description
Water Butts (Bristol Water subsidy) - Customer Demand
Yield
0.40 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystems services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.40 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves property visits which would involve the use of vehicles which can contribute to reducing the local air quality. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be neutral as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will remain at neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option involves the installation of water butts. There are emissions from embodied carbon associated with this equipment. An unknown total of butts are expected to be installed as part of this option. This is assumed to have a minor effect on GHG emissions. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.40 MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	+	0	0	This option involves a 'low' average yearly expenditure (£4.3 million undiscounted CAPEX) which has been assessed as having a minor positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.40 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.40 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices and construction waste along with fuel usage for vehicles (emitting 2,874tCO ₂). Consequently, a minor negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_P_001 Change WC standards
Option Description
The option is a specific change to water supply fitting regulations to WC's that would prevent future installation of potentially leaky loos. This would include a return to only using siphonic flush water cistern mechanisms. This option is a change of standards to prevent future leaky loos' in new developments. This would reduce leakage in approx. 5% of new developments of which 90% of future leaky loos' would be prevented (in the mid scenario - assuming some leaky loos' would still slip through), with 100% prevented in the upper scenario.
Yield
4.77 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 4.77 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not directly involve the construction of above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not impact upon WFD objectives for any watercourses.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	The option involves a specific change to water supply fitting regulations to WC's that would prevent future installation of potentially leaky loos. Data is unavailable regarding potential for emissions to air, however, the characteristics of the option suggest this will be very low and the potential for effects to air quality are considered neutral.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option concerns a change in behaviour rather than new infrastructure or equipment. No GHG emissions are anticipated above the baseline.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 4.77 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	This option involves a 'low' average yearly expenditure (£3,000 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 4.77 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	This would not result in disruption to people. It is expected to reduce demand for water and result in a yield of 4.77 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	+	The option promotes water efficiency through changing regulations to reduce the amount of leaks in future development. This option would provide an additional 4.77 MI/d and results in a minor improvement in water efficiency and resilience.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_P_002 Water labelling - with minimum standards
Option Description
In this intervention water labelling of relevant products is legislated as mandatory and managed by government. The scheme would be operated in association with Building Regulations and minimum standards (i.e. based on changes to The Water Supply (Water Fittings) Regulations 1999). This would mean that only products performing at a baseline level will be allowed on the market and referenced in the Building Regulations. This would require not only the development of the labelling policy but also the development and agreement on the baseline standard and the amendment of the relevant Building Regulations.
This option produces a staged PCC reduction in all households in the region in yearly increments based on data from the Artesia Report 2019.
Yield
51.93 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+++	This option is expected to reduce the demand for water resources by saving 51.50 MI/d. This will have a moderate positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve the construction of above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not result in any effects on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not involve construction, or home visits. As a result, there is no anticipated impact upon air quality.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option would not involve construction, or home visits. As a result, there is no anticipated impact upon GHG emissions above the existing baseline.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+++	This option is expected to have a major positive effect to improve resilience to climate change from a reduction in demand and provision of up to 51.93 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+++	This option does not involve the construction of above-ground infrastructure and will not contribute to the local economy during a construction phase. In operation, the improved continuity of supply, including the provision of an additional 51.93 MI/d, is expected to have a major positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	+++	This option is expected to reduce demand for water and result in a yield of 51.93 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a major positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	+	This option would not have a negative impact upon material assets. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be minor.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_P_003 Water labelling - with no minimum standards
Option Description
In this option water labelling of relevant water using products is legislated as mandatory (for manufacturers and retailers similar to the current energy label regulations) and managed by government. The scheme would be operated in isolation with no specified intensive marketing campaigns and is not referenced in any other government legislation or scheme. This option produces a staged PCC reduction in all households in the region in yearly increments based on data from the Artesia Report 2019.
Yield
21.50 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 21.50 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve the construction of above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not include any construction, or vehicle movements, and therefore would not directly result in any effects on air quality and AQMAs.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option does not include any construction, or vehicle movements, and therefore would not directly result in any effects on GHG emissions above the existing baseline.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 21.50 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option does not involve construction of infrastructure or home improvements, and therefore will not contribute to the local economy during a construction phase. In operation, the improved continuity of supply, including the provision of an additional 21.50 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	This option is expected to reduce demand for water and result in a yield of 21.50 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There is no significant resource use due to this option. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_P_004 New development standards - water neutrality
Option Description
Influencing planning authorities to grant permission for larger developments to build in water neutrality to the overall masterplan. Delivered through efficient design, non-potable rainwater harvesting, and associated retrofits elsewhere within a defined radius. This option is a change of standards to ensure water efficiency standards are met in new developments. This would reduce PCC in 90% of new developments (in the mid scenario - assuming some new developments would not fully comply), with 100% of new development reducing PCC in the upper scenario.
Yield
2.60 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 2.60 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve the construction of above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve construction or vehicle movements above the existing baseline, and therefore would not directly result in any effects on air quality and AQMAs.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option does not involve construction or vehicle movements above the existing baseline, and therefore would not directly result in any effects on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 2.60 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	This option does not have a construction stage and will not contribute to the local economy in this way. In operation, the improved continuity of supply, including the provision of an additional 2.60 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.

SOCIO-ECONOMICS	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	This option would influence planning authorities to grant larger developments with water neutrality and would not directly cause any disruption to the population. Once implemented, this option is expected to reduce demand for water and result in a yield of 2.60 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	+	The option promotes water efficiency through influencing planning authorities to grant permission for developers who build in water neutrality to proposals. This option would change standards which would enable households to reduce PCC in 90% of new developments and provide an additional 2.60 MI/d of water which results in a minor improvement in water efficiency and resilience.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_P_005 New home standards - mandatory
Option Description
The option will require all developers to install water using devices to meet specific standards. These would be lined to the water labelling minimum standards as highlighted above.
Yield
12.98 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 12.98 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve the construction of above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not require construction above the existing baseline, and therefore no impact on local air quality is anticipated.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	+	This option does not require construction above the existing baseline, and therefore no negative effects regarding greenhouse gas emissions is anticipated. There may be positive effects through less energy required to treat water made available through implementation of the option, but this would be minor.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 12.98 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option does not involve construction above the existing baseline and therefore will not contribute to the local economy in this regard. In operation, the improved continuity of supply, including the provision of an additional 12.98 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	This option would ensure developers install water using devices with specific standards. Once implemented, the option would have a minor increase in design capacity of drinking water (12.98 MI/d), which would have a moderate, sustained positive effect on the health of local communities and would ensure that surface water quality is maintained.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option involves altering construction that would happen regardless, and therefore does not result in any resource use above the existing baseline. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_W_001 Resource West campaign
Option Description
HH_W_001 is a Resource West Campaign. HH_W_001 has been further developed off the back of a pilot project to reduce domestic energy and water usage. This involved the recruitment of participants willing to make behavioural changes in their domestic routines and to report their results following their receipt of advice and communication tools to support the changes. The pilot project ran over the winter of 2022-23 to identify and quantify specific measured improvements. The pilot project recommended that a third party would be required to be the main contact point for such a project and so this option assumes this.
Yield
0.15 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to have a minor positive effect on resource levels by saving 0.15 MI/d for other use or through reduced need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option could help achieve WFD objectives by reducing abstraction by an average of 0.30 MI/d however the overall effect is anticipated to be negligible.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not require the use of vehicles or machinery. There would be no impact upon local air quality from this option.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	There would be no direct carbon emissions associated with this option therefore no effects on greenhouse gas emissions are anticipated.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would save an average of 0.15MI/d and therefore there would be a minor positive impact on resilience to climate change, by reducing the need for abstraction.
Human Health and Social Wellbeing	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	In operation, the improved continuity of supply, including the provision of an additional 0.15 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities. There is no construction associated with this option.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism and recreation.

Socio-Economics	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option would not negatively impact on human health. This option is expected to result in a yield of 0.15MI/d which is considered to be a neutral positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	+	The advice and communication tools to support the customer behaviour changes regarding water and energy use is anticipated to be minor positive effect on material assets.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
NHH_A_001 Business Efficiency Visits (BEV) - water efficiency audit - in person audit, fix and retrofit, targeted at specific sectors/businesses
Option Description
Visits to businesses including undertaking a water audit, advice and tailored retrofit of free water efficient devices to bathrooms and kitchens only (not wider process water). Business sectors are targeted based on high potential for water savings. BEV's are undertaken following liaison with Water Retailers. Specific BEV's to be target individual customers through detailed analysis of MOSL data. Initial analysis of sectors to include are: * Retail * Tourist sector (e.g. hotels, holiday complexes, static caravan parks etc..) * Leisure sector * Public sector * Universities - Option could be enhanced with prior installation of smart meter.
Yield
0.53 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.53 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	Implementation of this option will not have an effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves visiting businesses which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 362,390 km vehicle movement is estimated over the period of the plan. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Given the relatively low vehicle usage, the impact on air quality is anticipated to be neutral as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. Any effect will be further reduced if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	<p>This option is to undertake business efficiency visits (BEV) and involves undertaking water audits and installing water saving devices where appropriate. The modelling suggest no devices will be deployed for this option, therefore any effects from associated embodied carbon are expected to be neutral.</p> <p>There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 20 tCO2 (petrol vehicles) and 573 tCO2 (electric vehicles) over the period of the plan which results in a neutral effect on this objective.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0		+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.53 Ml/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0		+	This option involves a low average yearly expenditure (~£38,000 undiscounted CAPEX) which has been assessed as having an insufficient scale to have an effect on the economy (through creation of jobs). In operation, the improved continuity of supply, including the provision of an additional 0.53 Ml/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect for construction on this objective. This option is expected to reduce demand for water and result in a yield of 0.53 Ml/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including fuel usage for vehicles (362,390 km distance travelled). Consequently, a neutral effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
NHH_A_003 & 006 Business Efficiency Visits (BEV) - leakage detection - in person (NOT targeted at specific sectors/businesses) Business Efficiency Visit (BEV) - water efficiency audit/leakage detection - in person targeted at leisure sector (golf)
Option Description
This options investigates leakage reduction and irrigation efficiency advice to targeted golf courses that are currently using the PWS. The option would look to see whether non PWS supplies could be used to take reliance away from PWS, including the user of rainwater harvesting and obtaining their own abstraction licence and storage options.
Yield
0.64 Ml/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.64 Ml/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	Any advice and fix required as a result of water audits will take place on existing leisure sites and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not result in any effects to WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	-	0	This option involves business visits which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 472,369 km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	This option involves undertaking business efficiency visits. There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 20 tCO2 (petrol vehicles) and 745 tCO2 (electric vehicles) which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	0	This option is expected to have a neutral positive effect to improve resilience to climate change.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a 'low' average yearly expenditure (£49,500 undiscounted CAPEX) which has been assessed as having a neutral effect for construction through creation of jobs. In operation, there is no additional savings and is expected to have a neutral effect to improve economic and social wellbeing in local communities. The option will provide a negligible increase in design capacity of 0.64 Ml/d. This will have a positive effect on the economy and wellbeing of the community however this will be of neutral significance.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option could help existing recreational facilities operate more sustainably that may have positive effects, however, these are considered small scale and of neutral significance.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	In operation, the improved continuity of supply, including the provision of an additional 0.64 Ml/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including fuel usage for vehicles (214,439 vehicle cumulative km). Consequently, a neutral effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
NHH_E_001 Sector specific water efficiency advice e.g. partnerships with holiday rental companies Airbnb.
Option Description
A package of measures that targets water efficiency in holiday rental homes which could include: *Water efficiency advice packs to holiday home owners *Advice packs to holiday visitor on how to save water *Certification schemes that owners can use to market their green/water efficiency credentials.
Yield
0.01 Ml/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.01 Ml/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on air quality and AQMAs.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	The reduction in use is expected to deliver a negligible effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.01 Ml/d additional resource. While savings delivered will only be achieved for a portion of the time (i.e. when visitors are present), this is very likely to peak during the summer season when demands are highest.
Human Health and	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a low average yearly expenditure which has been assessed as having a major neutral effect on the economy and wellbeing of the community. In operation, the improved continuity of supply, including the provision of an additional 0.01 Ml/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.

Human Health and Socio-Economics	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option could result in effects on existing recreational facilities and/or tourism. However, these are anticipated to be positive as a growing number of guests are interested in these sorts of measures being present.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.01 Ml/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
NHH_E_002 (AMI) SMART Online - Water smart online tools and resources.
Option Description
The development of a central website/customer engagement dashboard website to provide information on water efficiency campaigns and online tools for customers to engage with that provide water efficiency advice (e.g. water calculators effectively acting as a self-audit) and wider resources. This could be extended to allow customers to login to their accounts to look at real time water use from Smart meters: advice would then be more tailored.
Yield
0.71 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.71 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not directly result in any effects on air quality and AQMAs.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 10 tCO2 (petrol vehicles) and 127 tCO2 (electric vehicles) over the period of the plan which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.71 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a low average yearly expenditure (less than £1m undiscounted CAPEX) which has been assessed as having a neutral positive effect on the economy and wellbeing of the community. In operation, the improved continuity of supply, including the provision of an additional 0.71 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option could result in effects on existing recreational facilities and/or tourism. However, these are anticipated to be positive as a growing number of guests are interested in these sorts of measures being present.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.71 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not result in any effects on the local landscape or townscape.

Option Name
NHH_I_001 Rewards to water retailers for business water use savings.
Option Description
Introduce a scheme whereby water companies reward in-region retailers with a one-off payment of water saved for each of their non-household customers.
Yield
0.18 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would not result in either a reduction or an enhancement in natural capital assets.
	1.3	To protect priority habitats and species	0	0	0	0	This option would not result in impacts, adverse or beneficial, to priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option would not result in changes to the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not require the use of any land.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option would not result in changes to the quality of surface waters or groundwaters.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.18 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve construction, and maintenance of all infrastructure will be sub-surface. Therefore, this option would neither cause, exacerbate or reduce flood likelihood or severity.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in changes to the WFD status of any waterbody.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve construction and is not expected to increase vehicle movements above the existing baseline.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	The operation of this option requires no construction, and in operation there is not expected to be any effect to GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.18 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a low average yearly expenditure (less than £1m undiscounted CAPEX) which has been assessed as having a neutral positive effect to support economic conditions in local communities. In operation, the improved continuity of supply, including the provision of an additional 0.18 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any impacts to recreational or tourism assets.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.18 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore heritage assets will not be impacted.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore landscape assets will not be impacted.

Option Name
NHH_T_003 Benchmarked rising block business tariffs
Option Description
This option would require benchmarking of sector water usage to determine base water requirements. Usage would be billed at a lower rate until the benchmarked base use had been reached in a given time period (monthly/annual), and usage beyond this billed at a higher rate.
Yield
0.06 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option is not expected to have an effect on the conservation of designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.06 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have an impact on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option is not expected to have an effect on air quality.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	The reduction in water use is expected to deliver a negligible effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.06 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	In operation, the improved continuity of supply, including the provision of an additional 0.06 MI/d, is expected to have a neutral effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have an effect on tourism or recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option is expected to reduce demand for water and result in a yield of 0.06 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	Reductions in water use will provide a negligible effect to minimise waste through reduced energy and chemicals required in the treatment process.

Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
NHH_N_001 Rainwater harvesting is included in new developments to meet planning conditions - commercial/public sector developments -single or multiple
Option Description
This option would work with developers to provide rainwater harvesting systems to provide a non-potable supply for use within the new commercial properties. Water is collected from roof runoff and a sustainable drainage system is created. The collected water goes through a basic level of treatment. Rainwater harvesting is included in the development to meet planning conditions.
Yield
0.02 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	Negligible positive effect - rainwater harvesting systems reduce the quantity of surface water runoff thus reduces the potential for the inundation of the surface water drainage systems and treatment facilities and associated impacts (e.g. sewer overflows).
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.02 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+	The rainwater harvesting systems are unlikely to involve the construction of above-ground infrastructure that would exceed that which would have resulted from development without the systems included. The option will neither cause nor exacerbate flooding in the catchment. There are potential benefits associated with attenuation of surface water runoff during rainfall events. Rainwater harvesting systems capture rainwater or surface water at source which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow. A minor positive effect is anticipated.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0/?	0	0	0	This option involves site visits to development plots (total number of visits are unknown) which would involve the use of vehicles which can contribute to reducing the local air quality. The total vehicle distance is currently uncertain. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	-/?	0	0	0	This option involves working with developers to provide rainwater harvesting systems. There are emissions from embodied carbon associated with the technology and systems required. The number of vehicle movements is undisclosed. There would also be power requirements resulting from the use of the system itself. A total of 31 systems are expected to be installed as part of this option. This would have a minor uncertain effect on GHG emissions. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.02 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a low average yearly expenditure (£11,455 undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.02 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.02 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including for installation of a small number of rainwater harvesting systems (31 systems) and construction waste along with fuel usage for vehicles (the cumulative vehicle distance is currently unknown). A neutral uncertain negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	It is assumed that any components of the rainwater harvesting systems that are visible would be adequately designed inline with the rest of the development so as not to result in any adverse effects to landscape and townscape character and visual amenity .

Option Name
NHH_N_002 Rainwater harvesting feasibility assessment and/or subsidised installation - target large water users
Option Description
This option would support the user through financial subsidy to carry out a feasibility assessment for the installation of rainwater harvesting systems to existing commercial buildings to provide non potable water supply. Specific commercial premises would be targeted with high water consumption.
Yield
0.18 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	Rainwater harvesting systems reduces the quantity of surface water runoff thus reduces the potential for the inundation of the surface water drainage systems and treatment facilities and associated impacts (e.g. sewer overflows). A neutral positive effect is anticipated.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.18 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	The retrofitting of rainwater harvesting systems is unlikely to involve the construction of new above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment. There are potential benefits associated with attenuation of surface water runoff during rainfall events. Rainwater harvesting systems capture rainwater or surface water at source which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow. A minor positive effect is anticipated.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not directly result in any effects on air quality and AQMAs.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0/?	0	0	0	This option involves supporting the user through financial subsidy to carry out a feasibility assessment for the installation of rainwater harvesting systems. There is potential for emissions from embodied carbon associated with material production of devices, their transportation, installation and operation however this is not included in the assessment. A total of 146 devices are expected to be installed as part of this option. This would have a negligible effect on GHG emissions, however this is currently uncertain. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.18 MI/d additional resource

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a 'low' average yearly expenditure (less than £100,000 undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.18 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation of the harvesting systems and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.18 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be a small increase in resource use associated with this option. A neutral negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive. Indirect benefits also include those associated with the contribution of these systems to the need for new water infrastructure.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	There is the potential for the retrofit of rainwater harvesting systems to result in small scale effects to the appearance of buildings. However, most systems and components of systems will not be visible and will result in negligible effects.

Option Name
NHH_N_003 Rainwater harvesting - target large water users
Option Description
This option would involve the water company financing the retrofit of rainwater harvesting systems to existing commercial buildings to provide non potable water supply. Specific commercial premises would be targeted with high water consumption.
Yield
0.33 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	Negligible positive effect - rainwater harvesting systems reduces the quantity of surface water runoff thus reduces the potential for the inundation of the surface water drainage systems and treatment facilities and associated impacts (e.g. sewer overflows).
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.33 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	+/?	The retrofitting of rainwater harvesting systems is unlikely to involve the construction of new above-ground infrastructure and will neither cause nor exacerbate flooding in the catchment. There are potential benefits associated with attenuation of surface water runoff during rainfall events which is anticipated to be minor positive operationally. Rainwater harvesting systems capture rainwater or surface water at source which can help reduce the volume of flow of rainwater into drains and sewers thus reducing the pressure on drainage systems in times of high flow.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option would not directly result in any effects on air quality and AQMAs.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0/?	0	0	0	This option involves financial subsidy to carry out the installation of rainwater harvesting systems. There is potential for emissions from embodied carbon associated with material production of devices, their transportation, installation and operation however this is not included in the assessment. A total of 271 devices are expected to be installed as part of this option. This would have a negligible effect on GHG emissions, however this is currently uncertain. There are negligible GHG emissions directly associated with this option in operation, transport is achieved through wider operations, which results in a neutral effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up 0.33 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	This option involves a low average yearly expenditure (less than £100,000 undiscounted CAPEX) which has been assessed as having a neutral positive effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 0.33 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation of the harvesting systems and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 0.33 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	The option promotes water efficiency through encouraging the retrofitting of rainwater harvesting systems to existing commercial buildings. There would be an increase in resource use associated with this option, including for installation of rainwater harvesting systems (271 systems over the period fo the plan) and construction waste along with fuel usage for vehicles (currently uncertain). Consequently, a neutral negative effect on resources and waste is identified. This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	There is the potential for the retrofit of rainwater harvesting systems to result in small scale effects to the appearance of buildings. However, most systems and components of systems will not be visible and will result in negligible effects.

Option Name
C016 Water saving devices - waterless urinals
Option Description
This option would involve the installation of waterless urinals in non-household properties to replace existing urinals. The rationale behind this option is to reduce demand for water used for urinal flushing. This would 'free up' resources to be used by other customers.
Yield
1.03 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	Any advice and fix required as a result of water audits will take place in existing buildings. This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystem services.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 1.03 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	Any advice and fix required as a result of water audits will take place in existing buildings and will neither cause nor exacerbate flooding in the catchment.
	3.4	To meet WFD objectives	0	0	0	0	This option would not result in any effects on WFD objectives on watercourses in the Bristol Water area.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves business visits which would involve the use of vehicles which can contribute to reducing the local air quality. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be neutral as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will remain neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	There are negligible GHG emissions directly associated with this option, transport is achieved through wider operations, which results in a neutral effect on this objective.

	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 1.03 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	+	This option involves a 'low' average yearly expenditure which has been assessed as having a neutral effect for construction through creation of jobs. In operation, the improved continuity of supply, including the provision of an additional 1.03 MI/d, is expected to have a minor positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	+	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 1.03 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a minor positive positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (8,513 devices). This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
HH_A_005 - Cenergist Home Efficiency Visits (HEV) - HEV/retrofit visits (no flow regulations)
Option Description
<p>These are more conventional interventions but managed in the same way in a sub-contract basis initially within programmes to install flow regulators by the same contractor.</p> <p>This is a slightly lower outcome return and there is an increased risk of savings decay since it is more dependent on behaviour change.</p> <p>It is applicable in high usage households where the options of a flow regulator installation is not available.</p>
Yield
0.13 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.13 MI/d following implementation. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option is not expected to have any effect on WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	-	0	This option involves household visits (145,750 total visits) which would involve the use of vehicles which can contribute to reducing the local air quality. A total of 2,933,357km vehicle movements is estimated. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor negative as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	-	0	<p>This option involves home efficiency visits to retrofit water saving devices. There are emissions from embodied carbon associated with water saving devices. The embedded carbon associated with this option is 9,761tCO2 which would have a major negative effect on greenhouse gases in construction.</p> <p>In operation, there are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 458tCO2 over the period of the plan which results in a minor negative effect on this objective.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 0.13 MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	There is no CAPEX (£) associated with this option therefore no effect is anticipated in relation to employment opportunities. A saving of 0.13 MI/d will have a neutral positive effect on the economy and community wellbeing, as it increases the resilience of the water supply.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism and recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	<p>The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health.</p> <p>However, this option is expected to reduce demand for water and result in a yield of 0.13 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	<p>There would be an increase in resource use associated with this option, including for installation of water efficient devices and construction waste along with fuel usage for vehicles (vehicle cumulative km / 25 years). Consequently, a minor negative effect on resources and waste is identified.</p> <p>This option is for demand reduction and promotes water efficiency. There will be operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_020 Communication and awareness campaign and associated product support
Option Description
<p>This option would be a general awareness campaign, smaller in scale than HH_E_016 and less targeted than HH_E_017. Ensure continuous public awareness of the importance of using water efficiently and provides pointers to other programme element and benefits. Costs allow extensive use of product orders. Can reach relatively large numbers of people and assist with them making relatively small savings.</p>
Yield
0.10 MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to have a minor positive effect on resource levels by saving 0.10 MI/d for other use or through reduced need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option could help achieve WFD objectives by reducing abstraction by an average of 0.10 MI/d however the overall effect is anticipated to be negligible.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not require the use of vehicles or machinery. There would be no impact upon local air quality from this option.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	0	0	There would be no direct carbon emissions associated with this option therefore no effects on greenhouse gas emissions are anticipated.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would save an average of 0.10MI/d and therefore there would be a minor positive impact on resilience to climate change, by reducing the need for abstraction.
Human Health and Social Wellbeing	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	In operation, the improved continuity of supply, including the provision of an additional 0.10 MI/d, is expected to have a neutral positive effect to improve economic and social wellbeing in local communities. There is no construction associated with this option.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism and recreation.

Socio-Economics	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	This option would not negatively impact on human health. This option is expected to result in a yield of 0.10MI/d which is considered to be a neutral effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	+	The communication campaign will advertise and promote the efficient use of water. This is anticipated to be minor positive effect on material assets.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name
HH_E_021 - Innovative water saving devices 1 - Installation of flow regulators in supply pipes
Option Description
<p>Use of sub-contract programmes of installation following successful programmes in SWW in the Collifrod and Roadford supply areas. Proven process with good feedback from customers.</p> <p>The programme should be trialled in the Bristol supply area in AMP7 to understand the effect of differences between Bristol and the SWW supply areas implemented so far. Many water companies are now making use of these devices although they are not shown as a specific type of intervention.</p>
Yield
8.98MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to have a minor beneficial effect on resource levels by saving 8.98 MI/d by 2050.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	-	0	This option involves household visits which would involve the use of vehicles which can contribute to reducing the local air quality. A cumulative total of approximately 176,000km vehicle movements would be required for the period of the plan. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	0	0	This option involves installation of flow regulators on supply pipes. There are emissions from embodied carbon associated with water saving devices. A total of 2,750 devices/year are expected to be installed as part of this option. This would have a moderate negative effect on GHG emissions (2,932tCO2 cumulative carbon over the planning period).
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option would provide an additional 8.98MI/d of water resource which would have a minor positive effect on increasing the resilience to climate change effects.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	There is no CAPEX associated with this option therefore it is assumed there will be no benefits associated with construction-related employment. In operation, the improved continuity of supply, including the provision of an additional 8.98 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option is not expected to have a noticeable effect on tourism and recreation.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. However, once implemented, the option would provide an additional 8.98 MI/d which has a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	There would be an increase in resource use associated with this option, including for installation of water efficient devices (2,750/year) and construction waste along with fuel usage for vehicles (175,700km cumulative vehicle movements). Consequently, a minor negative effect on resources and waste is identified during construction. This option is for demand reduction and promotes water efficiency. Operational energy savings associated with the reduced treatment and pumping of water are likely to result in a positive benefit however this is considered to be negligible.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option is not expected to have an effect on historic designations and heritage.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option is not expected to have an effect on visual, town, or landscape amenity.

Option Name

HH_E_022 Innovative Water Saving Devices 2 - Installation of flow regulators with meter installation

Option Description

By the start of AMP8, Bristol Water must still install meters at 15% of households to reach 90% penetration whatever type of meter is to be used, this offers a lower cost means of installing flow regulators during the same installation visits. This process also needs to be trialled in AMP7 to work out the best means to ensure the same level of acceptability for customers.

Yield

21.63MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 21.63 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option involves installing flow regulators during Bristol Water's usual meter installations. Therefore, no additional vehicle movements are associated with this option over and above the normal daily operations.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	---	0	0	0	This option involves the installation of flow regulators. There are emissions from embodied carbon associated with the flow regulators . A total of 11,000 devices are expected to be installed as part of this option. The embedded carbon is estimated at 8,300 tCO2 which would have a major negative effect on GHG emissions.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect in improving resilience to climate change from a reduction in demand and provision of up to 21.63 MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	<p>There is no additional CAPEX associated with this option as the installation of the flow regulators will be carried out during meter installations as part of the daily operational activities. Therefore, there is considered to be no effect on employment opportunities.</p> <p>In operation, the improved continuity of supply, including the provision of an additional 21.63 MI/d, is expected to have a moderate positive effect on improving economic and social wellbeing in local communities.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>This option is not expected to have a noticeable effect on tourism and recreation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	<p>The will be no additional impact of any noise/vibration disturbance or nuisance resulting from installation and the transportation of equipment/material over and above Bristol Water's usual activities. Consequently, this option has been assessed as having a neutral effect on health and wellbeing.</p> <p>This option is expected to reduce demand for water and result in a yield of 21.63 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	<p>There would be an increase in resource use associated with this option, including for installation of flow regulators (11,000 devices). There will be no additional fuel usage as the installations would occur alongside usual metering activities. Consequently, a minor negative effect on resource efficiency and waste minimisation is identified.</p> <p>The option promotes water efficiency. Operational energy savings associated with the reduced treatment and pumping of water are likely to result in a positive benefit however this is considered to be negligible.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>This option is not expected to have an effect on historic designations and heritage.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	<p>This option is not expected to have an effect on visual, town, or landscape amenity.</p>

HH_E_023 Innovative water saving devices 3 - Combining installation with home efficiency visits

Option Description

This is the most comprehensive approach to reducing individual household usage but also the most expensive and so needs to be targeted towards higher usage customers as much as possible, the right-hand site of the distribution.
This is a more proven approach and does not depend to the same extent on the need for a trial during AMP7.

Yield

0.2MI/d

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Effect Description	
		Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)		
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	No construction or new infrastructure is required. This option is not expected to have an effect on the conservation of designated sites as changes would be carried out within customers' property.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option is not expected to have an effect on NCA or BNG.
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on Priority Habitats.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option is not expected to have an effect on soils, geomorphology or geodiversity.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 0.2 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in any effects on Water Framework Directive (WFD) waterbody status (or potential).
Air Quality	4.1	To protect and enhance air quality	0	0	-	0	This option involves household visits to install water saving devices and undertake home efficiency visits. This would involve the use of vehicles which can contribute to reducing the local air quality. A total of 149,865 km vehicle movements is estimated over the 25-year implementation period. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area, the effect on air quality is anticipated to be minor. The significance will reduce to neutral if electric vehicles are used.

Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	--	0	0	0	<p>This option involves installing water efficient devices. There are emissions from embodied carbon associated with the water saving devices. A total of 2,750 devices are expected to be installed per year which is equivalent to 1,554tCO₂ of embedded carbon. This would have a moderate negative effect on GHG emissions.</p> <p>In operation, there are GHG emissions associated with the use of vehicles and total operational carbon emissions are estimated to increase by 22 tCO₂ over the 25 year period which results in a neutral effect on this objective.</p>
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	<p>This option is expected to have a minor positive effect on improving resilience to climate change from a reduction in demand and provision of up to 0.2 MI/d additional resource.</p>
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	0	<p>There are no CAPEX costs associated with this option therefore there is no anticipated effects on construction-related employment.</p> <p>In operation, the improved continuity of supply, including the provision of an additional 0.2 MI/d, is expected to have a neutral positive effect on improving economic and social wellbeing in local communities.</p>
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	<p>This option is not expected to have a noticeable effect on tourism and recreation.</p>
	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	<p>The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. However, this option is expected to reduce demand for water and result in a yield of 0.2 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a neutral positive effect on human health and wellbeing.</p>
Material Assets	7.1	To promote the efficient use of resources and minimise waste	-	0	0	0	<p>There would be an increase in resource use associated with this option, including for installation of water efficient devices (2750/year) and construction waste along with fuel usage for vehicles (149,865 km / 25 years). Consequently, a minor negative effect on resources and waste is identified.</p>
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	<p>This option is not expected to have an effect on historic designations and heritage.</p>
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	<p>This option is not expected to have an effect on visual, town, or landscape amenity.</p>

Option Name
No reduction (D001-D010)
Option Description
No reduction - Looks at the ALC maintenance only of start leakage
Yield
0.0 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would not result in either a reduction or an enhancement in natural capital assets.
	1.3	To protect priority habitats and species	0	0	0	0	This option would not result in impacts, adverse or beneficial, to priority habitats or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option would not result in changes to the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not require the use of any land above or below the current baseline.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option would not result in changes to the quality of surface waters or groundwaters.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	0	This option is not expected to reduce the demand for water resources. This will have a neutral positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option does not involve construction, and maintenance of all infrastructure will be sub-surface. Therefore, this option would neither cause, exacerbate or reduce flood likelihood or severity.
	3.4	To meet WFD objectives	0	0	0	0	This option would not directly result in changes to the WFD status of any waterbody.
Air Quality	4.1	To protect and enhance air quality	0	0	0	0	This option does not involve construction and is not expected to increase vehicle movements above the existing baseline.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	---	0	There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be 18,312tCO ₂ e over the 25 year period which results in a major effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	0	This option is expected to have a neutral positive effect to improve resilience to climate change with the reduction in demand and provision of 0.0MI/d additional resource.
Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	0	0	++	This option involves a 'high' average yearly expenditure (£24 million undiscounted CAPEX) which has been assessed as having a moderate positive effect for construction through creation of jobs. In operation, the option does not improve continuity of supply and is expected to have a neutral positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any impacts to recreational or tourism assets.

	6.3	To protect and enhance the human health and wellbeing	0	0	0	0	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	There will be no operational savings from the reduced treatment and pumping of water (energy and chemical usage). These have not been quantified but are anticipated to be neutral positive.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore heritage assets will not be impacted.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	No new surface infrastructure or construction is involved in this option, therefore landscape assets will not be impacted.

Option Name
Linear 50 (D001-D010)
Option Description
Targets 50% reduction by 2050, allowed to choose whether to do Smart Metering, note that this also meets fast/front loaded targets of 30% by 2030
Yield
9.89 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystems services
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 9.89 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	+/?	This option would not directly result in changes to the WFD status of any waterbody. By reducing demand and leakage, it may indirectly result in less water being abstracted from watercourses, aiding achievement of WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	-/?	0	The option is likely to result in a small increase in vehicle movements from increased leakage reduction. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	---	0	There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be more than 20,000tCO2e over the 25 year period which results in a major effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 9.89MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	++	This option involves a high average yearly expenditure (£18,300,000 undiscounted CAPEX average over 25years) which has been assessed as having a moderate effect for construction through creation of jobs. In operation, the improved continuity of supply and efficiency through increasing metering and reducing leakage, including the provision of an additional 9.89 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 9.89 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency through metering. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

Option Name
Linear 50 by 2045 (D001-D010)
Option Description
Targets 50% reduction by 2045, allowed to choose whether to do Smart Metering, note that this also meets fast/front loaded targets of 30% by 2030
Yield
9.89 MI/d

SEA Topic	SEA Objective		Construction Effects		Operational Effects		Effect Description
			Construction (negative)	Construction (positive)	Operational (negative)	Operational (positive)	
Biodiversity, Flora and Fauna	1.1	To protect and enhance sites that are designated, both nationally and internationally, for their conservation value	0	0	0	0	This option would not result in any effects on designated or non-designated sites.
	1.2	To avoid a reduction, and contribute to an enhancement where possible, in natural capital assets, and to provide opportunities for biodiversity net gain, where possible	0	0	0	0	This option would have no effect on natural capital, biodiversity net gain or ecosystems services
	1.3	To protect priority habitats and species	0	0	0	0	This option is not expected to have an effect on priority habitats and/or species.
	1.4	To reduce the spread of invasive, non-native species	0	0	0	0	This option is not expected to have an effect on the spread of INNS.
Soil, Geology and Land Use	2.1	To ensure the appropriate and efficient use of land and protect and enhance local geomorphology, soil quality and geodiversity	0	0	0	0	This option would not result in any effects on soils or land use.
Water	3.1	To protect and improve the quality of surface water and groundwaters	0	0	0	0	This option is not expected to have an impact on the quality of surface water or groundwater.
	3.2	To protect flows and resource levels of surface waters and groundwaters	0	0	0	+	This option is expected to reduce the demand for water resources by saving 9.89 MI/d. This will have a minor positive effect on resource levels by reducing the need for abstraction.
	3.3	To reduce or manage flood risk whilst accounting for climate change	0	0	0	0	This option is not expected to have an impact on flood risk.
	3.4	To meet WFD objectives	0	0	0	+/?	This option would not directly result in changes to the WFD status of any waterbody. By reducing demand and leakage, it may indirectly result in less water being abstracted from watercourses, aiding achievement of WFD objectives.
Air Quality	4.1	To protect and enhance air quality	0	0	-/?	0	The option is likely to result in a small increase in vehicle movements from increased leakage reduction. The significance of effect will depend on the type of vehicles utilised (petrol/electric). Assuming at the start of implementation vehicles will be petrol, the impact on air quality is anticipated to be minor as the scale of vehicle movements are not expected to cause significant effects on air quality, given the geographic extent of the Bristol Water supply area and assuming vehicles are dispersed across the area. The significance will reduce to neutral if electric vehicles are used.
Climate Change	5.1	To minimise greenhouse gas emissions and embodied carbon	0	0	---	0	There are GHG emissions associated with the use of vehicles and total carbon emissions are estimated to be more than 20,000 tCO2e over the 25 year period which results in a major effect on this objective.
	5.2	To adapt and improve resilience to the threats of climate change	0	0	0	+	This option is expected to have a minor positive effect to improve resilience to climate change from a reduction in demand and provision of up to 9.89MI/d additional resource.

Human Health and Socio-Economics	6.1	To promote a sustainable economy and maintain the economic and social wellbeing of local communities	0	++	0	++	This option involves a high average yearly expenditure (£17,800,000 undiscounted CAPEX average over 25years) which has been assessed as having a moderate effect for construction through creation of jobs. In operation, the improved continuity of supply and efficiency through increasing metering and reducing leakage, including the provision of an additional 9.89 MI/d, is expected to have a moderate positive effect to improve economic and social wellbeing in local communities.
	6.2	To maintain and enhance tourism and recreation	0	0	0	0	This option would not result in any effects on existing recreational facilities and/or tourism.
	6.3	To protect and enhance the human health and wellbeing	0	0	0	++	The cumulative impact of any noise/vibration disturbance and nuisance resulting from installation and the transportation of equipment/material are not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having neutral effect on this objective. This option is expected to reduce demand for water and result in a yield of 9.89 MI/d. This would help to ensure continuity of supply of safe and secure drinking water and would have a moderate positive effect on human health and wellbeing.
Material Assets	7.1	To promote the efficient use of resources and minimise waste	0	0	0	0	This option is for demand reduction and promotes water efficiency through metering. There will be operational savings from the reduced treatment and pumping of water (e.g. chemical usage). These have not been quantified but are anticipated to be neutral.
Cultural Heritage	8.1	To conserve and enhance the significance of designated and non-designated heritage assets and their settings, including archaeologically important sites	0	0	0	0	This option will have no effect on cultural heritage assets or archaeology.
Landscape & Visual Amenity	9.1	To conserve and enhance landscape and townscape character and visual amenity	0	0	0	0	This option will not directly result in any effects on the local landscape or townscape.

A5 Appendix 5 Quality Assurance Checklist

ODPM Guidance³ on SEA contains a Quality Assurance checklist to help ensure that the requirements of the SEA Regulations are met. The checklist is reproduced in Table A-12, indicating where this Environmental Report meets the requirements.

Table A-13: SEA Directive Quality Assurance Checklist

Checklist Item	Comments
Objectives and Context	
The plan's or programme's purpose and objectives are made clear	The purpose and the aims of the dWRMP24 are set out in Section 1 of this Environmental Report
Environmental issues and constraints, including international and EC environmental protection objectives, are considered in developing objectives and targets	Key Environmental Issues were identified in the SEA Scoping Report and can be found in Table 4-1. International and European environmental protection objectives have been considered as part of the review of plans, programmes and policies, which are displayed in Appendix 2.
SEA objectives, where used, are clearly set out and linked to indicators and targets where appropriate.	SEA objectives and how they link to indicators and targets are set out in Section 5 and shown in Table 5-1.
Links with other related plans, programmes and policies are identified and explained.	Links are identified Appendix 2 of this Environmental Report.
Scoping	
Consultation bodies are consulted in appropriate ways and at appropriate times on the content and scope of the Environmental Report.	The Scoping Report was a part of the consultation process required to meet the requirements of the SEA Directive and was circulated to consultees. Further consultation has been undertaken on the Environmental Report and dWRMP24. The consultation process is described in Section 0
The assessment focuses on significant issues.	The scope of the assessment reflects the geographic extent of Bristol Water supply area and provides a comprehensive approach to assessment (reflecting the large number of interactions dependent on the continued supply of water) which has enabled the subsequent assessment to determine which effects are considered significant. The SEA Scoping Report identified key environmental issues for every SEA topic. These are shown in Table 4-1.
Technical, procedural and other difficulties encountered are discussed, assumptions and uncertainties are made explicit.	Assumptions made and limitations of the data are stated in Section 4.3.
Reasons are given for eliminating issues from further consideration.	The SEA objectives provide a comprehensive basis for assessment and no issues were eliminated at scoping stage.
Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	The appraisal framework, was used to assess WRMP24 options, alternative programmes (combinations of options) and the plan. This is set

Checklist Item	Comments
	out in sections as set out in Sections 6, 7 and 8 of this Environmental Report.
Alternatives include 'do minimum' and/or 'business as usual' scenarios wherever relevant.	A 'do nothing' scenario has not been considered and the reasoning for this is explained in Section 4.1. Assessment of alternatives has been considered in Section 6, 7 and 8 of the Environmental Report.
The environmental effects (both adverse and beneficial) of each alternative are identified and compared.	Assessment of alternatives has been considered in Section 6, 7 and 8 of the Environmental Report.
Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained.	Assessment of alternatives has been considered in Section 6, 7 and 8 of the Environmental Report.
Reasons are given for selection or elimination of alternatives.	Assessment of alternatives and reasons for selection are provided in has been considered in Section 7 of the Environmental Report.
Baseline information	
Relevant aspects of the current state of the environment and their likely evolution without the plan or programme are described.	The current state of the environment and predicted future baseline is set out in Section 4 and Appendix 3 of this Environmental Report for each SEA topic.
Environmental characteristics of areas likely to be significantly affected are described, including areas wider than the physical boundary of the plan area where it is likely to be affected by the plan.	Environmental characteristics of areas likely to be affected are described in Section 4 and Appendix 3,
Difficulties such as deficiencies in information or methods are explained.	Limitations of the data used is described in Section 4.3.
Prediction and evaluation of likely significant environmental effects	
Effects identified include the types listed in the Directive (biodiversity, population, human health, fauna, flora, soil, water, air, climate factors, material assets, cultural heritage and landscape), as relevant, other likely environmental effects are also covered, as appropriate.	Potential effects for each of the topics have been considered within the assessment in Environmental Report. The assessment framework is described in Table 5-2. Environmental effects for each option that align to the types listed in the Directive are described in the individual option SEA tables contained in Appendix 4 and summarised in Sections 6 and 7 of the Environmental Report. .
Both positive and negative effects are considered, and the duration of effects (short, medium or long-term) is addressed.	Positive and negative effects, along with their durations, are assessed within each SEA table, contained in Appendix 4.
Likely secondary, cumulative and synergistic effects are identified where practicable.	Secondary, cumulative and synergistic effects are described in Section 7 and 8 of the Environmental Report.
Inter-relationships between effects are considered where practicable.	These effects have been identified in the Environmental Report using an appraisal framework included in Section 5 of this Environmental Report. These effects have been identified and described in the Environmental Report, in Sections 6,7 and 8. Interactions between objectives are also described in Section 5.2.

Checklist Item	Comments
The prediction and evaluation of effects makes use of relevant accepted standards, regulations, and thresholds.	Relevant standards have been used where appropriate in undertaking the assessment in the Environmental Report.
Methods used to evaluate the effects are described.	The Environmental Report includes information on the Methods used for evaluation of potential effects are described in Sections 6,7 and 8.
Mitigation measures	
Measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the plan or programme are indicated.	Mitigation measures for potential negative effects have been incorporated into the assessment undertaken in preparing the Environmental Report. Mitigation is discussed in in Section 9.
Issues to be taken into account in project consents are identified.	Such mitigating measures, if required, are discussed in Section 9.
The Environmental Report	
Is clear and concise in its layout and presentation.	The Environmental Report is clear and concise.
Uses simple, clear language and avoids or explains technical terms.	The Environmental Report uses simple, clear language, and explains technical terms, as appropriate. The Non-Technical Summary to this Environmental Report is available to read as a separate document.
Uses maps and other illustrations where appropriate.	The Environmental Report uses maps and illustrations where appropriate
Explains the methodology used.	The SEA methodology is clearly described in Section 1.
Explains who was consulted and what methods of consultation were used.	The consultation strategy, including organisations and dates of consultation, is included in the Environmental Report – see Section 1.7.
Identifies sources of information, including expert judgement and matters of opinion.	Sources of information are detailed in the Environmental Report.
Contains a non-technical summary covering the overall approach to the SEA, the objectives of the plan, the mains options considered, and any changes to the plan resulting from the SEA.	A Non-Technical summary of this Environmental Report has been written and is available to view as a separate document.
Consultation	
The SEA is consulted on as an integral part of the plan-making process.	The Scoping Report was consulted on, and this Environmental Report will be part of the consultation process required to meet the requirements of the SEA Directive and will be circulated to consultees (alongside the draft plan). The consultation process is described in Section 1.7.
Consultation Bodies and the public likely to be affected by, or having an interest in, the plan or programme are consulted in ways and at times which give them an early and effective opportunity within appropriate timeframes to express their options on the draft plan and Environmental Report.	The consultation process is described in Section 0. Consultation responses for the Scoping Report, alongside the changes that have been to the Environmental Report as a result of them, are available to view in Appendix 1. This Environmental Report is a part of the consultation process required to meet the

Checklist Item	Comments
	requirements of the SEA Directive and will be circulated to consultees (alongside the draft plan). The consultation process is described in Section 1.7.
Decision-making and information on the decision	
The environmental report and the opinions of those consulted are taken into account in finalising and adopting the plan or programme.	Responses from consultation on the draft Environmental Report will be incorporated into the final Environmental Report. After finalisation of the plan, a statement will be published describing how the SEA and the responses to consultation have been considered during the preparation of the plan (see Section 1.7 and 10 of this Environmental Report).
An explanation is given of how they have been taken into account.	Responses from consultation on the draft Environmental Report will be incorporated into the final Environmental Report. After finalisation of the plan, a statement will be published describing how the SEA and the responses to consultation have been considered during the preparation of the plan (see Section 1.7 and 10 of this Environmental Report). Appendix 1 provides an overview of consultation responses received on the Scoping Report and how we have responded to them in the preparation of this Environmental Report.
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	Details on the assessment of the alternative programmes and the role of SEA in developing the preferred programme is set out in Section 7 of this Environmental Report.
Monitoring measures	
Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	Monitoring proposals are described in Section 9 of this Environmental Report.
Monitoring is used, where appropriate, during implementation of the plan or programme to make good deficiencies in baseline information in the SEA.	The suggestions for monitoring have been made in this Environmental Report, with monitoring taking place following implementation of the plan, further to consultation with regulatory authorities.
Monitoring enables unforeseen adverse effects to be identified at an early stage. (These effects may include predictions which prove to be incorrect).	The suggestions for monitoring have been made in this Environmental Report, with monitoring taking place following implementation of the plan, further to consultation with regulatory authorities.
Proposals are made for action in response to significant adverse effects.	Mitigation measures for adverse effects are discussed in Section 9 of this Environmental Report.



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